



خواجہ معین الدین چشتی اردو، عربی-فارسی یونیورسٹی، لکھنؤ، اترپردیش، ہندوستان
ख्वाजा मुईनुद्दीन चिश्ती उर्दू، अरबी-फ़ारसी विश्वविद्यालय, लखनऊ, उत्तर प्रदेश, भारत
KHWAJA MOINUDDIN CHISHTI URDU, ARABI-FARSI UNIVERSITY, LUCKNOW, U.P., INDIA
U.P. STATE GOVERNMENT UNIVERSITY
(RECOGNISED U/S 2(F) & 12(B) OF THE UGC ACT 1956 & B.TECH. APPROVED BY AICTE)

Department of Computer Science and Information Technology

Bachelor of Computer Application (B.C.A.)

Evaluation Scheme

and

Course Structure

**KHWAJA MOINUDDIN CHISHTI LANGUAGE UNIVERSITY
UTTAR PRADESH, LUCKNOW**



Introduction

The Program's thrust is to provide the students a thorough and sound background in theoretical and skill-oriented courses relevant for productive careers in software industry, corporate sector, Govt. organizations and academia. The program emphasizes providing skill-based environment for teaching and research in the core and emerging areas of software technology to solve mathematical, computing, communications/networking and commercial problems.

This Undergraduate Degree Program has been designed with a semester approach in mind. The first-year courses are aimed at skills development in computers using various technologies while the second year is more focused on core courses providing conceptual frame work and the third year provides the specialization and the project work.

A three-year degree (six-semesters) in Computer Applications will get skills and information not only about Computer and Information Technology but also in communication, organization and management. One also gets to learn programming languages such as Java, C, C++, C#, SQL, Php, Python, front-end and back-end design etc. Information about various computer applications and latest developments in IT and communication systems is also provided. The Bachelor of Computer Application Programme has been designed to supply trained manpower it ever growing IT and IT Enabled industry.

1. Applicability

These regulations shall apply to the Bachelor of Computer Application (BCA) programme from the session 2021-22.

2. Minimum Eligibility for Admission

The candidate must have passed 10+2, with Mathematics as one of the subjects with a minimum of 50% Obtained (45% marks in case of candidates belonging to reserved category) in the qualifying Examination.

3. Programme Objectives

The BCA Programme is designed to enhance employability by preparing students for careers in computer science and leadership in both the private and public sectors. Students acquire a comprehensive foundation in the fundamentals of computer applications, the environment in which they will function, the analytical tools for intelligent decision-making and problem solving. Specifically:

- BCA course aim to create outstanding computer professionals with ethical and human values to reshape the nation's destiny.
- This program aims to prepare young minds for the challenging opportunities in the IT industry, nourished and supported by experts in the fields.
- Impart knowledge required for planning, designing and building complex Application Software Systems as well as provide support to automated systems or application.
- To enable students for pursuing respectable career through Self- Employment, Executive Employment, Entrepreneurship, Professional Career in the field of service sectors such as e-Banking, Marketing, Investment, Insurance hospitality and other avenues.



- To develop academically competent and professionally motivated personnel, equipped with objective, critical thinking, right moral and ethical values that compassionately foster the scientific temper with a sense of social responsibility.
- To develop students to become globally competent.
- To inculcate Entrepreneurial skills among students.
- To develop the foundation for higher studies in the field of Computer Application.

3. Programme Outcomes (POs)

Upon completion of the BCA Programme, the students will be able to:

- PO1. Inculcates the ability to analyse, identify, formulate and develop computer applications using modern computing tools and techniques.
- PO2. To impart knowledge required for planning, designing and building complex Application Software Systems as well as provide support to automated systems or applications.
- PO3. To produce entrepreneurs who can develop customized solutions for small to large enterprises and to train students to become globally competent and employable.
- PO4. To develop competent and professionally motivated personnel, equipped with objective, critical thinking, right moral and ethical values that foster the scientific temper with a sense of social responsibility.
- PO5. To work effectively both as an individual and a team leader on multi-disciplinary projects.

5. Programme Specific Outcomes (PSOs)

After completing the program students will be capable of:

- PSO1. An ability to understand the concepts of logic development, analysing, identifying and defining problems for logical modelling and its solutions with best software practices used in industry.
- PSO2. Understanding to apply knowledge of computing and technological advances appropriate to the programme.
- PSO3. Understanding a sense of professional, ethical, legal, security and social issues and responsibilities.
- PSO4. Analysing the local and global impact of business solutions on individuals, organizations, and society.

6. Course Structure

The course structure of the **Bachelor of Computer Application (BCA)** programme shall be as under:



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Year I, BCA Semester I

Course Code	Course Name	L	T	P	C	Marks				
						IA	PE	ESE	Tot.	
BCA 101	Fundamentals of Computer	4		4*	4+2=6	30	20	50	100	Core
BCA 102	Office Automation	4		4*	4+2=6	30	20	50	100	Core
ES	Environmental Science	2			2	15	-	35	50	AEC
GE1	Elective Course - Generic/Interdisciplinary	5	1		5+1=6	30	-	70	100	GE
	Total				20				350	

Year I, BCA Semester II

Course Code	Course Name	L	T	P	C	Marks				
						IA	PE	ESE	Tot.	
BCA 201	Programming Concepts and C Language	4		4*	4+2=6	30	20	50	100	Core
BCA 202	Data Structures	4		4*	4+2=6	30	20	50	100	Core
MIL	MIL	2			2	15	-	35	50	AEC
GE2	Elective Course - Generic/Interdisciplinary	5	1		5+1=6	30	-	70	100	GE
	Total				20				350	

Year II, BCA Semester III

Course Code	Course Name	L	T	P	C	Marks				
						IA	PE	ESE	Tot.	
BCA 301	Object Oriented Programming Using C++	4		4*	4+2=6	30	20	50	100	Core
BCA 302	Database Management System	4		4*	4+2=6	30	20	50	100	Core
BCA 303	Digital Electronics and Computer Organization	5	1		5+1=6	30		70	100	Core
BCA 304	Numerical Methods	2			2	15		35	50	SEC
GE3	Elective Course - Generic/Interdisciplinary	5	1		5+1=6	30	-	70	100	GE
	Total				26				450	



Year II, BCA Semester IV

Course Code	Course Name	L	T	P	C	Marks				
						IA	PE	ESE	Tot.	
BCA 401	Programming in JAVA	4		4*	4+2=6	30	20	50	100	Core
BCA 402	Web Technology	4		4*	4+2=6	30	20	50	100	Core
BCA 403	Operating Systems	5	1		5+1=6	30		70	100	Core
BCA 404	Optimization Techniques	2			2	15		35	50	SEC
GE2	Elective Course – Generic/Interdisciplinary	5	1		5+1=6	30	-	70	100	GE
Total					26	450				

Year III, BCA Semester V

Course Code	Course Name	L	T	P	C	Marks				
						IA	PE	ESE	Tot.	
BCA 501	Software Engineering **	4		4*	4+2=6	30	20	50	100	Core
BCA 502	Computer Networks	5	1		5+1=6	30	-	70	100	Core
BCAE11-13	DSE – 1	4		4*	4+2=6	30	20	50	100	DSE
BCAE21-23	DSE – 2	5	1		5+1=6	30	-	70	100	DSE
Total					24	400				

** Lab: Minor Project based on Software Engineering

Discipline Specific Elective

DSE – 1: BCAE11 - PHP Programming

BCAE12 - Introduction to Python Programming

BCAE13 - Android Programming

DSE – 2: BCAE21- Management Information System (MIS)

BCAE22 - Data Warehousing and Data Mining

BCAE23 - Graph Theory



Year III, BCA Semester VI

Course Code	Course Name	L	T	P	C	Marks				
						IA	PE	ESE	Tot.	
BCA 601	E-Commerce	5			5+1=6	30	-	70	100	Core
BCA 602	Project			12*	2+4=6	30	70	-	100	Core
BCAE31-33	DSE - 3	5	1		5+1=6	30	-	70	100	DSE
BCAE41-43	DSE - 4	5	1		5+1=6	30	-	70	100	DSE
	Total				24				400	

Discipline Specific Elective

DSE – 3: BCAE31 - Information Security and cyber Law

BCAE32 - Software Quality

BCAE33 - Software Project Management

DSE – 4: BCAE41 - Introduction to Client- Server Computing

BCAE42 - Mobile Computing

BCAE43 - Cloud Computing

- L: Lecture, T: Tutorial, P: Practical, C: Credit, IA: Internal Assessment, PE: Practical Exam., ESE: End Semester Examination, AEC: Ability Enhancement Course, GE: Generic Elective, SEC: Skill Enhancement Course, DSE: Discipline Specific Elective



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BCA Semester -I

BCA 101 - Fundamentals of Computer

6 Credits = 4 Th.+ 2 Prac.

Duration: 2 hrs.

Marks: 100 (50+20+30)

60 Lectures+ 30 Prac.

OBJECTIVES OF THE COURSE: To understand the functional components of computers. To differentiate between hardware and software. To understand the concept of data representation. To introduce & understand various operating systems. To understand the concept of data communication, networking and internet.

UNIT-I

Lectures: 15

Introduction to Computers

Introduction, Functional Components of Computers, Block diagram of computer, Input/Output devices, Characteristics of Computers. Application of Computers, Generation of computers, Types of computers, Mini Computers, Micro Computers, Mainframe Computers, Super Computers. Types of Software. Types of Programming Languages (Machine Languages, Assembly Languages, High Level Languages). Types of Memory (Primary And Secondary) RAM, ROM, PROM, EPROM, EEPROM. Secondary Storage Devices (FD, CD, HD, Pen drive), I/O Devices.

UNIT-II

Lectures: 15

Data Representation

Number systems and Number representation- Binary, Octal, Hexadecimal. Inter Conversion between Number Systems, Binary Coded Decimal (BCD) Numbers, weighted codes, Complement notations, Binary Arithmetic- Addition, Subtraction, Multiplication, Division. Binary Codes- Gray, ASCII.

UNIT-III

Lectures: 15

Operating System

Introduction to Operating system, Functions of Operating System, Types of Operating System, DOS – Files and Directories, Internal and External Commands, Batch Files. **Windows Operating Environment-** Features of MS – Windows, Control Panel, Taskbar, Desktop, Windows Application, Icons, Windows Accessories, Notepad, Paintbrush.

UNIT-IV

Lectures: 15

Communication and Networking

Introduction to Data Communication and Networking, Different Topologies, Types of Network, communication Media. Introduction to Internet, Features of Internet, working of Internet- Client, Server, Client-Server Network, Web Server, Browser, URL, ISPs, Modem, Web Page, Web development, Site Hosting Modes of connecting to internet (Access Methods), Internet address, domain name, World Wide Web- Introduction, searching the www- Directories search engines.

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
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خواجه مؤینوددین چشتی اردو، اربی-فارسی ویسویعیالی، لکھنؤ، اتر پردیش، ہارٹ
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1	CO1 To understand basic component of computer	K2
2	CO2. To learn number systems and number representation	K3,
3	CO3. Concept of Operating system	K5
4	CO4. Introduction to Data Communication and computer Networking	K2
5	CO5.To usage and understanding of internet technologies	K2,K4,

References:

1. Fundamental of Computers – By V.Rajaraman B.P.B. Publications
2. Fundamental of Computers – By E. Balagurusamy, **McGraw Hill** Education.
3. Introduction to Computers and C Programming – By D.S. Yadav & S.K. Bajpai, New Age Publication.
4. Fundamental of Computers – By P.K. Sinha
5. Computer Concepts – By Vikas Gupta, Dreamtech Press
6. Comdex windows 7 with Office 2010 – By Vikas Gupta, Dreamtech Press



LAB 1: FUNDAMENTALS OF COMPUTER

2 Credits = 2 Prac.

Duration: 2 hrs. Marks: 20, 30 Pract.

OBJECTIVES OF THE COURSE: To understand the booting & shutting down process of computer. To understand the hardware components of computer. To understand the concept of operating systems. To acquire skills of using basic internal/external MS-DOS commands. To acquire skills of using windows operating system and its applications. To understand the use of internet and its applications.

- Introduction to booting & shutting down process of computer.
- Demonstration of hardware parts of computer.
- Use of basic Internal/External MS-DOS commands (CUI).
- Working with Windows Operating System (GUI).
- Working with Application software.
- Working with Internet.

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1 Introduction to booting & shutting down process of computer.	K3
2	CO2. Demonstration of hardware parts of computer.	K3
3	CO3. Use of DOS commands	K3
4	CO4. To understand GUI Windows	K3
5	CO5. To understand and use of internet terms and technologies	K3



BCA 102 - Office Automation

Duration: 2 hrs.

Marks: 100 (50+20+30)

6 Credits = 4 Th.+ 2 Prac.

60 Lectures+ 30 Prac.

OBJECTIVES OF THE COURSE: To explore various features of MS-Word and its applications. To develop understanding of MS-Excel. To design the presentation using MS-power Point. To understand the basic concept and objects of database using MS-Access.

UNIT-I

Lectures: 15

MS-Office : Introduction, Overview of the office components, MS-Office files and folders, Opening, and saving files.

MS-Word: Starting MS-Word, Creating and Formatting a document, Changing fonts and point size, Table Creation and operations, Autocorrect, Auto-text, Spell Check, Word Art, Working with Header, Footers and Footnotes, Working with Graphics, Inserting objects, Page setup, Page Preview, Printing a document, Mail Merge, Outline, Find and Automatic features, Creating Macros.

UNIT-II

Lectures: 15

MS-Excel: Starting Excel, Worksheet, Rearranging Worksheet and Cell, Inserting Data into Rows/Columns, Alignment, Text wrapping, Sorting data, Excel formatting tips and Techniques, generating graphs, Organizing large project, Introduction to Functions, Excels chart features.

UNIT-III

Lectures: 15

MS-Power Point: Starting MS-Power Point, Creating a presentation using Auto-content Wizard, Blank Presentation, Creating, Saving and Printing a presentation, Adding a slide to presentation, Navigating through a presentation, Slide-sorter, Slide-show, Editing slides, Working with Graphics and Multimedia in PowerPoint (Inserting Photo, Video & Sound).

UNIT-IV

Lectures: 15

MS-Access: Introduction to Access, Creating Tables and Database, Data Type and Properties, Adding & Deleting Field in Table, Primary Key Fields, Queries, Forms: The Forms wizard saving forms, Modifying forms, Pages, Macro, Module, Reports, Printing Report, Forms, Letter, Relation Database, Graphics in Database, Linking Importing and Exporting Records.

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1 To understand introduction and overview of the MS-Office components	K2
2	CO2. MS-Word: Starting MS-Word, Creating and Formatting a document.	K5, K6
3	CO3. To understand the concept of Mail Merge	K6
4	CO4. To understand MS-Excel, MS-Power Point	K2, K3
5	CO5. To learn use of MS-Access as a database	K2, K4,



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References:

1. MS-Office 2000(For Windows) – By Steve Sagman.
2. Office 2007 – By Shelly, Cengage Publication.
3. MS-Office 2007 – Michael Price
4. Comdex windows 7 with Office 2010 – By Vikas Gupta, Dreamtech Press
5. MS-Office 2000 – No Experience Required, Courter G. and Marquis A., BPB Publications.
6. Working in Microsoft Office, Mansfield R., Tata McGraw Hill Edition.
7. Teach Yourself Microsoft Office 2000, Perry G., Techmedia.



LAB II: OFFICE AUTOMATION

2 Credits = 2 Prac.

Duration: 2 hrs. Marks: 20,

30 Prac.

OBJECTIVES OF THE COURSE: To understand the use of various features of MS-Word through its applications. To develop the understanding of working with MS-Excel. To design the presentation using MS-power Point. To understand the basic concept and creation of database, table, query & report using MS-Access. To understand the concept of database operations.

- **MS-WORD:** Creating, Editing, Formatting: Font name, size, color, alignment, changing, paragraph settings, change case, Mail Marge, Creating Tables, editing tables, alignment settings in tables.
- **MS-EXCEL:** Creating, Editing, Formatting: font name, size, color, alignment, changing, entering data, Sorting Data, Inserting, renaming and deleting Sheet, Inserting row, column, cell, picture, background, graph, symbol, hyperlink ,object, diagram.
- **MS-POWERPOINT:** Creating, Editing, Formatting: font name, size, color, alignment, changing, Inserting table, picture, background, graph, symbol, hyperlink, object, diagram.
- **MS-ACCESS:** Creating database, table, query, report. Insert, retrieve & edit data.

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1 To understand MS-WORD: Creating, Editing, Formatting	K3
2	CO2. To understand MS-EXCEL: Creating, Editing, Formatting	K3
3	CO3. To understand MS-POWERPOINT: Creating, Editing, Formatting.	K3
4	CO4. To understand MS-POWERPOINT: Creating, Editing, Formatting.	K3
5	CO5.MS-ACCESS: Creating database, table, query, report etc.	K3



BCA 201 – Programming Concepts and C Language

Duration: 3 Hrs.

Marks: 100 (50+20+30)

6 Credits = 4 Th.+ 2 Prac.

60 Lectures+ 30 Prac.

OBJECTIVES OF THE COURSE: To understand the basic terminology used in C programming. To develop programs in C language by writing, compiling and debugging. To develop programs involving simple statements, conditional statements, iterative statements, array, strings, functions, recursion, structure and union. To differentiate between call by value and call by reference. To acquire skills of using dynamic memory allocations, use of pointers and basic operations on a file.

UNIT-I

Lectures: 15

Introduction to problem solving: Concept, Problem solving techniques, Algorithms and Flowcharts. **Introduction to ‘C’ Language:** History, Structures of ‘C’ Programming, Function as building blocks. **Language Fundamentals:** Character set, C Tokens, Keywords, Identifiers, Variables, Constant, Data Types.

UNIT-II

Lectures: 15

Operators: Types of operators, Precedence and Associativity, Expression, Statement and types of statements **Build in Operators and function:** Console based I/O and related built in I/O function, Concept of header files, Preprocessor directives: #include, #define. **Control structures:** Decision control structures: If, If-else, Nested If-else, Switch; Loop Control structures: While, Do-while, for, Nested for loop; Other statements: break, continue, goto, exit statements, Bitwise operator.

UNIT-III

Lectures: 15

Arrays: Definition, declaration and initialization of one dimensional array; Accessing array elements; Displaying array elements; Sorting arrays; Arrays and function; Two -Dimensional array: Declaration and Initialization, Accessing and Displaying, Memory representation of array. **Strings:** Definition, declaration and initialization of strings; standard library function. **Functions:** Basic types of function, Declaration and definition, Function call, Types of function, Parameter passing, Call by value, Call by reference, Scope of variable, Storage classes, Recursion.

UNIT-IV

Lectures: 15

Pointers: Definition, notation, pointers and arrays, array of pointers and functions- call by value and call by reference, pointers to pointers **Structures:** Definition and declaration; Variables initialization; Accessing fields and structure operations; Nested structures; Union: Definition and declaration; Differentiate between Union and structure. **File handling**

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1 To understand Introduction to ‘C’ Language	K2



2	CO2. To learn Types of operators, Precedence and Associativity, Expression	K3, K6
3	CO3. Concept of Control structures, Strings and Arrays	K5, K6
4	CO4. Introduction to Functions and Pointers	K2
5	CO5. To usage of Structures and file handling	K2, K4,

References:

1. Yashwant Kanetkar, Let us C”, BPB Publications.
2. E. Balagurusamy, “Programming in ANSI C”, TMH.
3. Vikas Verma, Work Book on C, Cengage Publication.
4. D.S. Yadav & S.K. Bajpai ,Introduction to Computers and C Programming, New Age Publication.
5. Kamthane, Programming in C, Pearson Education.
6. Kernighan and Dennis M. Ritchie, The C Programming Language, Pearson Education.
7. B. Kernighan and D. Ritchie, The ANSI C Programming Language, PHI.



LAB I: PROGRAMMING IN C

2 Credits = 2 Prac.

Duration: 2 hrs.

Marks: 20 30 Prac.

OBJECTIVES OF THE COURSE: To understand the basic terminology used in C programming. To learn programs in C language by writing, compiling and debugging. To develop programs involving simple statements, conditional statements, iterative statements, array, strings, functions, recursion, structure and union. To learn implementation of call by value and call by reference. To develop programs by using of pointers and basic operations on a file.

- Data types, operators and expressions.
- Control Structure: Loop Control, Case Control.
- Terminal Input/output Functions. Pattern design.
- Functions and parameter passing.
- Array handling.
- String handling.
- Pointers, structures and union.
- File Handling.

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1 To understand Data types, operators and expressions.	K3
2	CO2. To apply Control Structure: Loop Control, Case Control.	K3
3	CO3. To use Array handling and String handling.	K3
4	CO4. To apply Functions and parameter passing.	K3
5	CO5. To understand and implement Pointers, structures, union, File Handling.	K2, K3



BCA 202 –Data Structures

Duration: 3 hrs.

Marks: 100 (50+20+30)

6 Credits = 4 Th.+ 2 Prac.

60 Lectures+ 30 Prac.

OBJECTIVES OF THE COURSE: To develop the understanding of data structures. To learn the applications of various data structures. To be familiar with utilization of data structure techniques in problem solving. To implement them using C programming language.

UNIT-I

Lectures: 15

Introduction to Data Structure and its Characteristics: Array, Representation of single and multidimensional arrays; Stack: Array representation and Implementation of Stack, Operation on Stack: Push and Pop, Stack application. Infix, postfix, prefix expressions; Evaluation of postfix expression; Conversion between prefix, infix and postfix

UNIT-II

Lectures: 15

Introduction and primitive operation on queues, priority queues. Enqueue, Dequeue, Queue front, Queue Rear, Create Queue, Insert Data into Queue, Delete Data from Queue, Retrieve data at front of Queue, Queue Empty, Full Queue.

UNIT-III

Lectures: 15

Lists: Introduction to linked lists; Sequential and linked lists, operations such as traversal, insertion, deletion searching, Two way lists and Use of headers. Trees Introduction and terminology; Traversal of binary trees; Recursive algorithms for tree operations such as traversal, insertion, deletion; Binary Search Tree.

UNIT-IV

Lectures: 15

B-Trees: Introduction, The invention of B-Tree; Statement of the problem; Indexing with binary search trees; a better approach to tree indexes; B-Trees; working up from the bottom; Example for creating a B-Tree. Sorting Techniques; Insertion sort, selection sort, merge sort, heap sort, searching Techniques: linear. search, binary search and hashing

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1 Identify user defined data types, linear data structures for solving realworld problems.	K2
2	CO2. Write modular programs on nonlinear data structures and algorithms for solving engineering problems efficiently.	K3
3	CO3. State what is an undirected graph, directed graph and apply BFS and DFS to traverse a graph	K2
4	CO4. Introduction to Functions and Pointers	K2
5	CO5. Demonstrate knowledge of sorting algorithms and their run-time complexity	K3

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2. Seymour Lipschutz, Data Structure, McGraw-Hill Education.
3. Richard F. Gilberg | Behrouz A. Forouzan, Data Structures: A Pseudocode Approach with C, Cengage.
4. R.S.Salaria, “ Data Structures & Algorithms” , Khanna Book Publishing Co. (P) Ltd.
5. Y.Langsam et. Al., “ Data Structures using C and C++” , PHI.



LAB II: DATA STRUCTURE

Duration: 2 hrs.

2 Credits = 2 Prac.
Marks: 20 30 Prac.

OBJECTIVES OF THE COURSE: To make programs that use array, linked structures, stacks, queues. To compare and contrast the benefits of dynamic and static data structures implementations. To demonstrate organization of information using Trees and also to perform different operations on these data structures.

- Sorting programs: Bubble sort, Merge sort, Insertion sort, Selection sort, and Quick sort.
- Searching programs: Linear Search, Binary Search.
- Array implementation of Stack, Queue, and Linked List.
- Implementation of Stack, Queue, Linked List using dynamic memory allocation.
- Implementation of Binary tree.
- Tree Traversals (preorder, in order, post order).

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1 To make programs that use array, linked structures, stacks, queues	K3
2	CO2. Touse Sorting programs: Bubble sort, Merge sort, Insertion sort, Selection sort, and Quick sort.	K3
3	CO3. Array implementation of Stack, Queue, and Linked List.	K3
4	CO4. Implementation of Stack, Queue, Linked List using dynamic memory allocation	K3
5	CO5. To Implementation of Binary tree and Tree Traversals	K2, K3



BCA 301 – Object Oriented Programming Using C++

Duration: 2 hrs.

Marks: 100 (50+20+30)

6 Credits = 4 Th.+ 2 Prac.

60 Lectures + 30 Prac.

OBJECTIVES OF THE COURSE: To understand the need and significance of OOP. To develop, debug and document programs using OOP paradigms. To apply concepts and techniques for implementation using C++. To Implement the Real Life Problems using Object Oriented Techniques.

UNIT-I Lectures: 15

Principles of Object-Oriented Programming: Procedure-Oriented Programming, Object-Oriented Programming, Basic Concepts of Object-Oriented Programming, Benefits of OOP, Beginning of C++: Structure of C++ Program, Creating the Source File, Compiling and Linking, Tokens, Expressions and Control Structure.

UNIT-II Lectures: 15

Functions in C++: Main Function, Function Prototyping, Call by Reference, Return by Reference, Inline Functions, Recursion, Function Overloading, Friend and Virtual Functions. Classes and Objects: Specifying a Class, Defining Member Functions, Making an Outside Function Inline, Nesting of Member Functions, Private Member Functions, Arrays within a Class, Arrays of Objects, Friend Functions, Returning Objects, Const Member Functions, Pointers to Members, Constructors and Destructors.

UNIT-III Lectures: 15

Operator Overloading and Type Conversions, Inheritance: Extending Classes: Defining Derived Classes, Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Member Classes: Nesting of Classes. Pointers, Virtual Functions and Polymorphism.

UNIT-IV Lectures: 15

Managing Console I/O Operations: C++ Streams, C++ Stream Classes, Unformatted I/O Operations, Formatted Console I/O Operations, Managing Output with Manipulators. Working with Files, File Pointers and their Manipulations Sequential Input and Output Operations, Updating a File: Templates and Exception Handling.

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1 Identify importance of object oriented programming and difference between structured	K2
2	CO2. Creating simple programs using classes and objects in C++.	K3, K5



3	CO3. Implement Object Oriented Programming Concepts in C++	K3, K5
4	CO4. Able to make use of objects and classes for developing programs.	K2
5	CO5 Able to use various object oriented concepts to solve different problems.	K2,K4,

References:

1. E Balagurusamy "Object Oriented Programming with C++" McGraw Hill Education.
2. *James R Rumbaugh*, Michael R, Object - Oriented Modeling and Design With UML, Pearson.
3. A.R.Venugopal, Rajkumar, T. Ravishanker"Mastering C++", TMH.
4. S.B.Lippman&J.Lajoie, " C++ Primer", Addison Wesley.
5. R.Lafore, "Object Oriented Programming using C++", Galgotia Publications.



LAB I: Object Oriented Programming Using C++

2 Credits = 2 Prac.

Duration: 2 hrs.

Marks: 20

30 Prac.

OBJECTIVES OF THE COURSE: To differentiate between structures oriented programming and object oriented programming. To understand and apply various object oriented features like inheritance, data abstraction, encapsulation and polymorphism to solve various computing problems using C++ language. To apply concepts of operator-overloading, constructors and destructors. To apply object-oriented concepts in real world applications.

- Basic statements like control statements, looping statements, various I/O statements and various data structures in C++.
- Creating classes in C++ for understanding of basic OOPS features.
- Representing concepts of data hiding, function overloading and operator overloading.
- Using memory management features and various constructors and destructors.
- Representing Inheritance, virtual classes and polymorphism.
- Writing generic functions.
- File handling programs.

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1 Basic statements like control statements, looping statements, various I/O statements and various data structures in C++	K2,K3
2	CO2. Creating simple programs using classes and objects in C++.	K3
3	CO3. Implement Object Oriented Programming Concepts in C++	K3
4	CO4. Representing concepts of data hiding, function overloading and operator overloading.	K3
5	CO5 Representing Inheritance, virtual classes and polymorphism.	K3



BCA 302- Database Management System

Duration: 3 hrs.

Marks: 100 (50+20+30)

6 Credits = 4 Th.+ 2 Prac.

60 Lectures + 30 Prac.

OBJECTIVES OF THE COURSE: To define the fundamental concepts of database management system. To execute manually a given (simple) database design & transaction over it. To implement (simple) algorithms and data structures as database transaction. To introduce the concept of DBMS and providing a general introduction to relational model. To understand & learn SQL. To understand the concept of normalization.

Unit- I

Lectures: 15

Introduction: An overview of database management system, Database System Vs File System, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DML, Overall Database Structure. Concepts of keys.

Unit- II

Lectures: 15

Data Modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, relationships of higher degree. Relational data Model and Language: Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus, Generalization, aggregation.

Unit- III

Lectures: 15

Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators and their procedure, Tables, views and indexes, Queries and sub queries, Aggregate functions, Insert, update and delete operations, Joins, Unions, Intersection, Minus.

Unit- IV

Lectures: 15

Data Base Design & Normalization: Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependencies, normalization using FD, MVD, and JDs, alternative approaches to database design. Transaction Processing Concepts: Transaction system, Database Concurrency, Database Recovery.



Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1 To understand overview of database management system	K2
2	CO2. Effectively explains the basic concepts of databases and data models.	K3
3	CO3. Develops an Entity-Relationship model based on user requirements	K3, K5
4	CO4. Able to comprehend how to use Structured Query Language (SQL) to define and manipulate database information	K2
5	CO5 Able to describe and develop Relational Algebra and Relational Calculus queries and Data Base Design & Normalization	K2,K4,

References

1. Date C J, "An Introduction To Database System", Addison Wesley
2. Korth, Silbertz, Sudarshan, "Database Concepts", Tata Mcgraw-hill Education (India) Pvt. Ltd.
3. Elmasri, Navathe, "Fundamentals Of Database Systems", Pearson Education New Delhi India.
4. Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication Pvt. Ltd. New Delhi.
5. Majumdar & Bhattacharya, "Database Management System", Tata Mcgraw-hill Education (India) Pvt. Ltd.



LAB II: DBMS

2 Credits = 2 Prac.

Duration: 2 hrs.

Marks: 20

30 Prac.

OBJECTIVES OF THE COURSE: To understand the fundamental concepts of database management system. To understand the concept of entity-relationship. To create and manage database/tables. To create and querying of database tables for various cases. To retrieve data from multiple tables. To handle the aggregate functions. To understand the concept of normalization and dependencies.

- Creating Entity-Relationship Diagram using case tools.
- Creation and querying & managing database tables
- Writing SQL statements.
- Restricting and sorting data.
- Displaying data from multiple tables.
- Aggregating data using group function.
- Manipulating data.
- Design of tables by normalization and dependency analysis.

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1 Apply the basic concepts of Database Systems and ER model.	K3
2	CO2 Use the basics of SQL and construct queries using SQL in database creation and interaction.	K3
3	CO3. Design a commercial relational database system (Oracle, MySQL) by writing SQL using the system.	K3
4	CO4. Concept of concurrency control and transaction management.	K3
5	CO5 Analyze and Select storage and recovery techniques of database system.	K3



BCA 303–Digital Electronics and Computer Organization

Duration: 3 hrs.

Marks: 100 (70+30)

**6 Credits = 5 Th.+1Tut.
75 Lectures +15Tut.**

OBJECTIVES OF THE COURSE: To understand the basic structure and operation of digital computer. To study the design of arithmetic and logic unit and implementation of fixed point and floating-point arithmetic operations. To study the two types of control unit techniques & processor organization. To study the hierarchical memory system including cache memories and virtual memory. To study the different ways of communicating with I/O devices and standard I/O interfaces.

UNIT-I

Lectures: 19

Logic gates; Demorgan's laws; Boolean laws, Circuit designing techniques (SOP, POS, K-Map). Combinational Building Blocks: Multiplexes; Decoder; Encoder; Adder and Subtractor. Sequential Building Blocks: Flip-Flop. Registers & Shift registers. Counter. Register Transfer Language, Bus and Memory Transfers, Bus Architecture, Bus Arbitration, Arithmetic Logic, Shift Microoperations, Arithmetic Logic Shift Unit. Arithmetic Algorithms (addition, subtraction, Booth Multiplication), IEEE standard for Floating point numbers.

UNIT-II

Lectures: 19

Control Design:

Hardwired & Micro Programmed (Control Unit): Fundamental Concepts (Register Transfers, Performing of arithmetic or logical operations, Fetching a word from memory, storing a word in memory), Execution of a complete instruction, Multiple-Bus organization, Hardwired Control, Micro programmed control (Microinstruction, Microprogram sequencing, Wide-Branch addressing, Microinstruction with Next address field, Prefetching Microinstruction).

UNIT-III

Lectures: 18

Processor Design:

Processor Organization: General register organization, Stack organization, Addressing mode, Instruction format, Data transfer & manipulations, Program Control, Reduced Instruction Set Computer.

UNIT -IV

Input-Output and Memory Organization:

Lectures: 19

I/O Interface, Modes of transfer, Interrupts & Interrupt handling, Direct Memory access, Input-Output processor, Serial Communication. Memory Organization: Memory Hierarchy, Main Memory (RAM and ROM Chips), Introduction to 2D and 1/2D, Auxiliary memory, Cache memory, Virtual Memory, Memory management hardware.

Course Outcome: After successful completion of this course students will be able to:



S. No.	Course Outcome	Bloom's Taxonomy
1	CO1 To understand Logic gates, Demorgan's laws, Boolean laws.	K2, K3
2	CO2. To Understand concept of Hardwired & Micro Programmed.	K2, K5
3	CO3. To understand and examine the structure of various number systems and its application in digital design.	K3, K5
4	CO4. The ability to identify and prevent various hazards and timing problems in a digital design.	K5
5	CO5 The ability to understand, analyze and design various combinational and sequential circuits and Input-Output and Memory Organization.	K2, K4,

References:

1. M. Morris Mano, Digital Logic Design, Pearson.
2. Vravice, Zaky & Hamacher, Computer Organization, TMH Publication.
3. Tannenbaum, Structured Computer Organization, PHI.
4. Stallings, Computer Organization, PHI.
5. M. Morris Mano, Computer System Architecture, Pearson.
6. John P. Hayes, Computer Organization, McGraw Hill.



BCA 304 - Numerical Methods

2 Credits = 2Th.

Duration: 2 hrs.

Marks: 50 (35+15)

30 Lectures

OBJECTIVES OF THE COURSE: To develop a thorough understanding of the methods of numerical differentiation and integration. To get exposed to finite differences and interpolation. To solve the root of the equations using the different methods are Bisection, False & Newton's Raphson method. To solve linear equations using elimination & iterative methods.

UNIT-I

Lectures: 6

Roots of Equations: Bisections Method, False Position Method, Newton's Raphson Method, Rate of convergence of Newton's method.

UNIT-II

Lectures: 8

Interpolation and Extrapolation: Finite Differences, The operator E, Newton's Forward and Backward Differences, Newton's dividend differences formulae, Lagrange's Interpolation formula for unequal Intervals, Gauss's Interpolation formula, Starling formula, Bessel's formula, Laplace- Everett formula.

UNIT-III

Lectures: 8

Numerical Differentiation Numerical Integration: Introduction, direct methods, maxima and minima of a tabulated function, General Quadratic formula, Trapezoidal rule, Simpson's One third rule, Simpson's three- eight rule.

UNIT-IV

Lectures: 8

Solution of Linear Equation: Gauss's Elimination method and Gauss's Siedel iterative method. Solution of Differential Equations: Euler's method, Picard's method, Fourth order Ranga – Kutta method.

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1. Apply numerical methods to find our solution of algebraic equations using different methods under different conditions, and numerical solution of system of algebraic equations.	K3
2	CO2. Apply various interpolation methods and finite difference concepts.	K3
3	CO3 Work out numerical differentiation and integration whenever and wherever routine methods are not	K3



	applicable.	
4	CO4. Work numerically on the ordinary differential equations using different methods through the theory of finite differences.	K3
5	CO5 Work numerically on the partial differential equations using different methods through the theory of finite differences and Solution of Linear Equation	K3

References:

1. Scarbourogh, "Numerical Analysis".
2. Arun Kumar Jalan, Utpal Sarkar, Numerical Methods: A Programming Based Approach, Universities Press.
3. Gupta & Bose S.C. "Introduction to Numerical Analysis", Academic Press, Kolkata,
4. S.S. Shashtri, "Numerical Analysis", PHI.
5. Rajaraman V., "Computer Oriented Numerical Methods", PHI.
6. Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations", New Age Int.



BCA 401 –Programming in Java

Duration:2 hrs.

Marks: 100 (50+20+30)

6 Credits = 4 Th.+ 2 Prac.
60 Lectures + 30 Prac.

OBJECTIVES OF THE COURSE: To understand Object Oriented Concepts using Java Language. To develop, debug and document programs in Java using OOP paradigms. To develop and deploy applications and applets in JAVA. To develop and deploy GUI using JAVA Swing and AWT.

UNIT-I

Lectures: 15

Java Programming: Data types, control structured, arrays, strings, and vector, classes (inheritance, packages and Interfaces, exception handling) multithreaded programming.

UNIT-II

Lectures: 15

Java applets, AWT controls (Button, Labels, Combo box, list and other Listeners, menu bar) layout manager, string handling (only main functions), Introduction to JAVA Swing, Event Handling.

UNIT-III

Lectures: 15

Networking (datagram socket and TCP/IP based server socket) event handling, Introduction of RMI (Remote Method Invocation). JDBC: Introduction, Drivers, Establishing Connection, Connection Pooling.

UNIT-IV

Lectures: 15

Introduction to JDBC.Java Servlets:Introduction, HTTP Servlet Basics, The Servlet Lifecycle, Retrieving Information, Sending HTML Information, Session Tracking, Database Connectivity.

Java Server Pages:Introducing Java Server Pages, JSP Overview, Setting Up the JSP Environment,Generating Dynamic Content, Using Custom Tag Libraries and the JSP Standard Tag Library, Processing Input and Output.

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1. Understand and explain the basics of Java as data-types, control structures, strings, etc. and their use.	K1,K2
2	CO2.Comprehend, demonstrate and apply the fundamentals of Object-Oriented programming in Javaand other core Javaconcepts as exception handling, multi-threading, etc.	K2, K3
3	CO3. Familiarize with concepts of Java applets, AWT controls, event-handling, basics of Swings, and be able to develop small applications using them.	K2, K3



4	CO4. Comprehend and be able to implement Networking concepts in JAVA and understand fundamentals of RMI.	K1, K2, K3
5	CO5. Understand and be able to handle JAVA Database connectivity using JDBC.	K2, K3
6	CO6. Describe, understand and be able to develop interactive web applications in JAVA using concepts of Servlets, JSPs and related libraries.	K2, K3

References:

1. Patrick Naughton and Herbertz Schildt, "Java-2 The Complete Reference", TMH.
2. E. Balagurusamy, Programming With Java : A Primer, TMH.
3. Shelley Powers, "Dynamic Web Publishing", Techmedia.
4. Ivor Horton, "Beginning Java-2" SPD Publication.
5. Jason Hunter, "Java Servlet Programming" O'Reilly



LAB I: Java Programming

2 Credits = 2 Prac.

Duration: 2 hrs.

Marks: 20

30 Prac.

OBJECTIVES OF THE COURSE: To implement Object Oriented Concepts using Java Language. To develop and deploy applications and applets in JAVA. To develop and deploy GUI using JAVA Swing and AWT, JDBC. To develop and deploy web applications.

- Class, object, abstract classes and interfaces.
- Overloading, overriding and various forms of inheritance.
- Create packages and multiple threads in Java.
- Input/output and Applets.
- Exception handling.
- String handling.
- Event handling (Mouse and Keyboard events).
- Layout Manager create different applications.
- Create and manipulate Text Area, Canvas, Scroll Bars, Frames and Menus using swing/AWT
- Client Server Interaction with stream socket connections.
- Read data from disk file.



BCA 402-Web Technology

Duration: 2 hrs.

Marks: 100 (50+20+30)

6 Credits = 4 Th.+ 2 Prac.

60 Lectures + 30 Prac.

OBJECTIVES OF THE COURSE: To understand the concept of Web Application Development and its Architecture. To understand the Essentials of Web Application Development. To understand and practice web page designing techniques. To understand the differences between client side & server side technologies to develop Web Application.

UNIT I-INTRODUCTION & WEB DESIGN

Lectures: 15

Introduction: Concept of WWW, Internet and WWW, HTTP Protocol: Request and Response, Web browser and Web servers, Features of Web 2.0

Web Design: Concepts of effective web design, Web design issues including Browser, Bandwidth and Cache, Display resolution, Look and Feel of the Website, Page Layout and linking, User centric design, Sitemap, Planning and publishing website, Designing effective navigation.

UNIT II- HTML & STYLE SHEETS

Lectures: 15

HTML: Basics of HTML, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, forms, XHTML, Meta tags, Character entities, frames and frame sets, Browser architecture and Web site structure. Overview and features of HTML 5. Style sheets : Need for CSS, introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS, CSS2, Overview and features of CSS3.

UNIT III- JAVASCRIPT & XML

Lectures: 15

JavaScript : Client side scripting with JavaScript, variables, functions, conditions, loops and repetition, Pop up boxes, Advance JavaScript: JavaScript and objects, JavaScript own objects, the DOM and web browser environments, Manipulation using DOM, forms and validations, DHTML : Combining HTML, CSS and JavaScript, Events and buttons XML: Introduction to XML, uses of XML, simple XML, XML key components, DTD and Schemas, Using XML with application. Transforming XML using XSL and XSLT

UNIT IV- MYSQL

Lectures: 15

Basic commands, Connection to server, creating database, selecting a database, listing database, listing table names, creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, and database bugs.

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1. Explain basics of web development strategies, protocols governing Web and fundamentals of web-design.	K1,K2
2	CO2.Describe features of HTML and CSS and be able to	K2, K3



	design simple web pages using them.	
3	CO3. Describe and comprehend JavaScript and XML concepts/features and be able to design web pages using HTML, XML, CSS and JavaScript.	K2, K3
4	CO4. Understand and be able to handle database(MySQL) over web.	K2, K3

References:-

1. Developing Web Applications, Ralph Moseley and M. T. Savaliya, Wiley-India
2. Web Technologies, Black Book, Dreamtech Press
3. HTML 5, Black Book, Dreamtech Press
4. Web Design, Joel Sklar, Cengage Learning.
5. C. Xavier, Web Technology and Design, New Age Publication
6. E. Bayross, Web Technology, BPB Publication.



خواجہ معین الدین چشتی اردو، عربی-فارسی یونیورسٹی، لکھنؤ، اترپردیش، ہندوستان
ख्वाजा मुईनुद्दीन चिश्ती उर्दू، अरबी-फ़ारसी विश्वविद्यालय, लखनऊ, उत्तर प्रदेश, भारत
KHWAJA MOINUDDIN CHISHTI URDU, ARABI-FARSI UNIVERSITY, LUCKNOW, U.P., INDIA
U.P. STATE GOVERNMENT UNIVERSITY
(RECOGNISED U/S 2(F) & 12(B) OF THE UGC ACT 1956 & B.TECH. APPROVED BY AICTE)

LAB II: Web Technology

2 Credits = 2 Prac.

Duration: 2 hrs.

Marks: 20

30 Prac.

OBJECTIVES OF THE COURSE: To develop the concept of Web Application and its architecture. To understand the Essentials of Web Application Development. To implement and practice web page designing techniques. To develop and deploy the differences between client side & server side technologies to develop Web Application.

- Practice Tags and basic structure of HTML files.
- Develop the concept of basic and advanced text formatting.
- Practice the use of multimedia components in HTML documents.
- Designing of webpage-Document Layout, Working with List, Working with Tables.
- Practice Hyper linking, Designing of webpage-Working with Frames, Forms and Controls.
- Prepare creating style sheet, CSS properties, Background, Text, Font and styling etc.
- Working with List, HTML elements box, Positioning and Block properties in CSS.
- Designing with cascading style sheet-Internal and External style sheet.



BCA 403-Operating System

Duration: 3 hrs.

Marks: 100 (70+30)

**6 Credits = 5 Th.+1Tut.
75 Lectures +15Tut.**

OBJECTIVES OF THE COURSE: To develop the understanding of the structure and functioning of Operating System. To learn about Processes, Threads and Scheduling algorithms. To understand the principles of concurrency and Deadlock. To learn various memory management schemes. To study I/O management and File systems.

UNIT-I

Lectures: 19

INTRODUCTION Evolution of Operating System, Operating System Structure, types of Operating System: Batch Processing, Multiprogramming, Timesharing, Distributed System, Real Time System. Process: Concepts, Process control blocks, concurrency, mutual exclusion, semaphores, Interprocess Communication, Process Synchronization.

UNIT-II

Lectures: 18

Processor management techniques; Threads, Process Scheduling, Scheduling Criteria types of scheduling, scheduling algorithms, Deadlocks, Deadlocks Prevention, Deadlocks Avoidance, Deadlocks Detection.

UNIT-III

Lectures: 19

Memory Management: Real storage, Contiguous Vs. Non Contiguous storage allocation, Static and Dynamic Partitioned memory allocation; Virtual memory, management of virtual memory, Paging, Segmentations, Segmentation with Paging.

UNIT-IV

Lectures: 19

I/O Management: Disk Organization, disk space management, disk scheduling, Files types and operations, File access and security, File storage Management, File Organization, Operating System security, Case Study of UNIX/LINUX OS.

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1. Understand the structure, functions and types of Operating Systems and fundamental concepts of a Process.	K1,K2
2	CO2. Describe and learn about processes, threads, compare scheduling algorithms and explain deadlock concepts.	K2,K4
3	CO3. Describe and comprehend various memory management and allocation schemes.	K2,K4
4	CO4. Summarize and study various I/O management and File systems.	K2,K4



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ख्वाजा मुईनुद्दीन चिश्ती उर्दू، अरबी-फ़ारसी विश्वविद्यालय, लखनऊ, उत्तर प्रदेश, भारत
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References:

1. Silberschatz and Galvin, “ Operating System Concepts”, Pearson.
2. Madnick E., Donovan J., “ Operating Systems:”,Tata McGraw Hill.
3. H.M. Deitel, Operating Systems, Prentice-Hall.
4. Tannenbaum, “Operating Systems”, PHI.
5. D.M. Dhamdhare, Operating Systems A Concept Based Approach, TMH.



BCA 404 - Optimization Techniques

Duration: 2 hrs.

Marks: 50 (35+15)

2 Credits = 2Th.
30 Lectures

OBJECTIVES OF THE COURSE: To define the term optimize is “to make perfect”. To solve the linear programming problems and to apply the management application. To study of queuing theory for waiting lines or queues. To understand the replacement theory for decision making process of replacing used equipment with a substitute. To understand the concept of job sequencing.

UNIT-I

Lectures: 8

Introduction: Optimization Technique, History, Advantages and Limitations.

Linear programming

Central Problem of linear Programming various definitions included Statements of basic theorem and also their properties, simplex methods, primal and dual simplex method, transport problem.

Management Application: NWCR, LC Cell Method, VAM, tic-tac problem, and its solution. Assignment problem and its solution. Graphical Method Formulation,

UNIT-II

Lectures: 8

Queuing Theory

Characteristics of queuing system Poisson Process, Classification of Queuing Model Single Channel Queuing Theory, list of Symbols, Model I (M/M/I), (N/FC FS), Birth and Death Model, Model II (M/M/I), (N/FC FS) Finite Queue Length Model. Generalization of steady state M/M/1 queuing models (Model-I, Model-II).

UNIT-III

Lectures: 8

Replacement Theory

Replacement of item that deteriorates replacement of items that fail. Group replacement and individual replacement. **Inventory Theory** Cost involved in inventory problem- single item deterministic model economics long size model without shortage and with shorter having production rate infinite and finite.

UNIT-IV

Lectures: 6

Job Sequencing

Introduction, solution of sequencing problem Johnson s algorithm for n jobs through 2 machines

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1. Understand concepts of optimization techniques and explain fundamental concepts of linear programming and management applications problems and solutions	K1, K2, K5



2	CO2.Describe and comprehend concept of queuing theoryand evaluate queuing models.	K2, K5
3	CO3. Understand and analyze concepts and problems of inventory and replacement theory.	K2, K4
4	CO4.Understand and familiarize with fundamentals of Job Sequencing and solve related problems.	K2, K3

References:

1. Gillet B.E. “Introduction to Operation Research”, TMH.
2. Taha,H.A. “Operation Research - an introduction”, Pearson.
3. Kanti Swarup “Operation Research”, S. Chand.
4. S.D.Sharma “Operation Research”, Kedarnath, Ramnath &Co.
5. M Prabhakaran, Optimization Technique, Pragati.



BCA 501 - Software Engineering

Duration: 2 hrs.

Marks: 100 (50+20+30)

**6 Credits = 4 Th.+ 2 Prac.
60 Lectures + 30 Prac.**

OBJECTIVES OF THE COURSE: To understand the basic methodologies involved in the development and maintenance of software over the entire life cycle like requirements engineering and Analysis Modeling different design techniques and their implementation. To learn various testing and maintenance measures. To understand Project management and Quality Assurance plan.

UNIT-I Lectures: 15

Introduction to Software Engineering: The Evolving role of software. Software characteristics and applications, Evolution of Software Engineering, Software crisis, Software Engineering problems, Software development life cycle. Software Engineering Paradigms, Software Process, Project and Products.

Planning a Software Project: Cost Estimation (COCOMO and Function Points Model), Project Scheduling, Staffing and Personnel Planning, Software Configuration Management Plan, Quality Assurance Plans, Project Monitoring Plans, Risk Management.

UNIT-II

Lectures: 15

Software Design: Design objectives and principles, Design for Reuse & Change, Design Methodology: Structured Design and Object-oriented approach. Module level concepts: Coupling and Cohesion. Design Notation and specification, Metrics, Design validation & verification, Metrics. Detailed Design: Module specification, Detailed Design, Verification and Metrics (Cyclomatic Complexity, Data Bindings, Cohesion Metric).

UNIT-III Lectures: 15

Software Implementation: Implementation issues, Coding. Programming Practices: Structured coding and object oriented coding techniques, Modern programming language features. Verification and Validation techniques (Code reading, Static Analysis, Symbolic Execution, Proving Correctness, Code Inspections or Reviews, Unit Testing). Coding: Programming Principles and guidelines, Coding Process Metrics: Size Measures, Complexity Metrics, Style Metrics. Documentation: Internal and External Documentation.

UNIT-IV Lectures: 15

Software Testing, Maintenance and Quality Assurance: Error, Fault and Failure, Test Oracles, Test Case and Test Criteria, Psychology of Testing. Testing Objectives and Principles, Test Case Design. Approaches to Software Testing, Black Box testing and White Box testing. Testing Process: Comparison of Different Techniques, Levels of Testing, Test Plans, Test Case Specifications, Test Case Execution and Analysis. Software Reliability, Software Maintenance, Software Quality Assurance.

Course Outcome: Upon successful completion of this course students should acquire the following course outcomes.



Sl. No.	Course Outcomes (COs)	Blooms Taxonomy
1	To understand the methodologies involved in the development and maintenance of software over the entire life cycle.	K2
2	To understand and apply the different design techniques and their implementation.	K3
3	To analyze fundamental concepts of requirements engineering and Analysis Modeling.	K4
4	To apply knowledge of generic models of software development process.	K3
5	To judge various testing and maintenance measures. To understand Project management and Quality Assurance plan.	K5

References:

1. R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
2. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
3. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
4. R. A. Khan, A. Agrawal, Software Engineering: A Practitioner Approach, NarosaPulication.
5. PankajJalote, Software Engineering, Wiley .
6. Ian Sommerville, Software Engineering, Addison Wesley.



خواجہ معین الدین چشتی اردو، عربی-فارسی یونیورسٹی، لکھنؤ، اترپردیش، ہندوستان
خواجه مؤین الدین چشتی اردو، عربی-فارسی ویسویعیالی، لکھنؤ، اتر پردیش، ہارٹ
KHWAJA MOINUDDIN CHISHTI URDU, ARABI-FARSI UNIVERSITY, LUCKNOW, U.P., INDIA
U.P. STATE GOVERNMENT UNIVERSITY
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LAB: Minor Project (based on Software Engineering)

2 Credits = 2 Prac.

Duration: 2 hrs.

Marks: 20

30 Prac.

OBJECTIVES OF THE COURSE: To help students develop openness to new ideas in computer science. To develop the ability to draw reasonable inferences from observations and learn to formulate and solve new computer science problems using analytical and problem-solving skills. To help students acquire the necessary competences to build a real-life software system by completing different software life cycle phases (like, specification, architecture, design, implementation, validation, documentation, etc).



BCA 502 - Computer Networks

Duration: 3 hrs.

Marks: 100 (70+30)

6 Credits = 5 Th.+1Tut.
75 Lectures +15Tut.

OBJECTIVES OF THE COURSE: To introduce the concepts, terminologies and technologies used in data communication and computer networking. To study and analyze the OSI and TCP/IP Protocol Suites. To be familiar with the data transmission processes, transmission media and tools. To get familiarized with different routing protocols, congestion control protocols and network performance issues.

UNIT-I Lectures: 19

Basic Concepts: Components of data communication, Standards and organizations. Data representation, Data Flow, Topology, Types of Networks, Switching, Models: **OSI and TCP/IP**, Layers and their functions, comparison of models. Digital Transmission and Analog Transmission media.

UNIT-II Lectures: 19

Error Detection and Correction, Cyclic Code, Polynomial, Checksum, Data Link Control, Framing, Flow and error control, Connection less and Connection oriented, Data link layer Protocol: Simple, Stop and Wait, Piggy Backing. PPP.

UNIT-III Lectures: 18

Network Layer: Internet Protocol: Datagram Format, Fragmentation, IPv4, IPv6. Error, Reporting, and Multicasting, Delivery, Forwarding, and Routing.

UNIT-IV Lectures: 19

Transport Layer: Process-to-Process Delivery: UDP, TCP, and SCTP, Congestion Control and Quality of Service.

Application Layer: Domain Name System, Remote Logging, Electronic Mail, and File Transfer, WWW and HTTP, SNMP, Multimedia.

Course Outcome: Upon successful completion of this course students should acquire the following course outcomes.

Sl. No.	Course Outcomes (COs)	Blooms Taxonomy
1	To understand the basic concepts of networking	K2
2	Examine and analyze various protocols like transport-layer concepts: Transport-Layer services -Reliable vs. un-reliable data transfer -TCP protocol -UDP protocol	K4
3	Examine and synthesize the following network-layer concepts: - Network-Layer services -Routing -IP protocol -IP addressing	K3



4	Examine and evaluate the following link-layer and local area network concepts: -Link-Layer services –Ethernet -Token Ring -Error detection and correction -ARP protocol	K5
5	Analyze and implement applications of network system.	K4

References:

1. A.S.Tanenbaum, “Computer Networks”; Pearson Education Asia.
2. Brijendra Singh, “ Data Communication and Computer Networks”, PHI.
3. Behrouz A. Forouzan, “Data Communication and Networking”, Tata MCGraw Hill.
4. Forouzan, “Computer Network”, Tata MCGraw Hill.
5. Kurose “Computer Networking”, Pearson.



BCA 601: E-Commerce

Duration: 3 hrs.

Marks: 100 (70+30)

**6 Credits = 5 Th.+1Tut.
75 Lectures +15Tut.**

OBJECTIVES OF THE COURSE: To introduce the concepts of E-Commerce infrastructure. To understand security concerns in E-Commerce. To gain technical understanding of Electronic Payment Systems.

UNIT-I Lectures: 19

Introduction to E-Commerce: Fundamental of e-commerce, Brief history of e-commerce, Impact of e-commerce, Benefits and limitations of e-commerce, Classification of ecommerce: Inter organizational e-commerce, Intraorganizational e-commerce, Business to Business electronic commerce, Business to Customer electronic commerce and Collaborative commerce, Mobile Commerce etc., Applications of e-commerce technologies, E-Commerce Business models.

UNIT-II Lectures: 19

E-Commerce Infrastructure: Framework of e-commerce, I-Way Concept, EC Enablers, Review of the Internet structure, the TCP/IP Protocol Suite, The client/server model, Review of the architectural components of World-Wide Web, Proxy servers, Internet call centers, cookies, Agents in e-commerce and their role, Network infrastructure for ecommerce: Intranets and their applications, Extranets and their applications, Virtual Private Networks (VPNs), Internet-based VPNs, Firewalls and their types

UNIT-III Lectures: 19

Security in E-Commerce: Issues in Network and Transaction Security, Cryptography and Cryptanalysis, Symmetric and Public Key Cryptographic systems, Authentication protocols, Public Key Infrastructure (PKI), Integrity and Non-repudiation, Digital Certificates, Digital Signatures, Electronic mail security, Security protocols for web commerce: SSL, SET etc.

UNIT-IV Lectures: 18

Electronic Payments: Introduction to Money, The nature of money, Overview of electronic payment systems, Limitations of traditional payment instruments, Electronic payment requirements, Micro payments, Online payment systems, Card-based payment systems.

Course Outcome: Upon successful completion of this course students should acquire the following course outcomes.

COs	CO Statement	Bloom's Taxonomy
CO1	Illustrate the major categories and trends of ecommerce applications and Examine the essential processes of an e-commerce system.	K1,K2
CO2	To Understand E-Commerce Architecture.	K2
CO3	Analyze the basic concepts of cryptography and network security and classify attacks on a network. .	K2,K4
CO4	Define various electronic payment types and associated security risks and the ways to protect against them.	K1,K2



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ख्वाजा मुईनुद्दीन चिश्ती उर्दू، अरबी-फ़ारसी विश्वविद्यालय, लखनऊ, उत्तर प्रदेश, भारत
KHWAJA MOINUDDIN CHISHTI URDU, ARABI-FARSI UNIVERSITY, LUCKNOW, U.P., INDIA
U.P. STATE GOVERNMENT UNIVERSITY
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References:

1. David Whiteley, " E-Commerce", Tata McGraw Hill.
2. Ravi Kalakota, Electronic Commerce, Pearson.
3. GoelRitendra, E-Commerce, New Age.
4. K. C. Laudon and C. G. Traver, "E-commerce: business, technology, society", Addison Wesley
5. Eframi Turban, Jae Lee, David King, K. Michale Chung, "Electronic Commerce", Pearson.



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BCA 602: Project

Duration: 2 hrs.

Marks: 100 (30+70)

6 Credits = 2Tut.+4Prac.

OBJECTIVES OF THE COURSE:

- To help students develop openness to new ideas in computer science, develop the ability to draw reasonable inferences from observations and learn to formulate and solve new computer science problems using analytical and problem-solving skills;
- To help students develop the ability to synthesize and integrate information and ideas, develop the ability to think creatively, develop the ability to think holistically and develop the ability to distinguish between facts and opinion;
- To help students acquire the necessary competences to build a real-life software system by completing different software life cycle phases (like, specification, architecture, design, implementation, validation, documentation, etc).



BCAE11: PHP Programming

Duration: 2 hrs.

Marks: 100 (50+20+30)

6 Credits = 4 Th.+ 2 Prac.
60 Lectures + 30 Prac.

OBJECTIVES OF THE COURSE: To demonstrate basic of PHP and process of editing a web page using text editors and web page editors. To identify common designing form when creating a web based application using PHP to develop web application using loops and conditional events in PHP.

UNIT – I Lectures: 14

Introduction to PHP: PHP introduction, inventions and versions, important tools and software requirements (like Web Server, Database, Editors etc.) PHP with other technologies, scope of PHP. Basic Syntax, PHP variables and constants. Types of data in PHP, Expressions, scopes of a variable (local, global). PHP Operators: Arithmetic, Assignment, Relational, Logical operators, Bitwise, ternary and MOD operator. PHP operator Precedence and associativity

UNIT – II Lectures: 14

Handling HTML form with PHP: Capturing Form Data. GET and POST form methods. Dealing with multi value fields. Redirecting a form after submission.

PHP conditional events and Loops: PHP IF Else conditional statements (Nested IF and Else) Switch case, while, For and Do While Loop Goto, Break, Continue and exit.

UNIT – III Lectures: 14

PHP Functions: (3L) Function, Need of Function, declaration and calling of a function PHP Function with arguments, Default Arguments in Function Function argument with call by value, call by reference Scope of Function Global and Local

String Manipulation and Regular Expression: (3L) Creating and accessing String, Searching & Replacing String Formatting, joining and splitting String, String Related Library functions

UNIT – IV Lectures: 18

Use and advantage of regular expression over inbuilt function Use of preg_match(), preg_replace(), preg_split() functions in regular expression

Array: Anatomy of an Array, Creating index based and Associative array, Accessing array Looping with Index based array, with associative array using each() and foreach() Some useful Library function. Working with MySQL.

Course Outcome: Upon successful completion of this course students should acquire the following course outcomes.

Mapping between Cos and BT Level		
Sl. No.	Course Outcomes (COs)	BT Level



1	To demonstrate an understanding of basic PHP.	K2
2	To discuss the process of editing a web page using conditional events and Loops.	K2
3	To develop web application using loops and conditional events in PHP.	K4
4	To analyze functions and string manipulation and regular expressions and array.	K4
5	To identify common designing form when creating a web based application using PHP.	K6

References:

1. Steven Holzner, "PHP: The Complete Reference Paperback", McGraw Hill Education (India).
2. Timothy Boronczyk, Martin E. Psinas, "PHP and MYSQL (Create-Modify-Reuse)", Wiley India Private Limited.
3. Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS& HTML5", O'reilly.
4. Luke Welling, Laura Thompson, "PHP and MySQL Web Development", Addison-Wesley Professional.
5. David Sklar, Adam Trachtenberg, "PHP Cookbook: Solutions & Examples for PHP Programmers".



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خواجه مؤینوددین چشتی اردو، اربى-فارسى विश्वविद्यालय, लखनऊ, उत्तर प्रदेश, भारत
KHWAJA MOINUDDIN CHISHTI URDU, ARABI-FARSI UNIVERSITY, LUCKNOW, U.P., INDIA
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LAB: PHP PROGRAMMING

2 Credits = 2 Prac.

Duration: 2 hrs.

Marks: 20

30 Prac.

OBJECTIVES OF THE COURSE: To give basic Knowledge of PHP. To Learn about PHP Syntax. To understand & work with PHP Arrays, PHP Loops, To handle MySQL connectivity. To understand PHP form validation & PHP form handling.

- Introduction to PHP
- Handling HTML form with PHP
- PHP conditional events and Loops, PHP Functions: (3L)
- String Manipulation and Regular Expression: (3L) & Array
- MySQL connectivity
- PHP form validation &
- PHP form handling.



BCAE12: Introduction to Python Programming

6 Credits = 4 Th.+ 2 Prac.

Duration: 2 hrs.

Marks: 100 (50+20+30)

60 Lectures + 30 Prac.

OBJECTIVES OF THE COURSE: To understand python techniques for problem solving and algorithm development using standard control structures. To explore the techniques and benefits of procedural abstraction with function definitions using strings, text files, lists and dictionaries.

UNIT – I Lectures: 15

Problem solving – Planning a computer program, Problem solving techniques- Hierarchy chart, Algorithm, Flowchart, Pseudocode. Structuring the logic.

Getting started with Python programming- Running code in interactive shell. Input, processing and output. Editing, saving and running script. How python works.

Data Types and Expressions - Operators (unary, arithmetic, etc.) -- Data types, variables, expressions, and statements -- Assignment statements -- Strings and string operations.

UNIT – II Lectures: 15

Control Statements - Definite iteration- for loop, Formatting text for output. Selection- if and if-else statements. Conditional iteration- while loop. Design with Functions- Function as abstraction mechanism, Problem solving with Top-Down design, Design with recursive functions.

UNIT – III Lectures: 15

Strings and Text Files – Accessing characters and substrings in strings, strings and number system, string methods, Textfiles. List and Dictionaries – Lists, defining simple function, dictionaries. Exceptions and data structures -- Data Structures (array, List, Dictionary).

UNIT – IV Lectures: 15

Object Oriented Design- Design with Classes, Programming types , Object Oriented Programming , Structuring classes with Inheritance and Polymorphism. Case study- request, analysis, design & implementation.

Course Outcome: Upon successful completion of this course students should acquire the following course outcomes.

Mapping between Cos and BT Level		
Sl. No.	Course Outcomes (COs)	BT Level
1	To understand basics and techniques of python to solve the problem.	K2
2	To explore the techniques and benefits of procedural abstraction with function definitions.	K4
3	To explore the use of strings, text files, lists and dictionaries.	K4



4	To demonstrate the concept of object-oriented design with class and method.	K3
5	To cover the basics of problem solving and algorithm development using standard control structures.	K6

References:

1. Kenneth A. Lambert, Martin, Juneja "Fundamentals of Python", Cengage Learning.
2. Harsh Bhasin, "Python for Beginners", New Age International.
3. Ashok Namdev Kamthane , Programming and Problem Solving with Python, TMH.
4. Allen Downey, Learning with Python, Dreamtech.
5. Taneja Sheeta, "Python Programming: A modular approach", Pearson.



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ख्वाजा मुईनुद्दीन चिश्ती उर्दू، अरबी-फ़ारसी विश्वविद्यालय, लखनऊ, उत्तर प्रदेश, भारत
KHWAJA MOINUDDIN CHISHTI URDU, ARABI-FARSI UNIVERSITY, LUCKNOW, U.P., INDIA
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LAB: Python Programming

2 Credits = 2 Prac.

Duration: 2 hrs.

Marks: 20

30 Prac.

OBJECTIVES OF THE COURSE: To facilitate laboratory learning using standard control structures, techniques of procedural abstraction with function definitions. To implement the use of strings, text files, lists and dictionaries. To understand & implement the concept of object-oriented design with class and method.

- Data Types, Expressions and statements
- Control Statements
- Design with Functions
- Strings and Text Files
- List and Dictionaries
- Data Structures (array, List, Dictionary)
- Object Oriented Design
- Structuring classes with Inheritance and Polymorphism
- Case study- request, analysis, design & implementation.



BCAE13: Android Programming

6 Credits = 4 Th.+ 2 Prac.

Duration: 2 hrs.

Marks: 100 (50+20+30)

60 Lectures + 30 Prac.

OBJECTIVES OF THE COURSE: This course facilitates classroom and laboratory learning, letting students develop competence and confidence in android programming and understand the entire Android Apps Development Cycle, as well as it would also enable the students to independently create new Android Applications

UNIT- I Lectures: 14

JAVA Concepts, OOPs Concepts, Inheritance in detail, Exception handling, Packages & interfaces, JVM & .jar file extension, Multi-threading. SQL- DML & DDL Queries in brief. What is Android?, Setting up development environment, Dalvik Virtual Machine & .apk file extension, Fundamentals: Basic Building blocks - Activities, Services, Broadcast Receivers & Content providers, UI Components - Views & notifications, Components for communication - Intents & Intent Filters, Android API levels (versions & version names).

UNIT- II Lectures: 14

Application Structure - AndroidManifest.xml, Uses-permission & uses-sdk, Resources & R.java, Assets, Layouts & Drawable Resources, Activities and Activity lifecycle, First sample application. Emulator-Android Virtual Device, Basic UI design, Preferences, Menu, Intents, UI design, Tabs and Tab Activity, Styles & Themes, Content Providers, SQLite Programming, SQLiteOpenHelper, SQLiteDatabase, Cursor, Reading and updating Contacts, Reading bookmarks.

UNIT- III Lectures: 16

Android Debug Bridge (adb) tool, Linkify, Adapters and Widgets, Notifications, Broadcast Receivers, Services and notifications, Toast, Alarms. Custom components, Custom Tabs, Custom animated popup panels, Other components, Threads, Threads running on UI thread (runOnUiThread), Worker thread, Handlers & Runnable, AsyncTask. Live Folders, Using sdcards, XML Parsing, JSON Parsing, Maps, GPS, Location based Services, Accessing Phone services (Call, SMS, MMS), Network connectivity services, Sensors.

UNIT- IV Lectures: 16

Services, Multimedia in Android, Location Based Services and Google Maps, Sensors, WiFi, Telephony Services- Making calls, Monitoring data connectivity and activity, Accessing phone properties and status, Controlling the phone, Sending messages, Camera, Bluetooth, Testing and Debugging Android Application, Android Application Deployment- Android Application Deployment on device with Linux and Windows Android Application Deployment on Android Market, Basics of Android Secure Coding.

Course Outcome: Upon successful completion of this course students should acquire the following course outcomes.



Sl. No.	Course Outcomes (COs)	BT Level
1	To understand basic concept of Java used in android application development.	K2
2	To develop competence and confidence in android programming.	K4
3	To understand the entire Android Apps Development Cycle.	K2
4	To analyze Android programming loops and components.	K4
5	To create new Android Applications.	K6

References:

1. Erik Hellman, Android Programming: Pushing the Limits, wiley.
2. Greg Nudelman, Android Design Patterns: Interaction Design Solutions for Developers, Wiley.
3. Harwani, Android Programming Unleashed, Paperback, Pearson.
4. Donn Felker, Android Application Development for Dummies, Wiley.



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LAB: Android Programming

2 Credits = 2 Prac.

Duration: 2 hrs.

Marks: 20

30 Prac.

OBJECTIVES OF THE COURSE: To facilitate laboratory learning, letting students develop competence and confidence in android programming and understand and implement the entire Android Apps Development Cycle, as well as it would also enable the students to independently create new Android Applications.

- JAVA Concepts, OOPs Concepts Control
- SQL- DML & DDL Queries in brief.
- Setting up development environment,
- Basic Building blocks - Activities, Services
- Emulator-Android Virtual Device
- Basic UI design, Preferences, Menu, Intents
- Tabs and Tab Activity, Styles & Themes, Content Providers, SQLite Programming
- Android Debug Bridge (adb) tool, Linkify, Adapters and Widgets
- Custom components, Threads, Live Folders, Using sdcards, XML Parsing
- Phone services (Call, SMS, MMS), Network connectivity services, Sensors
- Services, Multimedia in Android, Location Based Services
- Google Maps, Sensors, WiFi,
- Android Application Deployment, Basics of Android Secure Coding



BCAE21: Management Information System (MIS)

Duration: 3 hrs.

Marks: 100 (70+30)

**6 Credits = 5 Th.+1Tut.
75 Lectures +15Tut.**

OBJECTIVES OF THE COURSE: To help learners in developing broad understanding of information systems, seen within organizational and societal contexts. To provide students with an appropriate balance of technical and organizational perspectives to serve as the basis for further study in the field of IS and IT.

UNIT -I Lectures: 19

Foundation of Information Systems: Introduction to information system in business, fundamentals of information systems, Solving business problems with information systems, Types of information systems, Effectiveness and efficiency criteria in information system.

An overview of Management Information Systems: Definition of a management information system, MIS & Decision Support Systems, MIS & Information Resources Management, End user computing, Concept of an MIS, Structure of a Management information system.

UNIT –II Lectures: 18

Concepts of planning & control: Concept of organizational planning, The Planning Process, Computational support for planning, Characteristics of control process, The nature of control in an organization.

UNIT –III Lectures: 19

Business applications of information technology: Internet & electronic commerce, Intranet, Extranet & Enterprise Solutions, Information System for Business Operations, Information System for Managerial Decision Support, Information System for Strategic Advantage.

UNIT –IV Lectures: 19

Managing Information Technology: Enterprise & global management, Security & Ethical challenges, Planning & Implementing changes.

Advanced Concepts in Information Systems: Enterprise Resource Planning, Supply Chain Management, Customer Relationship Management, and Procurement Management.

Course Outcome: Upon successful completion of this course students should acquire the following course outcomes.

Mapping between Cos and BT Level		
Sl. No.	Course Outcomes (COs)	BT Level
1	Illustrate Information System and Management Information System	K2
2	To Understand the concept of Planning and Control.	K2



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خواجه مؤینوددین چشتی اردو، اربى-فارسى विश्वविद्यालय, लखनऊ, उत्तर प्रदेश, भारत
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3	Analyze Business Applications of information technology	K4
4	To Manage Information Technology and discuss advance concepts in Information Systems	K3
5	Correlates the concept of Management Information System in planning new projects.	K3

References:

1. O. Brian, "Management Information System", Tata Mcgraw-hill Education Pvt. Ltd.
2. Gordon B. Davis & Margrethe H. Olson, "Management Information System", Tata Mcgraw-hill Education Pvt. Ltd.
3. Murdick, "Information System for Modern Management", PHI Learning Private Limited, Delhi India.
4. Jawadekar, "Management Information System", Tata Mcgraw-hill Education Pvt. Ltd.
5. Jain Sarika, "Information System", PPM Publication.



BCAE22: Data Warehousing and Data Mining

Duration: 3 hrs.

Marks: 100 (70+30)

6 Credits = 5 Th.+1Tut.

75 Lectures +15Tut.

OBJECTIVES OF THE COURSE: To understand data warehouse concepts, architecture, business analysis and tools. To understand data pre-processing and data visualization techniques. To study algorithms for finding hidden and interesting patterns in data. To understand and apply various classification and clustering techniques using tools.

UNIT - I Lectures: 19

DATA WAREHOUSING:- Overview, Definition, Data Warehousing Components, Building a Data Warehouse, Warehouse Database, Mapping the Data Warehouse to a Multiprocessor Architecture, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Marting.

UNIT - II Lectures: 19

DATA WAREHOUSE PROCESS AND TECHNOLOGY:- Warehousing Strategy, Warehouse 8/management and Support Processes, Warehouse Planning and Implementation, Hardware and Operating Systems for Data Warehousing, Client/Server Computing Model & Data Warehousing. Parallel Processors & Cluster Systems, Distributed DBMS implementations, Warehousing Software, Warehouse Schema Design, Data Extraction, Cleanup & Transformation Tools, Warehouse Metadata

UNIT - III Lectures: 18

DATA MINING:- Overview, Definition & Functionalities, Data 8 Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction:- Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Red

UNIT- IV Lectures: 19

DATA MINING TECHNIQUES:- Classification: Definition, Data Generalization, Analytical Characterization, 8 Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases, Statistical-Based Algorithms, Distance-Based Algorithms, Decision Tree-Based Algorithms. Clustering: Introduction, Similarity and Distance Measures, Hierarchical and Partitional Algorithms. Hierarchical Clustering- CURE and Chameleon. Density Based Methods-DBSCAN, OPTICS. Grid Based Methods- STING, CLIQUE. Model Based Method –Statistical Approach, Association rules: Introduction, Large Itemsets, Basic Algorithms, Parallel and Distributed Algorithms, Neural Network approach.

Course Outcome: Upon successful completion of this course students should acquire the following course outcomes.



Mapping between Cos and BT Level

Sl. No.	Course Outcomes (COs)	BT Level
1	To Understand the basics of Data Ware house.	K2
2	To Discuss Data Warehouseprocess and technology	K3
3	To Understand Data Mining and its various techniques	K2
4	To Analyze Data Mining Techniques	K4
5	To illustrate database and data warehouse concepts in solution design.	K6

References:-

1. Alex Berson, Stephen J. Smith "Data Warehousing, Data-Mining & OLAP", TMH.
2. Tan, Kumar, Introduction to Data Mining, Pearson.
3. Shawkat Ali, Wasimi, Data Mining: Methods and Techniques, Cengage.
4. Elayidom, Data Mining and Warehousing, Cengage.
5. Mark Humphries, Michael W. Hawkins, Michelle C. Dy, "Data Warehousing: Architecture andImplementation", Pearson.
6. Margaret H. Dunham, S. Sridhar, "Data Mining: Introductory and Advanced Topics" Pearson.
7. Arun K. Pujari, "Data Mining Techniques" Universities Press.
8. Pieter Adriaans, Dolf Zantinge, "Data-Mining", Pearson.



BCAE23: Graph Theory

6 Credits = 5 Th.+ 1 Tut.

Duration: 3 hrs.

Marks: 100 (70+30)

75 Lectures + 15 Tut.

OBJECTIVES OF THE COURSE: To understand and apply the fundamental concepts in graph theory. to cover a variety of different problems in Graph Theory. To apply graph theory based tools in solving practical problems. To come across a number of theorems and proofs using various techniques. To understand various graphs algorithms and its analysis.

UNIT-I Lectures: 18

What is graph Application of graphs, Finite and Infinite graphs, Incidence & Degree, Isolated vertex, Pendant Vertex, and Null Graph.

UNIT-II Lectures: 19

Isomorphism, Sub graphs, A puzzle with multicolored Cubes, walks, Path, and circuits connected graph, Disconnected graphs and Components, Euler graphs, Operations on graphs more on Euler Graphs, Hamiltonian paths and circles.

UNIT-III Lectures: 19

Tree, some properties of trees, pendant Vertices in a tree, Distance and centers in a tree Rooted and Binary trees, Spanning trees, fundamental circuits, Finding all spanning tree of a graph.

UNIT-IV Lectures: 19

Cut-Sete, Some Properties of Cut-Set, All Cut-Sets in a graph, Path-Sets, some properties of paths sets in a graph, fundamental Circuits & Cut-Set, Connectively and separability. Directed graph, undirected graph. Matrix representation of graph.

Course Outcome: Upon successful completion of this course students should acquire the following course outcomes.

Sl. No.	Course Outcomes (COs)	BT Level
1	To Understand Graph and its Applications.	K2
2	Illustrate the application of Graph in real world Problems.	K4
3	To discuss Taxonomy of Tree and its types.	K2
4	To Understand Cut-set and its various forms	K3
5	To Design solutions using graph theory techniques.	K6

References:

1. Narsingh Deo, "Graph Theory", Prentice Hall of India.



خواجہ معین الدین چشتی اردو، عربی-فارسی یونیورسٹی، لکھنؤ، اتر پردیش، ہندوستان
ख्वाजा मुईनुद्दीन चिश्ती उर्दू، अरबी-फ़ारसी विश्वविद्यालय, लखनऊ, उत्तर प्रदेश, भारत
KHWAJA MOINUDDIN CHISHTI URDU, ARABI-FARSI UNIVERSITY, LUCKNOW, U.P., INDIA
U.P. STATE GOVERNMENT UNIVERSITY
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2. S.B.Singh, "Combinatorics and Graph Theory, Khanna Publication.
3. West, "Introduction To Graph Theory" TMH.
4. Narsingh Deo, Graph Theory With Applications To Engineering And Computer Science, PHI Learning.
5. Bondy, J. A. and Murty, U.S.R., 'Graph Theory with Applications', Springer.



BCAE31: Information Security and Cyber Law

Duration: 3 hrs. **Marks:** 100 (70+30) **6 Credits = 5 Th.+ 1 Tut.**
75 Lectures + 15 Tut.

OBJECTIVES OF THE COURSE: To sensitize with the fundamental concepts and principles of information security. To develop an understanding of malicious attacks, threats, and vulnerabilities. To introduce concepts of cryptography and its applications in maintaining information security. To introduce the concepts of network and internet security. To introduce the concepts of IT Act.

UNIT-I Lectures: 18

Introduction: Definition and need of Information Security, Threats to information and their classification, Attack, Risk, vulnerability and their types, Three pillars of security: Confidentiality, Integrity, Availability.

UNIT-II Lectures: 19

Network Security: Cryptography: Notion of Plain Text, Encryption, Key, Cipher Text, Decryption and cryptanalysis; Public Key Encryption, digital Signatures and Authentication.

Web Security: Requirement, Secure Socket Layer, Transport Layer Security, and Secure Electronic Transactions.

UNIT-III Lectures: 19

Software Security: Need of software security, Traditional approaches of software security, adopting a Secure Software Development Lifecycle, Risk Management and Security Testing, How to Approach Security Testing, Thinking About Malicious Input, Seven touch points for secure software development

UNIT-IV Lectures: 19

Cyber Laws: Legal, Ethical, and Professional Issues in Information Security, Information Ethics, Concept of 'Cyber Crime' and the IT Act, 2000, Hacking, Teenage Web Vandals, Cyber Fraud and Cyber Cheating, Virus on the Internet, Defamation, Harassment and E-mail Abuse, Cyber Pornography, Other IT Act Offences, Monetary Penalties, Adjudication and Appeals Under IT Act, 2000, Network Service Providers, Jurisdiction and Cyber Criminality, Strategies to Tackle Cyber Crime and Trends, Criminal Justice in India and Implications on Cyber Crime

Course Outcome: Upon successful completion of this course students should acquire the following course outcomes.

Sl. No.	Course Outcomes (COs)	BT Level
1	Define the Information security, services, attacks, mechanisms, types of attacks.	K1
2	Understand the basic concepts of public key cryptosystem, digital signature scheme, usage of security principles and digital signatures for any application	K2, K3



3	Examine different type of risk and security testing methods.	K4
4	Illustrate the legal, ethical and professional issues in information security	K2

References:

1. Computer Security: Art and Science: Matt Bishop, Addison Wesley
2. Nina Godbole, Cyber Security, wiley.
3. Nina Godbole, Information System Security, wiley.
4. R. Kumar, Cryptography, Network Security and Cyber Law, Cengage.
5. Tripathi, Goel, Introduction to Information Security and Cyber Laws, Wiley
6. Brijendra Singh, "Network Security and Management", PHI.
7. W. Stallings, Networks Security Essentials: Application & Standards, Pearson Education.
8. J. Viega and G. McGraw, "Building Secure Software", Addition Wesley.
9. Cyber Law Simplified, Vivek Sood, Tata McGraw Hill Education.



BCAE32: Software Quality

Duration: 3 hrs.

Marks: 100 (70+30)

6 Credits = 5 Th.+ 1 Tut.

75 Lectures + 15 Tut.

OBJECTIVES OF THE COURSE: To understand the quality in general. To understand software and software quality concept. To find goals and responsibilities of software quality assurance. To understand the quality metrics and quality models. To understand the concept of object oriented software design. To understand need, importance and significance of assessing quality of oriented software design.

UNIT-I Lectures: 18

SOFTWARE QUALITY CONCEPT

Software Perspective: Components, Characteristics, Types, Myths; Software Quality Overview: Concepts & Models; Software Quality Measurement and Metrics; Software Quality Assurance: Goals & Responsibilities; SQA Life Cycle & Activities. Value of a Quality Software: User's Perspective.

UNIT-II Lectures: 20

QUALITY ASSURANCE: PLANNING & STANDARDS

Need for SQA plan: Tools & Techniques; Risk Management; Importance of Software Quality; Quality Standards and Best Practices; SQA Standards: Requirements & Activities; ISO 9000 series for Quality Standards.

SOFTWARE QUALITY METRICS

Software Metrics: Definition & Examples; Quality Metrics: Features & Framework; Development & Selection of Quality Metrics using different approaches.

UNIT-III Lectures: 18

SOFTWARE QUALITY MODELS

Need for Good Quality Model; Hierarchical and Non-Hierarchical Quality Models; Characteristics of Quality Models; Capability Maturity Model.

UNIT-IV Lectures: 19

OBJECT ORIENTED SOFTWARE DESIGN: QUALITY METRICS & MEASUREMENT

Object Oriented Design & Paradigm; Metrics for Object Oriented Software Design & Selection Criterion; Quality Model for Object Oriented Design; Assessment of Object Oriented Design & Quality Attributes.

Course Outcome: Upon successful completion of this course students should acquire the following course outcomes.

Sl. No.	Course Outcomes (COs)	BT Level
1	Understand software testing and quality assurance as a fundamental component of software life cycle.	K2



2	Define the scope of software testing, quality assurance projects and various software quality metrics.	K3
3	Applying modern software tools to efficiently perform testing and quality assurance techniques.	K3
4	Estimate cost of a T&QA project and manage budgets	K5

REFERENCES

1. Software Quality: Concept and Practices, R A Khan, K Mustafa, S I Ahson
2. Software Quality Assurance: From Theory to Implementation, Daniel Galin
3. Metrics and Models in Software Quality Engineering, Stephen H. Kan
4. Quality Assurance: Software Quality Assurance Made Easy, Solis Tech



BCAE33:Software Project Management

Duration: 3 hrs.

Marks: 100 (70+30)

6 Credits = 5 Th.+ 1 Tut.

75 Lectures + 15 Tut.

OBJECTIVES OF THE COURSE:To understand the fundamental principles of Software Project management. To be familiar with the different methods and techniques used for project management. To develop understanding of responsibilities to handle project. To good knowledge of the issues and challenges faced while doing the Software project Management and will also be able to do the Project Scheduling, tracking, Risk analysis, Quality management and Project Cost estimation using different techniques

Unit I Lectures: 18

Introduction and Software Project Planning: Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope Document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of Project Plan, Structure of a Software Project Management Plan, Software Project Estimation, Estimation Methods, Estimation Models, Decision Process.

Unit II Lectures: 19

Project Organization and Scheduling Project Elements: Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project Schedule, Scheduling Objectives, Building the Project Schedule, Scheduling Terminology and Techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts

Unit III Lectures: 19

Project Monitoring and Control: Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Deskchecks, Walkthroughs, Code Reviews, Pair Programming.

Unit IV Lectures: 19

Software Quality Assurance and Testing Objectives, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, SQA Activities, Project Management and Project Management Tools.

Risk Management: Risks and Risk Types, Risk Breakdown Structure (RBS), Risk Management Process: Risk Identification, Risk Analysis, Risk Planning, Risk Monitoring, Cost Benefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS-Project.



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خواجه مؤیندین چشتی اردو، اربى-فارسى विश्वविद्यालय, लखनऊ, उत्तर प्रदेश, भारत
KHWAJA MOINUDDIN CHISHTI URDU, ARABI-FARSI UNIVERSITY, LUCKNOW, U.P., INDIA
U.P. STATE GOVERNMENT UNIVERSITY
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Course Outcome: Upon successful completion of this course students should acquire the following course outcomes.

Sl. No.	Course Outcomes (COs)	BT Level
1	Understand software projects and monitor software project process	K2
2	Identify and develop project modules and assign resources	K3
3	Comprehend, assess, and calculate the cost of risk involved in a project management	K3
4	Analyze the tools for risk management Design a Case study using SPM tools	K4

References:

1. M. Cotterell, Software Project Management, Tata McGraw-Hill Publication.
2. Royce, Software Project Management, Pearson Education
3. Kieron Conway, Software Project Management, Dreamtech Press
4. S. A. Kelkar, Software Project Management, PHI Publication.
5. Harold R. Kerzner, Project Mangment “A Systems Approach to Planning, Scheduling, and Controlling” Wiley.
6. Mohapatra, Software Project Management, Cengage Learning.
7. P.K. Agarwal, SAM R., Software Project Management, Khanna Publishing House



BCAE41: Introduction to Client-Server Computing

Duration: 3 hrs.

Marks: 100 (70+30)

6 Credits = 5 Th.+ 1 Tut.
75 Lectures + 15 Tut.

OBJECTIVES OF THE COURSE: To define the fundamental concepts of client server computing. To identify different components of client server architecture on Internet computing. To introduce the concepts, terminologies and technologies used in client server networking architecture. To introduce the concept of data storage with client server architecture.

UNIT- I Lectures: 18

CLIENT/SERVER COMPUTING:- DBMS concept and architecture, Single system image, Client Server architecture, mainframe-centric client server computing, downsizing and client server computing, preserving mainframe applications investment through porting, client server development tools, advantages of client server computing.

UNIT- II Lectures: 19

COMPONENTS OF CLIENT/SERVER APPLICATION:-The client: services, request for services, RPC, windows services, fax, print services, remote boot services, other remote services, Utility Services & Other Services, Dynamic Data Exchange (DDE), Object Linking and Embedding (OLE), Common Object Request Broker Architecture (CORBA). The server: Detailed server functionality, the network operating system, available platforms, the network operating system, available platform, the server operating system.

UNIT- III Lectures: 19

CLIENT/SERVER NETWORK:- connectivity, communication interface technology, Interposes communication, wide area network technologies, network topologies (Token Ring, Ethernet, FDDI, CDDI) network management, Client-server system development: Software, Client-Server System Hardware: Network Acquisition, PC-level processing unit, Macintosh, notebooks, pen, UNIX workstation, x-terminals, server hardware.

UNIT- IV Lectures: 19

DATA STORAGE:- magnetic disk, magnetic tape, CD-ROM, WORM, Optical disk, mirrored disk, fault tolerance, RAID, RAID-Disk network interface cards. Network protection devices, Power Protection Devices, UPS, Surge protectors. Client Server Systems Development: Services and Support, system administration, Availability, Reliability, Serviceability, Software Distribution, Performance, Network management, Help Disk, Remote Systems Management Security, LAN and Network Management issues. The future of client server Computing Enabling Technologies, The transformational system.

References:

1. Patrick Smith & Steave Guengerich, "Client / Server Computing", PHI.
2. Dawna Travis Dewire, "Client/Server Computing", TMH.
3. Majumdar & Bhattacharya, "Database management System", TMH.
4. Korth, Silberchatz, Sudarshan, "Database Concepts", McGraw Hill.
5. Elmasri, Navathe, S.B, "Fundamentals of Data Base System", Addison Wesley.



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خواجه مؤین الدین چشتی اردو، عربی-فارسی ویسویعیالی، لکھنؤ، اتر پردیش، ہندوستان
KHWAJA MOINUDDIN CHISHTI URDU, ARABI-FARSI UNIVERSITY, LUCKNOW, U.P., INDIA
U.P. STATE GOVERNMENT UNIVERSITY
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Course Outcome: Upon successful completion of this course students should acquire the following course outcomes.

Sl. No.	Course Outcomes (COs)	BT Level
1	Compare different type of client server computing, tools and its advantage.	K2
2	Define and Explain different components of client/server application.	K1, K2
3	Analyze client/server network, topology, services and System hardware.	K4
4	Use databases for building client server applications	K3, K4



BCAE42: Mobile Computing

6 Credits = 5 Th.+ 1 Tut.

Duration: 3 hrs.

Marks: 100 (70+30)

75 Lectures + 15 Tut.

OBJECTIVES OF THE COURSE: To demonstrate the actual meaning of power and energy management in wireless mobile networks. To outline knowledge on Mobile IP. To be familiar with the network protocol stack. To learn the basics of mobile telecommunication system. To be exposed to Ad-Hoc networks. To gain knowledge about different mobile platforms and application development.

UNIT-I Lectures: 18

Introduction, Issues in Mobile Computing, Overview of Wireless Telephony: Cellular Concept, GSM: Air-Interface, Channel Structure, Location Management: HLR, VLR, Hierarchical, Handoffs, Channel Allocation In Cellular Systems, CDMA, GPRS.

UNIT-II Lectures: 19

Wireless Networking, Wireless LAN Overview: MAC Issues, IEEE 802.11, Blue Tooth, Wireless Multiple Access Protocols, TCP Over Wireless, Wireless Applications, Mobile IP, WAP: Architecture, Protocol Stack, Application Environment, Applications, Wireless mark Up Language (WML).

UNIT-III Lectures: 19

Data Management Issues, Data Replication for Mobile Computers, Adaptive Clustering for Mobile Wireless Networks, File System, Disconnected Operations, Mobile Agents Computing, Security and Fault Tolerance.

UNIT-IV Lectures: 19

Adhoc Networks, Localization, MAC Issues, Routing Protocols, Global State Routing (GSR), Destination Sequenced Distance Vector Routing (DSDV), Dynamic Source Routing (DSR), Ad Hoc On Demand Distance Vector Routing (AODV), Temporary Ordered Routing Algorithm (TORA), QOS in Ad Hoc Network.

Course Outcome: Upon successful completion of this course students should acquire the following course outcomes.

Sl. No.	Course Outcomes (COs)	BT Level
1	Explain the principles and theories of mobile computing technologies.	K2
2	Describe infrastructures and technologies of mobile computing technologies and list applications in different domains that mobile computing offers to the public, employees, and businesses.	K1



3	Describe the functionality of Mobile IP and Transport Layer with security	K3
4	Classify different types of mobile telecommunication systems and Demonstrate the Adhoc networks concepts and its routing protocol	K2

References:

1. Asoke K Taukder, Roopa R Yavagal, Mobile Computing, Tata McGraw Hill Pub. Co., New Delhi.
2. J. Schiller, Mobile Communication, Addison Wesley.
3. Ivan Stojmenovic, Handbook of Wireless Networks and Mobile Computing, John Wiley & sons Inc, Canada.
4. William Stallings, "Wireless Communication and Networks", Pearson Education.
5. Yi-Bing Lin & Imrich Chlamtac, Wireless and Mobile Networks Architectures, John Wiley & Sons.
6. Raj Pandya, "Mobile and Personal Communication systems and services", Prentice Hall of India.
7. Hansmann, "Principles of Mobile Computing", Wiley Dreamtech.
8. Ray Rischpater, "Wireless Web Development", Springer Publishing.
9. P. Stavronlakis, "Third Generation Mobile Telecommunication systems", Springer Publishers.



BCAE43: Cloud Computing

Duration: 3 hrs.

Marks: 100 (70+30)

6 Credits = 5 Th.+1Tut.
75 Lectures +15Tut.

OBJECTIVES OF THE COURSE: To understand the concept of Existing Hosting Platforms and computing paradigms currently being used in industry and academia. To Identify the issues related to Cloud Computing. To analyse IASS/ PAAS and SAAS services along with Cloud models. To Understand the concepts of various Cloud Platforms with comparative analysis and the concepts of virtualization with the advantages in Cloud.

UNIT-I Lectures: 19

Introduction: Basics of Emerging Cloud Computing Paradigm, Cloud Computing History and Evolution, Cloud Enabling Technologies, Practical Applications of Cloud Computing for Various Industries, Economics and Benefits of Cloud Computing

Cloud Computing Architecture: Cloud Architecture Model, Types of Clouds: Public Private & Hybrid Clouds, Resource Management and Scheduling, QOS (Quality Of Service) and Resource Allocation, Clustering

UNIT-II Lectures: 18

Classification of Cloud Implementations- Amazon Web Services - IaaS, Elastic Compute Cloud (EC2), Simple Storage Service (S3), Simple Queuing Services (SQS), VMware vCloud - IaaS, vCloud Express, Google AppEngine - PaaS, JAVA Runtime Environment

UNIT-III Lectures: 19

Data Center : Classic Data Center, Virtualized Data Center (Compute, storage, Networking and Application) , Business Continuity in VDC

Virtualization: Virtualization, Advantages and disadvantages of Virtualization, Types of Virtualization: Resource Virtualization i.e. Server, Storage and Network virtualization, Migration of processes, VMware vCloud – IaaS

UNIT-IV Lectures: 19

Cloud Security and Privacy: Infrastructure Security: Infrastructure Security: The Network Level, Infrastructure Security: The Host Level, Infrastructure Security: The Application Level, Data Security and Storage: Aspects of Data Security, Data Security Mitigation, Provider Data and Its Security. Privacy: Data Life Cycle, Key Privacy Concerns in the Cloud, Responsibility for Protecting Privacy, Changes to Privacy Risk Management and Compliance in Relation to Cloud Computing, Legal and Regulatory Implications

Course Outcome: Upon successful completion of this course students should acquire the following course outcomes.

Sl. No.	Course Outcomes (COs)	BT Level
1	Define the concepts of various Cloud Platforms with comparative analysis and the concepts of virtualization with the advantages in Cloud and articulate the main concepts, key technologies,	K1



	strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing.	
2	To understand the basic terminology of Emerging Cloud Computing Paradigm, various cloud architecture models, types and resource scheduling and allocation and implement various types of clouds based upon the requirements of consumers.	K2
3	Define various data centers and several virtualization techniques.	K3
4	Explain the core issues of cloud computing such as security, privacy, and interoperability.	K2

References

1. Fundamentals of Cloud Computing, A. Kannammal, Cengage,
2. Cloud Computing: A practical approach for learning and implementation, Srinivasan, Pearson.
3. Cloud Computing Black Book, Jayaswal, Jagannath, Wiley.
4. Cloud Computing Bible, Barrie Sosinsky, Wiley.
5. Cloud Computing, Erl, Pearson.
6. Cloud Computing, Saurabh, Wiley.
7. Cloud Computing: Principles and Paradigms, Editors: RajkumarBuyya, James Broberg, Andrzej M. Goscinski, Wiley.
8. Cloud Computing, A Practical Approach, Toby Velte, Anthony Velte, Robert Elsenpeter McGraw Hills.



GECA 101 –Introduction to Information Technology

Duration: 2 hrs.

Marks: 100 (50+20+30)

6 Credits = 4 Th.+ 2 Prac.
60 Lectures+ 30 Prac.

OBJECTIVES OF THE COURSE: To understand the functional components of computers. To differentiate between hardware and software. To introduce & understand various operating systems. To understand the concept of data communication, networking and internet.

UNIT-I

Lectures: 15

Introduction to Computers

Introduction, Functional Components of Computers (Input unit, CPU, Memory and Output unit), Block diagram of computer, Characteristics of Computers. Application of Computers, Classification of computers, Types of Memory (Primary and Secondary), Advantages and limitations of computer.

UNIT-II

Lectures: 15

Hardware: Input devices- Keyboard, Voice speech devices, Scanner, Bar code reader, MICR, OMR, Digital camera etc., Output devices- Visual display unit, Printers, Plotter etc., Storage devices- Magnetic storage devices, Optical storage devices, FD, CD, HD, Pen drive etc.

Software: Introduction, Types of software, Introduction to language, Compiler, Interpreter and assembler.

UNIT-III

Lectures: 15

Operating System

Introduction to Operating system, Functions of Operating System, Types of Operating System, DOS – Files and Directories, Internal and External Commands.

Windows Operating Environment- Introduction to GUI, Features of MS – Windows, Control Panel, Taskbar, Desktop, Icons, Windows Accessories, Notepad, Paintbrush.

UNIT-IV

Lectures: 15

Data Communication and Internet

Introduction to Data Communication and Networking, Different Topologies, Types of Network, communication Media. **Internet-** Introduction to Internet, Features of Internet, working of Internet- Client, Server, Client-Server Network, Web Server, Browser, URL, ISPs, Modem, Web Page, Web development, Site Hosting Modes of connecting to internet (Access Methods), Internet address, domain name, World Wide Web- Introduction.

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1 To understand Functional Components of Computers.	K2
2	CO2. Effectively explains the basic concepts of Hardware: Input and out- put devices.	K2
3	CO3. To understand Software and its types	K2, K5



خواجہ معین الدین چشتی اردو، عربی-فارسی یونیورسٹی، لکھنؤ، اتر پردیش، ہندوستان
ख्वाजा मुईनुद्दीन चिश्ती उर्दू، अरबी-फारसी विश्वविद्यालय, लखनऊ, उत्तर प्रदेश, भारत
KHWAJA MOINUDDIN CHISHTI URDU, ARABI-FARSI UNIVERSITY, LUCKNOW, U.P., INDIA
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4	CO4. Able to understand Operating system, Functions of Operating System.	K2
5	CO5 Able to get overview of Data Communication and Internet	K2,K4,

References:

7. Fundamental of Computers – By V.Rajaraman, B.P.B. Publications
8. Fundamental of Computers – By P.K. Sinha
9. Computer Application in Management – R. Goel, D.N. Kakkar, New Age International
10. Computer Concepts – By Vikas Gupta, Dreamtech Press
11. Comdex windows 7 with Office 2010 – By Vikas Gupta, Dreamtech Press



Lab: Information Technology

Duration: 2 hrs.

2 Credits = 2 Prac.
Marks: 20 30 Prac.

OBJECTIVES OF THE COURSE: To understand the booting & shutting down process of computer. To understand the hardware components of computer. To understand the concept of operating systems. To acquire skills of using basic internal/external MS-DOS commands. To acquire skills of using windows operating system and its applications. To understand the use of internet and its applications.

- Introduction to booting & shutting down process of computer.
- Demonstration of hardware parts of computer.
- Use of basic MS-DOS commands (CUI).
- Working with Windows Operating System (GUI).
- Working with Application software.
- Working with Internet.

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1 Introduction to booting & shutting down process of computer.	K3
2	CO2. Effectively explains the basic concepts of Hardware: Input and out- put devices.	K3
3	CO3. To use of basic MS-DOS commands	K3
4	CO4. Able to Working with Application software	K3
5	CO5 Able to get Working with Internet	K3



GECA 201 –Desk Top Applications

Duration: 2 hrs.

Marks: 100 (50+20+30)

6 Credits = 4 Th.+ 2 Prac.
60 Lectures + 30 Prac.

Course Objective: After completing the course, the students will be familiar with

1. To understand the fundamental concept of computer.
2. To understand the basics concept of communication and network.
3. To explore various features of MS-Word and its applications.
4. To develop understanding of MS-Excel. To design the presentation using MS-power Point.
5. To understand the fundamental concept of database and working with MS-Access.

UNIT-I Lectures: 15

Introduction to Computers

Introduction, Functional Components of Computers (Input unit, CPU, Memory and Output unit), Block diagram of computer, Characteristics of Computers. Application of Computers, Types of Memory (Primary and Secondary), Introduction to software. Introduction to Data Communication and Networking, Introduction to Internet.

UNIT-II Lectures: 15

MS-Office : Introduction, Overview of the office components, MS-Office files and folders, Opening, and saving files. **MS-Word:** Starting MS-Word, Creating and Formatting a document, Changing fonts and point size, Table Creation and operations, Autocorrect, Auto-text, Spell Check, Word Art, Working with Header, Footers and Footnotes, Working with Graphics, Inserting objects, Page setup, Page Preview, Printing a document, Mail Merge.

UNIT-III Lectures: 15

MS-Excel: Starting Excel, Worksheet, Rearranging Worksheet and Cell, Inserting Data into Rows/Columns, Alignment, Text wrapping, Sorting data, Excel formatting tips and Techniques, Generating graphs, Organizing large project, Introduction to Functions, Excels chart features.

UNIT-IV Lectures: 15

MS-Power Point: Starting MS-Power Point, Creating a presentation using Auto-content Wizard, Blank Presentation, Creating, Saving and Printing a presentation, Adding a slide to presentation, Navigating through a presentation, Slide-sorter, Slide-show, Editing slides, Working with Graphics and Multimedia in PowerPoint (Inserting Photo, Video & Sound).

Course Outcomes: Upon successful completion of this course students should acquire the following course outcomes:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1. Understand the basic component of computers, software and hardware.	K2
2	CO2. Acquire knowledge about MS-Word and different formatting	K2, K3



	styles used in that.	
3	CO3. Acquire knowledge about MS-Excel and different techniques used in that.	K2, K3
4	CO4. Acquire knowledge about MS-Power Point and formatting styles used in that.	K2, K3
5	CO5. Acquire knowledge about MS-Access and different techniques such as creating form, writing queries used in that.	K2, K3

References:

12. Fundamental of Computers – By V.Rajaraman, B.P.B. Publications
13. Fundamental of Computers – By P.K. Sinha
14. Comdex windows 7 with Office 2010 – By Vikas Gupta, Dreamtech Press
15. MS-Office 2000(For Windows) – By Steve Sagman.
16. Office 2007 – By Shelly, Cengage Publication.



خواجہ معین الدین چشتی اردو، عربی-فارسی یونیورسٹی، لکھنؤ، اترپردیش، ہندوستان
ख्वाजा मुईनुद्दीन चिश्ती उर्दू، अरबी-फ़ारसी विश्वविद्यालय, लखनऊ, उत्तर प्रदेश, भारत
KHWAJA MOINUDDIN CHISHTI URDU, ARABI-FARSI UNIVERSITY, LUCKNOW, U.P., INDIA
U.P. STATE GOVERNMENT UNIVERSITY
(RECOGNISED U/S 2(F) & 12(B) OF THE UGC ACT 1956 & B.TECH. APPROVED BY AICTE)

Lab: Desk Top Applications

2 Credits = 2 Prac.

Duration: 2 hrs.

Marks: 20

30 Prac.

OBJECTIVES OF THE COURSE: To understand the use of various features of MS-Word through its applications. To develop the understanding of working with MS-Excel. To design the presentation using MS-power Point.

- MS-WORD: Creating, Editing, Formatting: Font name, size, color, alignment, changing, paragraph settings, change case, Mail Marge, Creating Tables, editing tables, alignment settings in tables.
- MS-EXCEL: Creating, Editing, Formatting: font name, size, color, alignment, changing, entering data, Sorting Data, Inserting, renaming and deleting Sheet, Inserting row, column, cell, picture.
- MS-POWERPOINT: Creating, Editing, Formatting: font name, size, color, alignment, changing, Inserting table, picture.



GECA 301- Introduction to Web Designing

Duration: 2 hrs.

Marks: 100 (50+20+30)

6 Credits = 4 Th.+ 2 Prac.

60 Lectures + 30 Prac.

OBJECTIVES OF THE COURSE: - To understand the fundamental concept of computer. To define the principle of Web page design. To understand the basics in web design. To visualize the basic concept of HTML. To recognize the elements of HTML. To introduce basic concept of SS. To develop the concept of web publishing.

Unit I

Lectures: 15

Introduction to Computers

Introduction, Functional Components of Computers (Input unit, CPU, Memory and Output unit), Block diagram of computer, Characteristics of Computers. Application of Computers, Types of Memory (Primary and Secondary), Introduction to software. Introduction to Data Communication and Networking, Introduction to Internet.

Unit II

Lectures: 15

Introduction

Introduction to HTML, What is HTML, HTML Documents, Basic structure of an HTML document, Creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags.

Presentation and layout: Text alignment, Center, left, right, Multicol, Color settings, bgcolor, Foreground color, Tables- TD, TR, Rowspan, Colspan, cell padding, Table within table.

Unit III

Lectures: 15

Lists: Ordered lists, Types of order list, Unordered lists, Types of unordered list, Nested Lists

Frames: Frameset, Row, Col, % split up of row, col, Frame targeting, Horizontal splitting, Vertical splitting

HTML form: Input fields, Text box, Password, Button, Drop down list box, Radio button, Check boxes, Submit /reset button, Methods post/get

Unit IV

Lectures: 15

Style sheet: Setting background, Repeating background image, Setting background image, Setting text color, Align the text, Text decoration, Font, Setting the font, Size, boldness of font, Border, Style of four order, Different borders on each side, Width setting, Margin, Padding, List, List-item marker, Positioning, Vertical alignment of an image, Placing an element behind another. Images in HTML, Optimizing images for the web using Photoshop.

Course Outcome: After successful completion of this course students will be able to:



S. No.	Course Outcome	Bloom's Taxonomy
1	CO1 To understand Functional Components of Computers.	K2
2	CO2. To understand the basics in web design.	K2
3	CO3. To Understand terms associated with basic Web page development.	K2, K5
4	CO4. Working with Hypertext Markup Language (HTML).	K3
5	CO5 Able to Design a Web page that incorporates specified colors and graphics.	K3,K4,

References:

1. Fundamental of Computers – By V.Rajaraman, B.P.B. Publications
2. Web Enabled Commercial Application Development Using-HTML, JavaScript, DHTML and PHP – Ivan Bayross, B.P.B. Publications
3. Web Technology & Design- C. Xavier, New Age International.



Lab: HTML PROGRAMMING

Duration: 2 hrs.

2 Credits = 2Prac.

Marks: 20 30 Prac.

OBJECTIVES OF THE COURSE: - To develop the concept of working with web files and WEB publishing. To recognize and use the elements/Tags of HTML. To learn the concept of designing the presentation and layout .To design lists, frames and forms. To develop style sheet in HTML.

- Working with Web files
 - WEB publishing
 - HTML tag concept, <head><body>,
 - URL, hyperlinks <link>href, <A> tags,
 - Image basics, alt attribute,
 - Hspace, Vspace, Height, Width, Image as buttons
 - Presentation and layout
 - Lists
 - Frames
 - HTML form
 - Style sheet
- **Course Outcome:** After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1 .Working with Web files	K3
2	CO2. To use various tools to create HTML documents.	K3
3	CO3. To understand Software and its types	K3
4	CO4. Able to develop an understanding of the formalistic (aesthetic) aspects of design and visual communication.	K3
5	CO5 Able to Create an Information Architecture document for a web site.	K3



GECA 401- Introduction to Database and MS-Access

6 Credits = 4 Th.+ 2 Prac.

Duration: 3 hrs.

Marks: 100 (50+20+30)

60 Lectures + 30 Prac.

OBJECTIVES OF THE COURSE: To understand basic concepts of database management systems. To understand the concept of making database and to design the tables. To acquire knowledge of working with queries, forms & reports. To design and implement a basic database application using the MS Access DBMS.

UNIT I

Lectures: 15

Data and information – Limitations of Manual Data Processing – Advantages of databases- DBMS- Functions of DBA, Elements DBMS : DDL,DML, Entities, Sets and attributes. Database Tables : Keys- Primary, Secondary, Composite and Foreign Key.

UNIT II

Lectures: 15

Creating Tables, Modifying Table Structures, Data Entity, Edit, Delete, Importing – Exporting table using MS Access.

UNIT III

Lectures: 15

Queries : Select Queries, Grouping, Parameters, Data Formatting, queries based on multiple sources, Cross Tab Queries , Action Queries , Make Table Queries, Append, Delete and Update Queries using MS Access.

UNIT IV

Lectures: 15

Forms and Reports : Forms – functions and uses – creating, Modifying labels List Boxes, Dialog Boxes. Reports: Creating, Modifying reports, Creating Reports with Report Graphics, Label Output format, Form Letters. (Using MS-Access)

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1 To understand overview of database management system	K2
2	CO2. Effectively explains the basic concepts of databases and data models.	K3
3	CO3.To use DDL,DML commands.	K3, K5
4	CO4. Able to comprehend how to use MS-Access to define	K2



	and manipulate database information	
5	CO5 Able to createForms and Reports using MS-Access	K2,K4,

References

1. Bipin C. Desai, “An introduction to Database Systems”, Galgotia Publication Pvt. Ltd. New Delhi.
2. Peter Rob, ElieSemaan Databases Design, Development, & Deployment using Microsoft Access, Tata Mcgraw – Hill Edition
3. Vikas Gupta, Windows 7 with Office 2010, Comdex Computer Course Kit, Dreamtech Press.



Lab: MS-Access

2 Credits = 2 Prac.

Duration: 2 hrs.

Marks: 20 30 Prac.

OBJECTIVES OF THE COURSE: To understand create database. To create tables. To create and working with queries, forms & reports. To design and implement a basic database application.

- Planning a Database & Creating a New Database
- Creating a Table Modifying a Table
- Creating a Query
- Creating query from multiple sources
- Append, Delete and Update Queries
- Sorting a Query Using AND and OR Operators in a Query
- Creating a Form with the Form Wizard
- Creating a Report with the Report Wizard
- Creating Mailing Labels with the Label Wizard

Course Outcome: After successful completion of this course students will be able to:

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1 Planning a Database & Creating a New Database	K3
2	CO2. Creating a Table Modifying a Table	K3
3	CO3.To use DDL, DMLQuery.	K3
4	CO4. Able to Creating a Form with the Form Wizard using MS-Access	K3
5	CO5 Able to create Creating Mailing Labels with the Label Wizard using MS-Access	K3