

**Bachelor of Computer Applications (BCA)
2022-23 & 2023-24 Sessions**

Third Semester

Course Code	Course Type	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
			L	T	P	External	Internal		
BCA-301	CC	Operating System	5	1	0	75	25	100	6
BCA-302	GE-II	GE-II	3	1	0	75	25	100	4
BCA-303	CC	Object Oriented Programming using 'C++'	3	1	0	75	25	100	4
BCA-303(P)		Software Lab – V	0	0	4	50	--	50	2
BCA-304	CC	Data Structures	3	1	0	75	25	100	4
BCA-304(P)		Software Lab – VI	0	0	4	50	--	50	2
		Total	14	4	8	400	100	500	22

***General Elective-II:**

1	BCA-302 E1	Cyber Ethics
2	BCA-302 E2	E-Commerce Technologies
3	BCA-302 E3	Fundamentals of Accounting

The breakup of marks for the continuous assessment for theory paper will be as under

i	Two tests will be conducted during the semester. Both the tests will be considered for assessment.	:	50% of the marks allotted for continuous assessment
ii	Assignment / Presentations	:	20% of the marks allotted for continuous assessment
iii	Class participation & behaviour	:	10% of the marks allotted for continuous assessment
iv	Attendance	:	20% of the marks allotted for continuous assessment

Mr.Mukesh Kumar Dr. Raman Maini Dr.Sarabjeet Singh Dr.Rajan Manro

Mr. Sandeep Sharma Mr. Parduman Singh Dr. Navdeep Singh Dr. Harjeet Singh

Mr. Devinder Singh Ms. HarsimratDeo Ms. RituWalia Ms. Devinder Kaur

Ms. Taranpreet Kaur Dr. Sangeeta Joshi Mr. Birinder Singh Sarao Ms. Manpreet Kaur Mr.Joga Singh

Bachelor of Computer Applications (BCA)
2022-23 & 2023-24 Sessions

Fourth Semester

Course Code	Course Type	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
			L	T	P	External	Internal		
BCA-401	CC	Computer Networks	5	1	0	75	25	100	6
BCA-402	DSE	DSE - I	5	1	0	75	25	100	6
BCA-403	CC	Relational Database Management System	3	1	0	75	25	100	4
BCA-403(P)		Software Lab – VII	0	0	4	50	--	50	2
BCA-404	CC	Artificial Intelligence	3	1	0	75	25	100	4
BCA-404(P)		Software Lab – VIII	0	0	4	50	--	50	2
DA-4001		Drug Abuse (Q)				35	15	50	
		Total	16	4	8	400	100	500	24

*** Discipline Specific Elective-I:**

1	BCA-402 DSE1	System Software
2	BCA-402 DSE2	Cloud Computing

The breakup of marks for the continuous assessment for theory paper will be as under

i	Two tests will be conducted during the semester. Both the tests will be considered for assessment.	:	50% of the marks allotted for continuous assessment
ii	Assignment / Presentations	:	20% of the marks allotted for continuous assessment
iii	Attendance, Class participation & behaviour	:	10% of the marks allotted for continuous assessment
iv	Attendance	:	20% of the marks allotted for continuous assessment

Mr.Mukesh Kumar Dr. Raman Maini Dr.Sarabjeet Singh Dr.Rajan Manro

Mr. Sandeep Sharma Mr. Parduman Singh Dr. Navdeep Singh Dr. Harjeet Singh

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Ms. Taranpreet Kaur Dr. Sangeeta Joshi Mr. Birinder Singh Sarao Ms. Manpreet Kaur Mr.Joga Singh

Semester III

Course Code:BCA-301

Board of Studies held on 5/05/2023

COURSE NAME:Operating System**Max Marks: 100****Maximum Time: 3 Hrs.****External Examination: 75****Internal Assessment: 25****Min Pass Marks: 35%****Lectures to be delivered: 45-55 Hrs.****Objectives of the Subject:**

- To learn the fundamentals of Operating Systems.
- To learn the mechanisms involved in memory management in contemporary OS
- To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols System Software.

Course Outcome: After Completion of the course the students will be able to:

- Describe the role of operating system in the management of various computer resources.
- Understand the process management policies and scheduling of processes by CPU.
- Evaluate the requirement for process synchronization and coordination handled by operating system.
- Describe and analyze the memory management and its allocation policies.
- Identify use and evaluate the storage management policies with respect to different storage management technologies.

(A) INSTRUCTIONS FOR THE PAPERSETTER

The question paper will consist of three sections UNIT-I, UNIT-II, and UNIT-III, Each of UNIT-I and UNIT-II will have four questions from the respective Units of the syllabus and each question will carry 12 marks. UNIT-III will have 9 short answer type questions which will cover the entire syllabus uniformly and will carry 3 marks in all.

(B) INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from UNIT-I and UNIT-II. UNIT-III is Compulsory.

Unit I**Operating System** – Definition, Need, Services

Types of operating systems: simple batch system, multiprogramming, time sharing system, parallel system, distributed system, real time system. Operating system services, system calls.

Process Management – process definition, process states, process states transition diagram, process scheduling. Basic concepts of thread, Difference between process and thread.

CPU Scheduling – Basic concepts, scheduling criteria, scheduling algorithms – FCFS, SJF, Round Robin, Priority and Multilevel queue scheduling, Multilevel feedback queue scheduling.

Unit II

Deadlocks – Characteristics of deadlocks, methods for handling deadlocks, deadlock prevention, deadlock Avoidance, deadlock detection and recovery.

Memory Management – Logical versus Physical address space, swapping, contiguous allocation, Paging, Concept of Virtual memory, Implementation by Demand Paging, Page replacement algorithms – FIFO, Optimal, LRU, Concept of thrashing.

File Management – Allocation methods: contiguous allocation, linked allocation and indexed allocation;

Device Management – Disk Scheduling: FCFS, SSTF, SCAN, C-SCAN, LOOK.

Text Books:

1. Abraham Silberschatz, Peter B. Galvin, Operating System Concepts, Addison –Wesley Publishing Co. Engineering, Third Edition 2005 ,PankajJalote, Narosa Publications. 5th Edition.

2. Andrew S. Tanenbaum, “Modern Operating Systems”, Prentice Hall of India Pvt. Ltd.

Reference Books:

1. William Stallings, “Operating System”, Prentice Hall of India.

Board of Studies held on 5/05/2023

2. Pramod Chandra P. Bhatt – “An Introduction to Operating Systems, Concepts and Practice, PHI.
3. Harvey M. Deitel, “Operating Systems”, Pearson Education Pvt. Ltd.

Teaching Plan:

Week	Content
1-2	Operating System – Definition, Need, Services, Types of operating systems: simple batch system, multiprogramming, time sharing system, parallel system, distributed system, real time system. Operating system services, system calls.
3-4	Process Management – process definition, process states, process states transition diagram, process scheduling. Basic concepts of thread, Difference between process and thread.
5-6	CPU Scheduling – Basic concepts, scheduling criteria, scheduling algorithms – FCFS, SJF, Round Robin, Priority and Multilevel queue scheduling, Multilevel feedback queue scheduling.
7-8	Deadlocks – Characteristics of deadlocks, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection and recovery.
9-10	Management – Logical versus Physical address space, swapping, contiguous allocation, Paging, Concept of Virtual memory, Implementation by Demand Paging, Page replacement algorithms – FIFO, Optimal, LRU, Concept of thrashing.
11-12	File Management – Allocation methods: contiguous allocation, linked allocation and indexed allocation;
13-14	Device Management – Disk Scheduling: FCFS, SSTF, SCAN, C-SCAN, LOOK.

Semester III**Course Code:BCA-302 E1****COURSE NAME: Cyber Ethics****Max Marks: 100****Maximum Time: 3 Hrs.****External Examination: 75****Internal Assessment: 25****Min Pass Marks: 35%****Lectures to be delivered: 45-55 Hrs.****Objectives of the Subject:**

- To learn foundations of Cyber Security and Ethical Hacking
- To learn various types of malware.
- To understand the concepts of Cyber law.

Course Outcome: After Completion of the course the students will be able to:

- Understand, appreciate, employ, design and implement appropriate security technologies and policies to protect computers and digital information.
- Identify & Evaluate Information Security threats and vulnerabilities in Information Systems and apply security measures to real time scenarios.
- Demonstrate the use of standards and cyber laws to enhance information security in the development process and infrastructure protection.

(A) INSTRUCTIONS FOR THE PAPERSETTER

The question paper will consist of three sections UNIT-I, UNIT-II, and UNIT-III, Each of UNIT-I and UNIT-II will have four questions from the respective Units of the syllabus and each question will carry 12 marks. UNIT-III will have 9 short answer type questions which will cover the entire syllabus uniformly and will carry 3 marks in all.

(B) INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from UNIT-I and UNIT-II. UNIT-III is Compulsory.

UNIT-I

Essential Terminologies: CIA, Risks, Breaches, Threats, Attacks, Exploits. Information Gathering (Social Engineering, Foot Printing & Scanning). Open Source/ Free/ Trial Tools: nmap, zenmap, Port Scanners, Network scanners

Malware: Explanation of Malware, Types of Malware: Virus, Worms, Trojans, Rootkits, Robots, Adware's, Spywares, Ransom wares, Zombies etc., OS Hardening (Process Management, Memory Management, Task Management, Windows Registry/ services another configuration), Malware Analysis. Open Source/ Free/ Trial Tools: Antivirus Protection, Anti Spywares, System tuning tools, Anti Phishing.

UNIT-II

Cyber Law: Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, National Cyber Security Policy 2013. Introduction to Cyber Forensics, Need of Cyber Forensics, Cyber Evidence, Documentation and Management of Crime Scene, Image Capturing and its importance, Web Attack Investigations, Denial of Service Investigations, Internet Crime Investigations, Internet Forensics, Steps for Investigating Internet Crime, Email Crime Investigations.

Introduction to Ethical Hacking : LINUX and Networking, Doxing, Website/ IP information Gathering, Network Mapping, Google Hacking, Discovering IP Range and Open Port, Identifying Target Operating System and Services, Secure Bypassing Firewalls while Scanning, Understanding Wireless Networks, Deauthentication attack, Fragmentation Attacks, Chop Chop attack, Fake authentication, hacking techniques, Cracking Wireless Passwords using Rainbow tables, cms-explorer for CMS Hacking and Pentesting, Websploit, SET, Fast-Track SQL Pwnage, Winautopwn for various System

Text Book:

1. Bothra Harsh, "Hacking", Khanna Publishing House, Delhi.
2. Network Security and Ethical Hacking, Rajat Khare , Luniver Press.

References:

1. Gupta Sarika, "Information and Cyber Security", Khanna Publishing House, Delhi
2. Ethical Hacking, Thomas Mathew ,OSB Publisher.

Teaching Plan:

Week	Content
1-2	Essential Terminologies: CIA, Risks, Breaches, Threats, Attacks, Exploits. Information Gathering (Social Engineering, Foot Printing & Scanning).Open Source/ Free/ Trial Tools: nmap, zenmap, Port Scanners, Network scanners
3-4	Malware: Explanation of Malware, Types of Malware: Virus, Worms, Trojans, Rootkits, Robots, Adware's, Spywares, Ransom wares, Zombies etc., OS Hardening (Process Management, Memory Management, Task Management, Windows Registry/ services another configuration), Malware Analysis.Open Source/ Free/ Trial Tools: Antivirus Protection, Anti Spywares, System tuning tools, Anti Phishing.
5-6	Cyber Law: Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, National Cyber Security Policy 2013.
7-8	Introduction to Cyber Forensics, Need of Cyber Forensics, Cyber Evidence, Documentation and Management of Crime Sense, Image Capturing and its importance, Partial Volume Image, Web Attack Investigations, Denial of Service Investigations, Internet Crime Investigations, Internet Forensics, Steps for Investigating Internet Crime, Email Crime Investigations.
9-10	Introduction to Ethical Hacking : LINUX and Networking,Doxing,Website/ IP information Gathering,Network Mapping Google Hacking, Discovering IP Range and Open Port, Identifying Target Operating System and Services,Secure Bypassing Firewalls while Scanning,
11-12	Understanding Wireless Networks, Deauthentication attack,Fragmentation Attacks, Chop Chop attack, Fake authentication ,Evil Twin Attack, Cafe-latte attack,Reveal Hidden SSID's, WPA and WPA2 wireless password,hacking techniques,Cracking Wireless Passwords using Rainbow tables, Brute force techniques. Wordpress-scan , Drupal scan, Joomscan, cms-explorer for CMS Hacking and Pentesting,Websploit, SET, Fast-Track SQL Pwnage, Winautopwn for various System

Semester III**Course Code:BCA-302 E2****COURSE NAME: E-Commerce Technologies****Max Marks: 100****Maximum Time: 3 Hrs.****External Examination: 75****Internal Assessment: 25****Min Pass Marks: 35%****Lectures to be delivered: 45-55 Hrs.****Objectives of the Subject:**

- Require general understanding of basic business management concepts.
- Describe Internet trading relationship.
- Discuss legal issues and privacy

Course Outcome: After Completion of the subject student should able to understand

- The basic concepts and technologies used in the field of management information systems
- Have the knowledge of the different types of management information systems; • Understand the processes of developing and implementing information systems
- Be aware of the ethical, social, and security issues of information systems

(A) INSTRUCTION FOR THE PAPER SETTER

The question paper will consist of three Units. Unit I and II will have four questions from the respective sections of the syllabus and each question carry 12 marks. Unit-III will have 9 short answer type questions which will cover the entire syllabus uniformly and will carry 3 marks each.

(B) INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from unit I and II and the entire unit III.

UNIT-I

Introduction to E-commerce: Definition of E-commerce, Advantages and disadvantages of E-commerce, Ecommerce versus traditional commerce. Internet and WWW, Electronic commerce framework, Electronic commerce and media convergence, The anatomy of E-commerce applications. Architectural framework for E-commerce, World Wide Web as the architecture, Web background: Hypertext publishing, Security and the Web.

Consumer-oriented E-commerce: Consumer-oriented applications, Mercantile Process Models – consumer's perspective, Merchant's perspective.

UNIT-II

Advertising and Marketing on the Internet: The new age information based marketing, Advertising on the Internet – Active or push-based advertising models, Passive or pull-based advertising models. Guidelines for Internet advertising. Online marketing process.

Introduction to Mobile-commerce: Types of Electronic Payment Systems, Digital token-based electronic payment systems, Smart cards and electronic payment systems, Credit card-based electronic payment systems, Risk and electronic payment systems. Electronic Data Interchange and its applications in business. Legal, Ethical and other public policy issues related to e-commerce.

Text Book:

1. Ravi Kalakota, Andrew B. Whinston: Frontiers of Electronic Commerce, Addison Wesley.

References:

1. Efraim Turbon, Jae Le, David King, Chung: Electronic Commerce- A managerial perspective, Prentice-Hall International.
2. Gary P. Schneider, James T. Perry: Electronic Commerce

Teaching Plan:

Week	Content
1-2	Introduction to E-commerce: Definition of E-commerce, Advantages and disadvantages of E-commerce, Ecommerce versus traditional commerce. Architectural framework for E-commerce, World Wide Web as the architecture, Web background: Hypertext publishing, Security and the Web.
3-4	Internet and WWW, Electronic commerce framework, Electronic commerce and media convergence, The anatomy of E-commerce applications.
5-6	Consumer-oriented E-commerce: Consumer-oriented applications, Mercantile Process Models – consumer’s perspective, Merchant’s perspective.
7-8	Advertising and Marketing on the Internet: The new age information based marketing, Advertising on the Internet – Active or push-based advertising models.
9-10	Introduction to Mobile-commerce Types of Electronic Payment Systems, Digital token-based electronic payment systems, Smart cards and electronic payment systems,
11-12	Passive or pull-based advertising models. Guidelines for Internet advertising. Online marketing process.
13-14	Credit card-based electronic payment systems, Risk and electronic payment systems. Electronic Data Interchange and its applications in business. Legal, Ethical and other public policy issues related to e-commerce.

Semester III
Course Code:BCA-302 E3
COURSE NAME: Fundamentals of Accounting

Max Marks: 100**Maximum Time: 3 Hrs.****External Examination: 75****Internal Assessment: 25****Min Pass Marks: 35%****Lectures to be delivered: 45-55 Hrs.****Objectives of the Subject:**

This course provides an orientation in the field of accounting and basic accounting fundamentals.

Course Outcome:

After completion of this course, candidates would be able to record and post transactions in the basic accounting equation and maintain subsidiary ledgers.

(A) INSTRUCTIONS FOR THE PAPERSETTER

The question paper will consist of three sections UNIT-I, UNIT-II, and UNIT-III, Each of UNIT-I and UNIT-II will have four questions from the respective Units of the syllabus and each question will carry 12 marks. UNIT-III will have 9 short answer type questions which will cover the entire syllabus uniformly and will carry 3 marks in all.

(B) INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from UNIT-I and UNIT-II. UNIT-III is Compulsory.

UNIT-I

Basic Accounting Concepts: Background of Accounting, Introduction, importance and scope, Basic terms– Capital, Income, Expenses, Assets, Liabilities. Accounting Equation, Double Entry System, Accounting Cycle. Accounting Concepts and Conventions, Generally Accepted Accounting Principles. Types of Accounts and their rules, Journal and recording of entries in Journal with narration; Ledger –Posting from Journal to respective ledger accounts. Basic concepts of purchase book, sales book and cashbook.

UNIT-II

Trial Balance: Need and objectives; Application of Trial Balance; different types of errors, Trial Balance preparation. Final Accounts: Terms related to Final Accounts, Final Accounts without adjustments. Bank Reconciliation Statement: Bank transactions, Preparation of simple Bank Reconciliation Statement. Types of Capital, Applications of computers in accounting.

Text Books:

1. Financial Accounting by Mukherjee Hanif.
2. Financial Accounting (Part I and Part II), R.L Gupta & V.K Gupta
3. Advanced Accountancy by M.A. Arulanandam & K.S.Raman
4. Fundamental Accountancy, S.N. Maheshwari

Reference Books:

1. Managerial Accounting, Jawahar Lal, First Edition
2. Financial Accounting, Dr. R.K. Mittal & M.R. Bansal
3. Basic Accounting, Rajni Sofat " Hiro, Second Edition

Teaching Plan:

Week	Content
1-2	Basic Accounting Concepts: Background of Accounting, Introduction, importance and scope, Basic terms– Capital, Income, Expenses, Assets, Liabilities.
3-4	Accounting Equation , Double Entry System, Accounting Cycle. Generally accepted accounting principles.
5-6	Types of Accounts and their rules, Journal and recording of entries in journal with narration; Ledger –Posting from Journal to respective ledger accounts. Basic concepts of purchase book, sales book and cashbook.
7-8	Trial Balance: Need and objectives; Application of Trial Balance; different types of errors escaped, trial Balance preparation.
9-10	Final Accounts: Terms related to Final Accounts, Final Accounts without adjustments.
11-12	Bank transactions , Preparation of simple bank reconciliation statement. Sources of raising the capital in corporate undertaking
13-14	working Capital and Long term Capital. Applications of computers in accounting.

Semester III**Course Code:BCA-303****COURSE NAME: Object Oriented Programming using 'C++'****Max Marks: 100****External Examination: 75****Min Pass Marks: 35%****Maximum Time: 3 Hrs.****Internal Assessment: 25****Lectures to be delivered: 45-55 Hrs.****Objectives of the Subject:**

- To understand how C++ improves C with object-oriented features
- To learn the syntax and semantics of the C++ programming language.
- To understand the concept of data abstraction and encapsulation.

Course Outcomes: On completion of this course, the student will be able to:

- Apply an object-oriented paradigm for problem solving.
- Select a suitable programming construct and in-built data structure for the given problem.
- Design, develop, document and debug modular programs.

(A) INSTRUCTION FOR THE PAPER SETTER

The question paper will consist of three Units. Unit I and II will have four questions from the respective sections of the syllabus and each question carry 12 marks. Unit-III will have 9 short answer type questions which will cover the entire syllabus uniformly and will carry 3 marks each.

(B) INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from unit I and II and the entire unit III.

UNIT-I

Introduction: Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Formatted and Console I/O, Manipulators, Storage classes.

Conditional Statements (if construct, switch case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements, Arrays.

Classes and Objects: Basics of Object Oriented Programming (OOP), Difference between C & C++, Class Declaration and Class Definition, Defining member functions, Functions returning value, Void functions, Inline Functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, inline functions, Members access control, this pointer.

Objects: Object as function arguments, array of objects, functions returning objects, Const member. Static data members and Static member functions, Friend functions and Friend classes

UNIT-II

Constructors: properties, types of constructors, Dynamic constructors, Constructor overloading.

Destructors: Properties, Virtual destructor. Destroying objects. Rules for constructors and destructors. Array of objects. Understanding a Pointer Variable, Simple use of Pointers, Dynamic memory allocation using new and delete operators, Nested and container classes, Scopes: Local, Global, Namespace and Class.

Inheritance: Defining derived classes, Types of inheritance, types of derivation- public, private, protected, function redefining, constructors in derived class, Types of base classes – abstract and virtual.

Operator overloading: rules for operator overloading binary operator, overloading unary operators, Function overloading. Polymorphism: virtual functions, late binding, pure virtual functions and abstract base class Difference between function overloading, redefining, and overriding.

Text Books:

1. E. Balaguruswamy, "Object Oriented Programming with C++", Tata McGraw's Hill.
2. Deitel & Deitel, "C++ How to Program", Pearson Education.

References:

1. Herbert Schildt, "The Complete Reference C++", Tata McGraw-Hill.
2. Robert Lafore, "Object Oriented Programming in C++", Galgotia Publications.
3. Bjarne Strastrup, "The C++ Programming Language", Addition- Wesley Publication Co.
4. E. Balagurusamy, "Object Oriented Programming with C++", Tata McGraw-Hill.
5. Anshuman Sharma, "Learn Programming in C++", Lakhanpal Publishers.

Teaching Plan:

Week	Content
1-2	Introduction: Basics of Object Oriented Programming (OOP), Difference between C & C++, Manipulators, Storage classes.
3-4	Classes and Objects: Class Declaration and Class Definition, Defining member functions, inline functions, Nesting of member functions, Members access control, this pointer
5-6	Object as function arguments, array of objects, functions returning objects, Const member. Static data members and Static member functions, Friend functions and Friend classes
7-8	Constructors: properties, types of constructors, Dynamic constructors, Constructor overloading.
9-10	Destructors: Properties, Virtual destructor. Destroying objects. Rules for constructors and destructors. Array of objects. Dynamic memory allocation using new and delete operators, Nested and container classes, Scopes: Local, Global, Namespace and Class.
11-12	Inheritance: Defining derived classes, Types of inheritance, types of derivation- public, private, protected, function redefining, constructors in derived class, Types of base classes – abstract and virtual.
13-14	Operator overloading: rules for operator overloading binary operator, overloading unary operators, Function overloading. Polymorphism: virtual functions, late binding, pure virtual functions and abstract base class Difference between function overloading, redefining, and overriding.

Semester III
Course Code:BCA-303(P)
COURSE NAME: Software Lab – V

Maximum Marks: 50

External Examination: 50

Maximum Time: 3 Hrs.

Minimum Pass Marks: 35%

Practicals sessions to be conducted: 45-55 hrs

Course Objectives:

- To learn how to design C++ classes for code reuse.
- To learn how to implement copy constructors and class member functions.
- To learn how inheritance and virtual functions implement dynamic binding with polymorphism.

Course Outcomes: On completion of this course, the student will be able to:

- Understand Object oriented approach for finding solutions to various problems with the help of C++ language.
- To understand Object oriented approach for finding Solutions to various problems with the help of C++ language.
- Create computer based solutions to various real-world problems using C++

Implement programs in C++:

1. Write a program to find the area of the rectangle using the concept of classes & objects.
2. Write a program to implement the concept of array of objects.
3. Write a program to show the use of friend functions.
4. Write a program to show the use of constructor overloading.
5. Write a program to show the use of a copy constructor.
6. Write a program to show the use of destructors.
7. Write a program to show the use of virtual function.
8. Write a program to implement the concept of multilevel inheritance.
9. Write a program to implement the concept of multiple inheritance.
10. Write a program of unary operator overloading
11. Write a program of Binary operator overloading.
12. Write a program to demonstrate how to insert and extract an object to and from data files.
13. Write a program to count the total number of account objects in a file and then display information of a particular account object.

The breakup of marks for the practical will be as under:

i.	Lab Record (Internal Assessment)	10 Marks
ii.	Viva Voce (External Evaluation)	20 Marks
iii.	Program Development and Execution(External Evaluation)	20 Marks

Semester III
Course Code:BCA-304
COURSE NAME: Data Structures

Max Marks: 100
External Examination: 75
Min Pass Marks: 35%

Maximum Time: 3 Hrs.
Internal Assessment: 25
Lectures to be delivered: 45-55 Hrs.

Objectives of the Subject:

- To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures
- To understand the abstract data types stack, queue, deque, and list.
- To understand the various searching and sorting techniques.

Course Outcomes:On completion of this course, the student will be able to:

- Able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
- Students will be able to handle operations like searching, insertion, deletion, traversing on various Data Structures and determine time and computational complexity.
- Student will able to write an algorithm Selection Sort, BubbleSort, InsertionSort, QuickSort, MergeSort, HeapSort and compare their performance in term of Space and Time complexity
- Students will be able to choose appropriate Data Structure as applied to specific problem definitions.

(A) INSTRUCTION FOR THE PAPER SETTER

The question paper will consist of three Units. Unit I and II will have four questions from the respective sections of the syllabus and each question carry 12 marks. Unit-III will have 9 short answer type questions which will cover the entire syllabus uniformly and will carry 3 marks each.

(B) INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from unit I and II and the entire unit III.

UNIT – I

Data Structure: Introduction to data structure and algorithm, complexity of an algorithm. Algorithm analysis: Time space trade off, Big O notation, Algorithmic notations & Complexity.

Arrays: Introduction, one dimensional and multidimensional array, memory representation of arrays, Operations on arrays: Insertion, Deletion, searching, sorting.

Stacks: Introduction, Operation on stacks, Implementation of stacks, Application of stacks: evaluation of arithmetic expressions, Parenthesis matching, String Reversal, Polish & Reverse Polish Notation.

Queues: Introduction, operation on queues, circular queue, memory representation of queues, Dequeues, Priority queues, application of queues.

UNIT – II

Linked List: Introduction to operation on linked list, circular linked list, doubly linked list, header linked list, implementation of linked list, application of linked lists.

Trees: Introduction to Trees, Binary Tree; Binary Search Tree, Heaps: Insertion and Deletion.

Searching: Linear search, Binary Search.

Graphs:Introduction, Memory Representation, Graph Traversal(DFS and BFS)

Sorting: Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Shell Sort, Radix Sort, Quick Sort .

Text Book:

1. Seymour Lipschultz, "Data Structures using C", McGraw-Hill,

2. Tanenbaum, Y. Lanhgsam and A.J. Augenstein, "Data Structures Using C", Prentice Hall of India, Loomis, "Data and File Structures".

References:

1. Seymour Lipschultz, "Theory and Problems of Data Structures", McGraw-Hill.
2. E. Horowitz and S. Sahni, "Data Structures with Pascal", Galgotia, 3rd Edition,
3. Robert Sedgewick, "Algorithms in C", Pearson Education.
4. M. J. Folk, B. Zoellick, G Riccardi, "File Structures", Pearson Education

Teaching Plan:

Week	Content
1-2	Data Structure: Introduction to data structure and algorithm, complexity of an algorithm. Algorithm analysis: Time space trade off, Big O notation, Algorithmic notations & Complexity.
3-4	Arrays: Introduction, one dimensional and multidimensional array, memory representation of arrays, Operations on arrays: Insertion, Deletion, searching, sorting.
5-6	Stacks: Introduction, Operation on stacks, Implementation of stacks, Application of stacks: evaluation of arithmetic expressions, Parenthesis matching, String Reversal, Polish & Reverse Polish Notation
7-8	Queues: Introduction, operation on queues, circular queue, memory representation of queues, Dequeues, Priority queues, application of queues.
9-10	Linked List: Introduction to operation on linked list, circular linked list, doubly linked list, header linked list, implementation of linked list, application of linked lists.
11-12	Trees: Introduction to Trees, Binary Tree; Binary Search Tree, Heaps: Insertion and Deletion.
13-14	Sorting: Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Shell Sort, Radix Sort, Quick Sort .

Semester III
Course Code:BCA-304(P)
COURSE NAME: Software Lab – VI

Maximum Marks: 50**External Examination: 50****Maximum Time: 3 Hrs.****Minimum Pass Marks: 35%****Practical Sessions to be conducted: 40-50 Hrs****Objectives of the Lab:**

- To develop skills to design programs for linear and non linear data structures.
- To Strengthen the ability to identify and apply the suitable data structure for the given real world problem.
- To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures

Course Outcomes:On completion of this course, the student will be able to:

- Students will be able to apply operations like searching, insertion, deletion, traversing on various Data Structures and determine time and computational complexity.
- Student will able to write an program Selection Sort, BubbleSort, InsertionSort, QuickSort, MergeSort, HeapSort and compare their performance in term of Space and Time complexity
- Students will be able to choose appropriate Data Structure as applied to specific problem definitions.

List of Practicals:

- Write a program using Array.
- Write a program to push and pop operations in stack.
- Write programs of searching.
- Write programs of sorting.
- Write a program for insertion and deletion in the queue.
- Write a program for insertion and deletion in the Linked List.
- write a program for traversing on various data structures.

The breakup of marks for the practical will be as under:

i.	Lab Record (Internal Assessment)	10 Marks
ii.	Viva Voce (External Evaluation)	20 Marks
iii.	Program Development and Execution(External Evaluation)	20 Marks

Semester IV
Course Code:BCA-401
COURSE NAME: Computer Networks

Max Marks: 100

External Examination: 75

Min Pass Marks: 35%

Maximum Time: 3 Hrs.

Internal Assessment: 25

Lectures to be delivered: 45-55 Hrs.

Objectives of the Subject:

- Build an understanding of the fundamental concepts of computer networking
- Familiarize the students with the basic terminology of computer networking area.
- Introduce the students to advanced networking concepts.

Course Outcomes:On completion of this course, the student will be able to:

- familiar with the different Network Models.
- Understand different network technologies and their application.
- update with different advanced network technologies that can be used to connect different networks
- familiar with various hardware and software that can help run a smooth network

(A) INSTRUCTIONS FOR THE PAPERSETTER

The question paper will consist of three sections UNIT-I, UNIT-II, and UNIT-III,Each of UNIT-I and UNIT-II will have four questions from the respective Units of the syllabus and each question will carry 12 marks. UNIT-III will have 9 short answer type questions which will cover the entire syllabus uniformly and will carry 3 marks in all.

(B) INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from UNIT-I and UNIT-II. UNIT-III is Compulsory..

UNIT – I

Introduction to Computer Networks: Network definition; network topologies, network classifications; network protocol, layered network architecture, overview of OSI reference model, overview of TCP/IP protocol suite.

Data Communication Fundamentals and Techniques Analog and digital signal; data-rate limits, digital to digital line encoding schemes, pulse code modulation parallel and serial transmission; digital to analog modulation, multiplexing techniques- FDM, TDM; transmission media.

Networks Switching Techniques and Access mechanisms Circuit switching, packet switching-connectionless datagram switching, connection-oriented virtual circuit switching, dial-up modems, digital subscriber line, cable TV for data transfer.

Data Link Layer Functions and Protocol Error detection and error correction techniques, data-link control-framing and flow control; error recovery protocols- stop and wait ARQ, go-back-n ARQ, Point to Point Protocol on Internet.

UNIT- II

Multiple Access Protocol and Networks CSMA/CD protocols; Ethernet LANS; connecting LAN and back-bone networks- repeaters, hubs, switches, bridges, router and gateways

Networks Layer Functions and Protocols Routing, routing algorithms, Congestion control algorithm, network layer protocol of Internet- IP protocol, Internet control protocols.

Transport Layer Functions and Protocols Transport services- error and flow control, Connection establishment and release- three way handshake, transport layer protocols-TCP, UDP.

Overview of Application layer protocol Overview of DNS protocol; overview of WWW & HTTP protocol

TextBook:

1.Andrew S. Tanenbaum, “Computer Networks”, Third Edition, PHI Publications.

References:

- 1.Data & Computer Communications by William Stallings, Pearson Education.
- 2.D.E. Corner, “Computer Networks and Internets”, Second Edition, Addison-Wesley Publication
- 3.Computer Networks by Forouzan, Tata McGrawhill Publications.

Teaching Plan:

Week	Content
1-2	Introduction to Computer Networks: Network definition; network topologies, network classifications; network protocol, layered network architecture, overview of OSI reference model, overview of TCP/IP protocol suite.
3-4	Data Communication Fundamentals and Techniques Analog and digital signal; data-rate limits, digital to digital line encoding schemes, pulse code modulation parallel and serial transmission; digital to analog modulation, multiplexing techniques- FDM, TDM; transmission media.
5-6	Networks Switching Techniques and Access mechanisms Circuit switching, packet switching- connectionless datagram switching, connection-oriented virtual circuit switching, dial-up modems, digital subscriber line, cable TV for data transfer. Data Link Layer Functions and Protocol Error detection and error correction techniques, data-link control- framing and flow control; error recovery protocols- stop and wait ARQ, go-back-n ARQ, Point to Point Protocol on Internet.
7-8	Multiple Access Protocol and Networks CSMA/CD protocols; Ethernet LANS; connecting LAN and back-bone networks- repeaters, hubs, switches, bridges, router and gateways.
9-10	Networks Layer Functions and Protocols Routing, routing algorithms, Congestion control algorithm, network layer protocol of Internet- IP protocol, Internet control protocols.
11-12	Transport Layer Functions and Protocols Transport services- error and flow control, Connection establishment and release- three way handshake, transport layer protocols-TCP, UDP.
13-14	Overview of Application layer protocol Overview of DNS protocol; overview of WWW & HTTP protocol

Semester IV
Course Code:BCA-402 DSE1
COURSE NAME: System Software

Max Marks: 100**Maximum Time: 3 Hrs.****External Examination: 75****Internal Assessment: 25****Min Pass Marks: 35%****Lectures to be delivered: 45-55 Hrs.****Objectives of the Subject:**

- To learn context free grammars, compiler parsing techniques.
- To understand the theory and practice of compiler implementation.
- This course provides knowledge to design various system programs.

Course Outcomes:On completion of this course, the student will be able to:

- Understand fundamentals of the compiler and identify the relationships among different phases of the compiler.
- Understand fundamentals of assembler and linker and loader.

(A) INSTRUCTIONS FOR THE PAPERSETTER

The question paper will consist of three sections UNIT-I, UNIT-II, and UNIT-III, Each of UNIT-I and UNIT-II will have four questions from the respective Units of the syllabus and each question will carry 12 marks. UNIT-III will have 9 short answer type questions which will cover the entire syllabus uniformly and will carry 3 marks in all.

(B) INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from UNIT-I and UNIT-II. UNIT-III is Compulsory.

UNIT- I

Introduction: Definition of system software, types of system software, features of system programming, system programming vs. application programming.

Language Processors: Introduction, Language processing activities, Fundamentals of Language Processing.

Assembler: Elements of Assembly Language Processing, A simple Assembly scheme, Pass structure of Assemblers, Design of a two pass assembler, Intermediate code forms (variant I and II). A brief overview of single pass assembly and problem of forward references.

Linkers and Loaders: Definition of linker and loader Design of Absolute Loader, Re-locatable Loader.

UNIT- II

Compilers: Overview of Compilation Process, Scanning, Parsing (Top down and Bottom Up parsing), intermediate code form for arithmetic expressions (postfix, prefix, triples, quadruples – concepts only), Code optimization transformations (Compile time evaluation, Elimination of common sub-expression, Dead code elimination, Frequency reduction, strength reduction – concepts only), compiler vs. interpreter.

Software Tools: Software tools for program development, Editors, Debug monitors, Programming environments, User Interfaces.

Text Books:

1. Dhamdhere D. M. "Systems Programming and Operating system", Tata McGraw-Hill Publishing Company Limited, New Delhi, Second Edition.
2. Donovan, "System programming". (McGraw-Hill), 1991.

Reference Book:

1. Aho and Ulman, "Principles of Compilers", Narosa Publishing House, 1986.

Teaching Plan:

Week	Content
1-2	Introduction: Definition of system software, types of system software, features of system programming, system programming vs. application programming.
3-4	Language Processors: Introduction, Language processing activates, Fundamentals of Language Processing.
5-6	Assembler: Elements of Assembly Language Processing, A simple Assembly scheme, Pass structure of Assemblers, Design of a two pass assembler. A brief overview of single pass assembly and problem of forward references.
7-8	Compilers: Overview of Compilation Process, Scanning, Parsing (Top down and Bottom Up parsing), Intermediate code forms (variant I and II) intermediate code form for arithmetic expressions
9-10	(postfix, prefix, triples, quadruples – concepts only), Code optimization transformations (Compile time evaluation, Elimination of common sub-expression, Dead code elimination, Frequency reduction, strength reduction – concepts only),
11-12	Software Tools: Software tools for program development, Editors, Debug monitors, Programming environments, User Interfaces.
13-14	A brief overview of single pass assembly and problem of forward references.

Semester IV**Course Code:BCA-402 DSE2****COURSE NAME: Cloud Computing****Max Marks: 100****Maximum Time: 3 Hrs.****External Examination: 75****Internal Assessment: 25****Min Pass Marks: 35%****Lectures to be delivered: 45-55 Hrs.****Objectives of the Subject:**

- To understand the basics of Cloud Computing.
- To understand the movement from a traditional network infrastructure to a Cloud solution.

Course Outcomes:On completion of this course, the student will be able to:

- Understand the core concepts of the cloud computing paradigm
- Understanding importance of virtualization along with their technologies
- Analyze various cloud computing service and deployment models and apply them to solve problems on the cloud.
- Implementation of various security strategies for different cloud platform

(A) INSTRUCTION FOR THE PAPER SETTER

The question paper will consist of three units I, II and III. Each of units I and II will have four questions from the respective sections of the syllabus and each question carry 12 marks. Unit-III will have 9 short answer type questions which will cover the entire syllabus uniformly and will carry 3 marks in all.

(B) INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from unit I and II and the entire unit III.

UNIT-I

Introduction : Definition of cloud, characteristics of cloud, historical developments & challenges ahead, the vision of cloud computing, Driving factors towards cloud, Comparing grid with utility computing, cloud computing and other computing systems, types of workload patterns for the cloud, IT as a service, Applications of cloud computing.

Cloud computing concepts: Introduction to virtualization techniques, Characteristics of virtualization, Pros and Cons of virtualization Technology, Hypervisors, Types of hypervisors, Multitenancy, Application programming interfaces (API), Elasticity and scalability.

UNIT-II

Cloud service models: Cloud service models, Infrastructure as a service (IaaS) architecture- details and example, Platform as a service (PaaS) architecture- details and example, Software as a service (SaaS) architecture-- details and example, Comparison of cloud service delivery models.

Cloud deployment models: Introduction to cloud deployment models, Public clouds, Private clouds, Hybrid clouds, Community clouds, Migration paths for cloud, Selection criteria for cloud deployment.

Security in cloud computing: Understanding security risks, Principal security dangers to cloud computing, Internal security breaches, User account and service hijacking, measures to reduce cloud security breaches Case Studies: Comparison of existing Cloud platforms /Web Services

Text Books:

1. Michael Miller, Cloud Computing, 2008.
2. Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper, Cloud Computing for dummies, 2009.
3. Sosinsky Barrie, "Cloud Computing: Bible", Wiley Publication, 2011.

Reference Book:

1. Raj Kumar Buyya, James Broberg, Andrezei M.Goscinski, Cloud Computing: Principles and paradigms, 2011.

Teaching Plan:

Week	Content
1-2	Introduction : Definition of cloud, characteristics of cloud, historical developments & challenges ahead, the vision of cloud computing, Driving factors towards cloud
3-4	Comparing grid with utility computing, cloud computing and other computing systems, types of workload patterns for the cloud, IT as a service, Applications of cloud computing.
5-6	Cloud service models: Cloud service models, Infrastructure as a service (IaaS) architecture- details and example, Platform as a service (PaaS) architecture- details and example, Software as a service (SaaS) architecture-- details and example, Comparison of cloud service delivery models.
7-8	Cloud deployment models: Introduction to cloud deployment models, Public clouds, Private clouds, Hybrid clouds, Community clouds, Migration paths for cloud, Selection criteria for cloud deployment.
9-10	Security in cloud computing: Understanding security risks, Principal security dangers to cloud computing, Internal security breaches, User account and service hijacking, measures to reduce cloud security breaches Case Studies: Comparison of existing Cloud platforms /Web Services

Semester IV**Course Code:BCA-403****COURSE NAME: Relational Database Management System****Max Marks: 100****Maximum Time: 3 Hrs.****External Examination: 75****Internal Assessment: 25****Min Pass Marks: 35%****Lectures to be delivered: 45-55 Hrs.****Objectives of the Subject:**

- To understand basic database concepts, including the structure and operation of the relational data model.
- To construct simple and moderately advanced database queries using Structured Query Language (SQL).
- It prepares the student to be in a position to use and design databases for different applications.

Course Outcomes:On completion of this course, the student will be able to:

- Understand relational database concepts and structures and query language.
- To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.
- Understand Functional Dependency and Functional Decomposition.
- Apply various Normalization techniques.
- Perform PL/SQL programming using concept of Cursor Management, Error Handling, Package and Triggers.
- Execute various advance SQL queries related to Transaction Processing & Locking using concept of Concurrency control.
- Understand query processing and techniques involved in query optimization.
- Understand the principles of storage structure and recovery management.

(A) INSTRUCTIONS FOR THE PAPERSETTER

The question paper will consist of three sections UNIT-I, UNIT-II, and UNIT-III, Each of UNIT-I and UNIT-II will have four questions from the respective Units of the syllabus and each question will carry 12 marks. UNIT-III will have 9 short answer type questions which will cover the entire syllabus uniformly and will carry 3 marks in all.

(B) INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from UNIT-I and UNIT-II. UNIT-III is Compulsory.

UNIT-I

Introduction of DBMS: Limitations of File System Approach, Advantages of Database Approach, Data Modeling for a Database, Three level Architecture of DBMS, Components of a DBMS. Database Schema, Database Administrator.

Entity relationship model : concepts, mapping cardinalities, entity relationship diagram, weak sets, strong entity sets, aggregation, generalization, converting ER diagram to tables.

Relational Database: Relational Data Structure, Types of Keys, Integrity Rules, Views, Relational Algebra, Basic operations, additional operations.

SQL Fundamentals: Data Definition Language, Data Manipulation Language, Data Control Language.

Unit -II

Relational Database design : CODD 12 rules, Functional dependency, decomposition.

Normalization: First, Second, Third Normal Forms, Dependency Preservation, Boyce-Codd Normal Form, Multi-valued Dependencies and Fourth Normal Form and Fifth Normal Form.

Transaction Management, Concurrency Control, Database Recovery Techniques, Database Security and Integrity, Distributed Database.

Text Books:

- 1.Elmasry, Navathe, "Fundamentals of Database System", Pearson Education.
2. Henry F. Korth, A Silberschhatz, "Database Concepts," Tata McGraw Hill.

Reference Books:

1. C.J. Date , " An Introduction to Database Systems", Pearson Education.
2. Oracle SQL Complete Reference", Tata McGrawHill.

Teaching Plan:

Week	Content
1-2	Introduction of DBMS: Limitations of File System Approach, Advantages of Database Approach, Data Modeling for a Database, Three level Architecture of DBMS, Components of a DBMS. Database Schema, Database Administrator. Entity relationship model : concepts, mapping cardinalities, entity relationship diagram, weak sets, strong entity sets, aggregation, generalization, converting ER diagram to tables
3-4	Relational Database: Relational Data Structure, Types of Keys, Integrity Rules, Views, Relational Algebra, Basic operations, additional operations. SQL Fundamentals: Data Definition Language, Data Manipulation Language, Data Control Language.
5-6	Relational Database design : CODD 12 rules, Functional dependency, decomposition.
7-8	Normalization: First, Second, Third Normal Forms, Dependency Preservation, Boyce-Codd Normal Form, Multi-valued Dependencies and Fourth Normal Form and Fifth Normal Form.
9-10	Transaction Management, Concurrency Control, Database Recovery Techniques, Database Security and Integrity, Distributed Database

Semester IV
Course Code:BCA-403(P)
COURSE NAME:Software Lab – VII

Max Marks: 50**Maximum Time: 3 Hrs.****External Examination: 50****Min Pass Marks: 35%****Practical sessions to be conducted: 45-55 Hrs.****Objectives of the Lab:**

- This practical will enable students to retrieve data from relational databases using SQL.
- Students will also learn about triggers, cursors, stored procedures etc.

Course Outcomes:On completion of this course, the student will be able to:

- Able to understand various queries and their execution
- Populate and query a database using SQL DML/DDI commands.
- Declare and enforce integrity constraints on a database
- Programming PL/SQL including stored procedures, stored functions, cursors, packages
- Able to design new database and modify existing ones for new applications and reason about the efficiency of the result

Syllabus Contents:

1. Introduction to SQL and installation of SQL Server / Oracle.
2. Data Types, Creating Tables, Retrieval of Rows using Select Statement, Conditional Retrieval of Rows, Alter and Drop Statements.
3. Working with Null Values, Matching a Pattern from a Table, Ordering the Result of a Query, Aggregate Functions, Grouping the Result of a Query, Update and Delete Statements.
4. Set Operators, Nested Queries, Joins, Sequences.
5. Views, Indexes, Database Security and Privileges: Grant and Revoke Commands, Commit and Rollback Commands.
6. PL/SQL Architecture, Assignments and Expressions, Writing PL/SQL Code, Referencing Non-SQL parameters.
7. Stored Procedures and Exception Handling.
8. Triggers and Cursor Management in PL/SQL.

The breakup of marks for the practical will be as under:

i.	Lab Record (Internal Assessment)	10 Marks
ii.	Viva Voce (External Evaluation)	20 Marks
iii.	Program Development and Execution(External Evaluation)	20 Marks

Semester IV**Course Code: BCA-404****COURSE NAME: Artificial Intelligence****Max Marks: 100****External Examination: 75****Min Pass Marks: 35%****Maximum Time: 3 Hrs.****Internal Assessment: 25****Lectures to be delivered: 45-55 Hrs.****Objectives of the Subject:**

- To impart basic proficiency in representing difficult real life problems in a state space representation so as to solve them using AI techniques like searching and game playing.
- To create an understanding of the basic issues of knowledge representation and Logic as well as an understanding of other topics that plays an important role in AI programs.

Course Outcomes:On completion of this course, the student will be able to:

- Understand the significance and domains of Artificial Intelligence and knowledge representation.
- Examine the useful search techniques; learn their advantages, disadvantages and comparison.
- Acquire the knowledge of real world Knowledge representation.
- Solve basic AI based problems.

(A) INSTRUCTIONS FOR THE PAPERSETTER

The question paper will consist of three sections UNIT-I, UNIT-II, and UNIT-III. Each of UNIT-I and UNIT-II will have four questions from the respective Units of the syllabus and each question will carry 12 marks. UNIT-III will have 9 short answer type questions which will cover the entire syllabus uniformly and will carry 3 marks in all.

(B) INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from UNIT-I and UNIT-II. UNIT-III is Compulsory.

Unit I

Introduction to Artificial Intelligence: Concept and definition, Elements of AI, History of AI, Turing Test, Application areas of AI.

Problem solving using AI: Introduction: Defining problem as state space: analyzing problem, Finding the solution, Representation of AI problem. Example if AI Problems: Tic-Tac-Toe, Water-Jug problem, 8- Puzzle problem, 8-Queens problem. Search Techniques: Breadth-first, Depth-first, Depth-limited, Bidirectional search.

Heuristic Search: Introduction, basic concept of heuristic search, Popular game Playing Theories: Min- Max search Procedure, Alpha -Beta pruning.

Unit-II

Logic: Introduction, propositional calculus, predicate Logic, Resolution, Unification, limitations of logic.

Introduction to knowledge: Introduction, Types of Knowledge, Knowledge acquisition.

Knowledge Representation Techniques: Introduction, Frames, Semantic Network, conceptual graph, Conceptual Dependencies, Script, CYC,

Expert System: Introduction to Expert System, Architecture of Expert System, ES Shells.

Introduction to Data Analysis: Introduction, Essential Python Libraries, NumPy array operations. Pandas: Data series & Frames, Data Virtualization using Matplotlib.

Text Books:

1. Introduction to Artificial Intelligence and Expert Systems by Dan W. Patterson, Published by Pearson Education, Inc
2. Artificial Intelligence By Ela Kumar, Published by IK International Publishing House PVT LTD

Reference Books:

1. Introduction to artificial Intelligence by E. Charnaik and D. McDermott,

Addison-Wesley Publishing Company.

2. Principles of Artificial Intelligence by Nils J. Nilson, Narosa Publishing Co.
3. Expert Systems for Personal Computers by M. Chandwick and J.A. Hannah, Galgotia Publications Pvt. Ltd.

Teaching Plan:

Week	Content
1-2	Introduction to Artificial Intelligence: Concept and definition, Elements of AI, History of AI, Turing Test, Application areas of AI.
3-4	Problem solving using AI: Introduction: Defining problem as state space: analyzing problem, Finding the solution, Representation of AI problem. Example if AI Problems: Tic-Tac-Toe, Water-Jug problem, 8- Puzzle problem, 8-Queens problem. Search Techniques: Breadth-first, Depth-first, Depth-limited, Bidirectional search.
5-6	Heuristic Search: Introduction, basic concept of heuristic search, Popular game Playing Theories: Min- Max search Procedure, Alpha -Beta pruning.
7-8	Logic: Introduction, propositional calculus, predicate Logic, Resolution, Unification, limitations of logic. Introduction to knowledge: Introduction, Types of Knowledge, Knowledge acquisition.
9-10	Knowledge Representation Techniques: Introduction, Frames, Semantic Network, conceptual graph, Conceptual Dependencies, Script, CYC,
11-12	Expert System: Introduction to Expert System, Architecture of Expert System, ES Shells.
13-14	Introduction to Data Analysis: Introduction, Essential Python Libraries, NumPy array operations. Pandas: Data series & Frames, Data Virtualization using Matplotlib.

Semester IV**Course Code: BCA-404(P)****COURSE NAME: Software Lab – VIII****Max Marks: 50****Maximum Time: 3 Hrs.****External Examination: 50****Min Pass Marks:35%****Practical sessions to be conducted: 45-55 Hrs.****Objectives of the Subject:**

- Apply AI techniques to real-world problems to develop intelligent systems.
- To enable students to work on various AI tools.

Course Outcomes: On completion of this course, the student will be able to:

- Demonstrate practical experience by implementing and experimenting with the learnt algorithms.
- Simulate given problem scenario and analyze its performance.
- Develop programming solutions for given problem scenario.

List of Experiments

- Array creation using NumPy
- Array Indexing
- Array Slicing
- Sorting
- Finding NaN values
- Append Values in an Array
- Arithmetic Operations in an Array
- Creating Series in Pandas
- Creating Data Frames in Pandas
- Display Summary of a Data Frame
- To select particular row or a column
- To append new rows and columns
- Handling Missing Values
- Data Visualization using Matplotlib

The breakup of marks for the practical will be as under:

i.	Lab Record (Internal Assessment)	10 Marks
ii.	Viva Voce (External Evaluation)	20 Marks
iii.	Program Development and Execution(External Evaluation)	20 Marks

CODE: DA-4001 Drug Abuse: Problem, Management and Prevention
(Compulsory qualifying paper for all undergraduate classes)

Maximum Marks-50
Theory marks- 35
Internal assessment-15

Time Allowed: 1:30 hours
Pass Percentage: 35%

Distribution of Internal Assessment marks

Assignment: 7 marks
Attendance: 8 marks
Total : 15 marks

Course Objectives-

To introduce the problem of drug abuse to the students
To aware the students regarding consequences of drug abuse
To familiarize the students with the management and prevention of drug abuse

Course Learning Outcomes-

The students will understand the meaning of drug abuse and addiction
The students will become aware of the common signs and symptoms of drug abuse
The students will gain knowledge of how to prevent and manage this menace

Pedagogy-

Class room lectures, assignments, discussions and seminars.

INSTRUCTIONS FOR THE PAPER SETTERS

The question paper will consist of three units I, II and III. Syllabus of each unit (i.e. I &II) will have two subparts. Examiner will set two questions from UNIT-I (each question having internal choice covering both parts of syllabus of UNIT-I) and two questions from UNIT-II (each question having internal choice covering both parts of syllabus of UNIT-II). Each question will carry 6.5 marks. Unit-III is compulsory, and shall comprise nine short answer type questions carrying 1 marks each. The short type answer should be written in approximately 25-30 words.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt one question from each subpart of both the UNIT-I & II of the question paper and the entire UNIT-III. The short type answer should be written in approximately 25-30 words i.e. 3-4 lines

UNIT-I

- 1) **Problem of Drug Abuse: Concept and Overview; Types of Drug Often Abused**
Meaning of drug abuse, drug dependence and drug addiction
Psychoactive and Non-Psychoactive drugs
Legal & Illegal drugs

Prevalence of drug abuse with special reference to Punjab
Brief introduction of stimulants, depressants, narcotics, hallucinogens, inhalants

II) **Nature of the problem**

Vulnerable age groups

Signs and symptoms of drug abuse: - physical, behavioural, psychological and academic signs

UNIT-II

I) **Causes and Consequences of Drug Abuse**

Physiological, psychological and sociological causes

Consequences of drug abuse for individual, family and society.

II) **Management and Prevention of Drug Abuse**

Medical management and psycho-social management

Role of family, school, media, legislation, deaddiction centers and religion in prevention of drug abuse.

Suggested readings

1. Sharma, R. and Bansal, Y. (2017). Drug Abuse: Problem, Management and Prevention. R.D. Publications, India, ISBN: 978-93-84594-56-5.
2. Goyal, N. (2018). Drug Abuse: Problem, Prevention and Management. Kalyani Publishers, India, ISBN: 978-93-272-8739-4.
3. Kapoor, T. (1985). Drug Epidemic among Indian Youth. New Delhi: Mittal Pub
4. Ahuja, R. (2003). Social Problems in India, Rawat Publications: Jaipur
5. World Drug Report 2011, United Nations Office of Drug and Crime.
6. World Drug Report 2010, United nations Office of Drug and Crime.
7. Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004.
8. The Narcotic Drugs and Psychotropic Substances Act, 1985, (New Delhi: Universal, 2012)