

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



**BCA Evaluation Scheme and Course Structure**  
**Regulations 2021**

**As Per**  
**National Education Policy 2020**  
**(Effective from the Session: 2021-22)**

## **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 C, C++, SQL, Php, 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:

**Bachelor of Computer Application (Three Year Course)**  
Study and Evaluation Scheme



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Course	Course Code	Title of the Paper	Maximum Marks			Credits Allotted				Teaching Hours
Semester I										
			Internal	ESE	Total	Lecture	Tutorial	Practical	Total Credits	
Core Course	BCA 101	Fundamentals of Computer	30	70	100	3	1	0	4	04
Core Course	BCA 102	Programming Concepts and C Language	30	70	100	3	1	0	4	04
Core Course	BCA 103	Mathematics	30	70	100	5	1	0	6	06
Generic Elective ( GE1)	BCA 104	Introduction to Information Technology (For other department students)  BCA Students may opt the Generic/Interdisciplinary Elective Course from the list of courses offered by other Departments / Subjects	30	70	100	3	1	0	4	04
SEC	BCA 105	Office Automation-I	30	70	100	2		0	2	02
AECC	AECC 01	Food Nutrition and Hygiene	30	70		3	1		0	02
Practical										
Core Course	BCA 106	Lab: Fundamentals of Computer, Programming in C	30	70	100	0	0	4	4	06
SEC	BCA 107	Lab-Office Automation-I	30	70	100			1	1	01
Semester Total					700				25	29
Course	Subject Code	Title of the Paper	Maximum Marks			Credits Allotted				Teaching Hours
Semester II										
			Internal	ESE	Total	Lecture	Tutorial	Practical	Total Credits	
Core Course	BCA 201	Object Oriented Programming using C++	30	70	100	3	1	0	4	04
Core Course	BCA 202	Data Structures	30	70	100	3	1	0	4	04
Core Course	BCA 203	Statistics	30	70	100	5	1	0	6	06
Generic Elective (GE2)	BCA 204	Desktop Applications (For other department students)  BCA Students may opt the Generic/Interdisciplinary Elective Course from the list of courses offered by other Departments / Subjects	30	70	100	3	1	0	4	04
SEC	BCA 205	Office Automation-II	30	70	100	2	0	0	2	02
AECC	AECC 02	First Aid and Health	30	70		3	1	0	0	02
Practical										
Core Course	BCA 206	Lab: OOP using C++, DS	30	70	100	0	0	4	4	06
SEC	BCA 207	Lab-Office Automation-II	30	70	100			1	1	01
Semester Total					700				25	29
Course	Subject Code	Title of the Paper	Maximum Marks			Credits Allotted				Teaching Hours
Semester III										
			Internal	ESE	Total	Lecture	Tutorial	Practical	Total Credits	
Core Course	BCA 301	Programming in JAVA	30	70	100	3	1	0	4	04

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Core Course	BCA 302	Web Technology	30	70	100	3	1	0	4	04	
Core Course	BCA 303	Digital Electronics and Computer Organization	30	70	100	5	1	0	6	06	
Generic Elective (GE3)	BCA 304	Introduction to Web Design (For other department students)  BCA Students may opt the Generic/Interdisciplinary Elective Course from the list of courses offered by other Departments / Subjects	30	70	100	3	1	0	4	04	
SEC	BCA 305	Computer Graphics	30	70	100	2	0	0	2	02	
AECC	AECC 03	Human Values and Environmental Studies	30	70		3	1	0	0	02	
Practical											
Core Course	BCA 306	Lab: Programming in JAVA, Web Technology	30	70	100	0	0	4	4	06	
SEC	BCA 307	Lab-Computer Graphics	30	70	100	0	0	1	1	01	
		Semester Total			700				25	29	
Course	Subject Code	Title of the Paper	Maximum Marks				Credits Allotted				Teaching Hours
Semester IV											
			Internal	ESE	Total	Lecture	Tutorial	Practical	Total Credits		
Core Course	BCA 401	PHP Programming	30	70	100	3	1	0	4	04	
Core Course	BCA 402	Database Management System	30	70	100	3	1	0	4	04	
Core Course	BCA 403	Operating Systems	30	70	100	5	1	0	6	06	
Generic Elective (GE4)	BCA 404	Introduction to Database and MS-Access (For other department students)  BCA Students may opt the Generic/Interdisciplinary Elective Course from the list of courses offered by other Departments / Subjects	30	70	100	3	1	0	4	04	
SEC	BCA 405	Linux Fundamentals	30	70	100	2			2	02	
AECC	AECCC 04	Food Nutrition and Hygiene	30	70		2			0	02	
Practical											
Core Course	BCA 406	Lab: PHP Programming, DBMS	30	70	100	0	0	4	4	06	
SEC	BCA 407	Lab: Linux Fundamentals	30	70	100	0	0	1	1	01	
		Semester Total			700				25	29	
Semester V											
Core Course	BCA 501	Software Engineering	30	70	100	4	1	0	5	05	
Core Course	BCA 502	Computer Networks	30	70	100	4	1	0	5	05	
Core Course/ MOOC	BCA 503	Elective-I	30	70	100	4	1	0	5	05	
Core Course	BCA 504	Mini Project	30	70	100	4	1	0	5	07	
Industrial Trainging	BCA 505	Industrial Training	30	70				0	0	00	
AECC	AECCC 05	Analytic Ability and Digital Awareness	30	70		2			0	02	
		Semester Total			400				20	24 Hours	
Semester VI											
Core Course	BCA 601	Information Security and cyber Law	30	70	100	4	1	0	5	05	

**Bachelor of Computer Application (Three Year Course)****Study and Evaluation Scheme**

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<b>Core Course</b>	BCA 602	Introduction to Cloud Computing	30	70	100	4	1	0	5	05
<b>Core Course/ MOOC</b>	BCA 603	Elective-II	30	70	100	4	1	0	5	05
<b>Core</b>	BCA 604	Project	30	70	100	4	1	0	5	07
<b>Research Project</b>	BCA 605	Research Project	30	70					0	00
<b>AECC</b>	AECCC 06	Communication Skill and Personality Development	30	70		2			0	02
		<b>Semester Total</b>			400				20	24 Hours
		<b>GRAND TOTAL</b>			3600				140	

- IA: Internal Assessment, ESE: End Semester Examination.
- Students are required to select one course from each set of electives (Elective-I to Elective-II) offered by the department.
- ESE=70, IA=30, P=70 (30 Marks for Practical Problems, 30 Marks for Viva-Voce, 10 Marks for Lab Record)
- The weight age of Internal Assessment and External Assessment will be in the ratio of 30% and 70% of total marks in all theory, practical papers & projects.

<b>Elective – I</b> BCAE51- Graph Theory BCAE52 - Data Warehousing and Data Mining BCAE53 - Software Project Management	<b>Elective –II</b> BCAE61 - Introduction to Client- Server Computing BCAE62 - Mobile Computing BCAE63 - Soft Computing
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**BCA Semester III**

**BCA 301: Programming in Java**

**Credit: 04, IA Marks: 30, ESE Marks: 70**

**Lectures: 45 Hours, Tutorial: 15 Hours**

**OBJECTIVES OF THE COURSE:**

1. To understand Object Oriented Concepts using Java Language.
2. To develop, debug and document programs in Java using OOP paradigms.
3. To develop and deploy applications and applets in JAVA.
4. To develop and deploy GUI using JAVA Swing and AWT.

**UNIT-I**

**Lectures: 11**

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

**UNIT-II**

**Lectures: 11**

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: 11**

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: 12**

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	Understand structure and model of the Java programming language Understand	K1
2	Analyze and develop exception handling and multithreaded programs Analyze	K3
3	Design and Develop GUI based applications using AWT & Swing Create	K5, K2
4	Apply knowledge of JDBC to create programs for establishing database connectivity	K2

**Suggested Readings:**

1. Patrick Naughton and Herbert 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



### BCA Semester III

#### BCA 302: Web Technology

**Credit: 04, IA Marks: 30, ESE Marks: 70**

**Lectures: 45 Hours, Tutorial: 15 Hours**

#### OBJECTIVES OF THE COURSE:

1. To understand the concept of Web Application Development and its Architecture.
2. To understand the Essentials of Web Application Development.
3. To understand and practice web page designing techniques.
4. To understand the differences between client side & server side technologies to develop Web Application.

#### UNIT-I

**Lectures: 11**

##### INTRODUCTION & WEB DESIGN

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

**Lectures: 11**

##### HTML & STYLE SHEETS

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

**Lectures: 12**

##### JAVES CRIPT & XML

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

**Lectures: 11**

##### MYSQL

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.



## Detailed Syllabus – BCA Semester III (Three Year Course)



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

S. No.	Course Outcome	Bloom's Taxonomy
1	Describe and differentiate different Web Extensions and Web Services	K1
2	Apply fundamental computer theory to basic programming techniques and fundamental skills to maintain web server services required to host a website	K2
3	Select and apply markup languages for processing, identifying, and presenting of information in web pages	K3
4	Use scripting languages and web services to transfer data and add interactive components to web pages	K2

### **Suggested Readings:**

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.



### BCA Semester III

#### BCA 303 – Digital Electronics and Computer Organization

**Credit: 06, IA Marks: 30, ESE Marks: 70**

**Lectures: 75 Hours, Tutorial: 15 Hours**

#### OBJECTIVES OF THE COURSE:

1. To understand the basic structure and operation of digital computer.
2. To study the design of arithmetic and logic unit and implementation of fixed point and floating-point arithmetic operations.
3. To study the two types of control unit techniques & processor organization.
4. To study the hierarchical memory system including cache memories and virtual memory.
5. 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

**Lectures: 19**

##### Input-Output and Memory Organization:

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	Represent numerical values in various number systems and perform conversions from one number system to another	K2
2	Analyze digital combinational circuits and sequential logic circuits	K3

## Detailed Syllabus – BCA Semester III (Three Year Course)



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3	Understand the evolution of processors, their present technology and inter-process communication. hierarchical memory system including cache memories and virtual memory	K1
4	Evaluate CPU organization and instruction, design a memory module and analyze its operation by interfacing with the CPU.	K3, K4

### Suggested Readings:

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 Semester III (Generic)**

**GE3:BCA 304: Introduction to Web Design**

**Credit: 04, IA Marks: 30, ESE Marks: 70**

**Lectures: 45 Hours, Practical: 15 Hours**

**OBJECTIVES OF THE COURSE:**

1. To understand the fundamental concept of computer.
2. To define the principle of Web page design.
3. To understand the basics in web design.
4. To visualize the basic concept of HTML.
5. To recognize the elements of HTML. To introduce basics concept of SS.
6. To develop the concept of web publishing.

**Unit-I**

**Lectures: 11**

**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: 11**

**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: 12**

**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: 11**

**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	To understand the fundamental concept of computer.	K1
2	To define the principle of Web page design.	K1, K2
3	To understand the basics in web design.	K1
4	To visualize the basic concept of HTML.	K3

## Detailed Syllabus – BCA Semester III (Three Year Course)



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### **Suggested Readings:**

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.



## BCA Semester III

### BCA 305: Computer Graphics

**Credit: 02, IA Marks: 30, ESE Marks: 70**

**Lectures: 30 Hours**

#### OBJECTIVES OF THE COURSE

1. To define the different concepts related to Computer Graphics Display Systems and devices.
2. To device algorithms for drawing lines, circles, and ellipse.
3. To learn various 2D, 3D transformation, clipping operations.
4. To learn various projection methods and curve and surface representation methods for representing the objects.

#### UNIT-I

**Lectures: 08**

**Overview of Graphics Systems:** Introduction of Computer Graphics, Graphics Applications, Video display devices, Raster-Scan System, Random-Scan Systems. Cathode Rays Tube (CRT) Display Device; Direct View Storage Tube (DVST) Display Device, Graphics monitors and workstations. Input devices: Hard copy devices, Graphics software

#### UNIT-II

**Lectures: 08**

**Output Primitives:** Line drawing algorithms circle generation algorithms. Ellipse Generating Algorithm, Pixel Addressing, Filled-Area Primitives, Fill Area Function, Cell Array, Character, Generation

**Attributes of Output Primitives:** Line Attributes, Curve Attributes, Color and Gray-Scale levels. Area-Fill Attributes, Character Attributes. Bundled attributes. Inquiry functions.

#### UNIT-III

**Lectures: 07**

**Two-Dimensional Transformation:** Basic transformations, Homogenous coordinate, composite transformations, other transformations. Affine transformations, transformation functions, Raster methods for transformations.

**Two-Dimensional Viewing and Clipping:** The viewing pipeline, viewing transformation, viewing functions. Line clipping, Cohen Sutherland line clipping, Liang Barsky line clipping Polygon clipping: Sutherland-Hodgman polygon clipping, WeilerAmerton polygon clipping

#### UNIT-IV

**Lectures: 07**

**Three Dimensional:** 3-D Geometric Primitives, 3-D Object representation, 3-D Transformation, 3-D viewing, projections, 3-D Clipping.

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

S. No.	Course Outcome	Bloom's Taxonomy
1	Describe the fundamental concepts of Computer Graphics.	K1

## Detailed Syllabus – BCA Semester III (Three Year Course)



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2	To demonstrate with the relevant mathematics of computer graphics, ex. line, circle and ellipse drawing algorithms. To understand the attributes of output primitives of Graphics	K3
3	Apply simple and composite transformation on graphic objects/elements in two dimensions. Analyze two dimensions modeling and clipping techniques	K3, K4
4	Apply simple and composite transformation on graphic objects/elements in three dimensions.	K3, K4

### **Suggested Readings:**

1. Donald Hearn & M. Pauline Baker: Computer Graphics.
2. J.D. Foley, A. Van Dam, J.F. Hughes and S.K. Feiner, Computer Graphics: Principles and Practice, Second Edition, Addison Wesley.
3. Pearson David F. Roger: Procedural Element for Computer Graphics.
4. TMH David F. Roger & J. A. Adams: Mathematical Element for Computer Graphics. TMH.
5. Heam Donald, Pauline Baker M: "Computer Graphics", PHI 2nd Edn.
6. Harrington S: "Computer Graphics - A Programming Approach", 2nd Edn. McGrawHill.
7. Shalini Govil-Pai, Principles of Computer Graphics, Springer.





**BCA 306: Lab: Programming in JAVA, Web Technology**

**Credit: 04, IA Marks: 30, ESE Marks: 70**

**Programming in JAVA**

**OBJECTIVES OF THE COURSE:**

1. To implement Object Oriented Concepts using Java Language.
  2. To develop and deploy applications and applets in JAVA.
  3. To develop and deploy GUI using JAVA Swing and AWT, JDBC.
  4. 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.

**Web Technology**

**OBJECTIVES OF THE COURSE:**

1. To develop the concept of Web Application and its architecture.
  2. To understand the Essentials of Web Application Development.
  3. To implement and practice web page designing techniques.
  4. 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.

Note: The Instructor may add/delete/modify experiments, wherever he/she feels in a justified manner.

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

S. No.	Course Outcome	Bloom's Taxonomy
1	To implement Object Oriented Concepts using Java Language.	K2, K3
2	To develop and deploy applications and applets in JAVA.	K2



Detailed Syllabus – BCA Semester III (Three Year Course)



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3	To develop and deploy GUI using JAVA Swing and AWT, JDBC.	K2
4	To develop the concept of Web Application and its architecture.	K2
5	To understand the Essentials of Web Application Development.	K2, K1
6	To develop the concept of Web Application and its architecture.	K2



**BCA 307: Lab: Computer Graphics**

**Credit: 01, IA Marks: 30, ESE Marks: 70**

**OBJECTIVES OF THE COURSE:**

1. Study of Fundamental Graphics Functions.
2. Implementation of Line drawing algorithms: DDA Algorithm, Bresenham's Algorithm
3. Implementation of Circle drawing algorithms: Bresenham's Algorithm, Mid-Point Algorithm.
4. Programs on 2D and 3D transformations.
5. To implement Cohen Sutherland line clipping algorithm

Sr. No.	Experiment Name
1	Study of basic graphics functions defined in “graphics.h”
2	To implement DDA(Digital Differential Algorithm) for line drawing
3	To implement Bresenham’s algorithm for line drawing
4	To implement Bresenham's algorithm for circle drawing
5	To implement Midpoint algorithm for circle drawing
6	To implement Midpoint algorithm for ellipse drawing
7	To perform 2D Rotation Transformation
8	To perform 2-D Translation Transformation
9	To perform 2-D Scaling Transformation
10	To perform 2-D Reflection Transformation
11	To perform a composite Transformation using 2D Transformation
12	To implement Cohen-Sutherland 2D Line clipping
13	To implement Sutherland Hodgeman Polygon clipping algorithm
14	Implementation of 3D Transformation,
	<b>Value Addition Experiments</b>
15	Designing simple animation using transformations
16	Implementation of draw Sine, Cosine and Tangent Curves
17	Implementation of puzzle game such as Sudoku

Note: The Instructor may add/delete/modify experiments, wherever he/she feels in a justified manner.

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

S. No.	Course Outcome	Bloom’s Taxonomy
1	Study of Fundamental Graphics Functions&Implementation of Line drawing algorithms&Circle drawing algorithms	K1, K2
2	Evaluate various Algorithms of 2D and 3D Transformations on different type of objects	K2, K3
3	Understanding and apply of clipping algorithms	K1, K2



**BCA Semester IV**  
**BCA 401: PHP Programming**

**Credit: 04, IA Marks: 30, ESE Marks: 70**  
**Lectures: 45 Hours, Tutorial: 15 Hours**

**OBJECTIVES OF THE COURSE:**

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

**UNIT – I Lectures: 11**

**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: 11**

**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: 12**

**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: 11**

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

S. No.	Course Outcome	Bloom's Taxonomy
1	To understand, analyze and apply the role languages like HTML, CSS, XML, JavaScript and protocols in the workings of web and web applications.	K1, K2, K3
2	To discuss the process of editing a web page using text editors and web page editors.	K1, K2

## Detailed Syllabus – BCA Semester IV (Three Year Course)



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3	To identify common designing form when creating a web-based application using PHP.	K2
4	To develop web application using loops and conditional events in PHP.	K2, K4

### **Suggested Readings:**

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".



## BCA Semester IV

### BCA 402: Database Management System

Credit: 04, IA Marks: 30, ESE Marks: 70

Lectures: 45 Hours, Tutorial: 15 Hours

#### OBJECTIVES OF THE COURSE:

1. To define the fundamental concepts of database management system.
2. To execute manually a given (simple) database design & transaction over it.
3. To implement (simple) algorithms and data structures as database transaction.
4. To introduce the concept of DBMS and providing a general introduction to relational model.
5. To understand & learn SQL.
6. To understand the concept of normalization.

#### Unit-I

Lectures: 11

**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: 12

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, Generalization, aggregation.

#### Unit-III

Lectures: 12

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: 10

Data Base Design & Normalization: Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependencies, 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	For a given query write relational algebra expressions for that query and optimize the developed expressions	K2
2	For a given specification of the requirement design the databases using ER method and normalization	K3
3	For a given specification create the SQL queries for Open source and Commercial DBMS -MYSQL&ORACLE.	K6
4	For a given evaluation of transaction-processing system, determine the transaction atomicity, consistency, isolation, and durability	K2, K5

#### Suggested Readings:

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.

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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.





**BCA Semester IV**  
**BCA 403 – Operating Systems**

**Credit: 06, IA Marks: 30, ESE Marks: 70**  
**Lectures: 75 Hours, Tutorial: 15 Hours**

**OBJECTIVES OF THE COURSE:**

1. To develop the understanding of the structure and functioning of Operating System.
2. To learn about Processes, Threads and Scheduling algorithms.
3. To understand the principles of concurrency and Deadlock.
4. To learn various memory management schemes.
5. To study I/O management and File systems.

**UNIT-I**

**Lectures: 11**

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: 11**

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

**UNIT-III**

**Lectures: 12**

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: 11**

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	Understand the important computer system resources and the role of operating system in their management policies and algorithms, storage management policies and memory management and its allocation policies.	K1
2	Apply the process management policies and scheduling of processes by CPU.	K2
3	Analyze a system model for deadlock and methods for handling deadlocks	K3
4	Evaluate the requirement for process synchronization and coordination handled by operating system	K4, K5

**Suggested Readings:**

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 Semester IV (Generic)**

**GE4: BCA 404: Introduction to Database and MS-Access**

**Credit: 04, IA Marks: 30, ESE Marks: 70**

**Lectures: 45 Hours, Practical: 15 Hours**

**OBJECTIVES OF THE COURSE:**

1. To understand basic concepts of database management systems.
2. To understand the concept of making database and to design the tables.
3. To acquire knowledge of working with queries, forms & reports.
4. To design and implement a basic database application using the MS Access DBMS.

**UNIT-I**

**Lectures: 11**

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: 11**

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

**UNIT-III**

**Lectures: 11**

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: 12**

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	To understand basic concepts of database management systems.	K1
2	To understand the concept of making database and to design the tables.	K3
3	To acquire knowledge of working with queries, forms & reports.	K3
4	To design and implement a basic database application using the MS Access DBMS.	K2,K4

**Suggested Readings:**

1. Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication Pvt. Ltd. New Delhi.
2. Peter Rob, Elie Semaan 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.





**BCA Semester IV**

**BCA 405: Linux Fundamentals**

**Credit: 02, IA Marks: 30, ESE Marks: 70**

**Lectures: 30 Hours**

**OBJECTIVES OF THE COURSE**

1. Be familiar with various types of operating systems including UNIX, Linux, windows and Linux Directories
2. To understand about the Linux Files and Simple filter commands
3. To understand about the file hierarchy and file security.
4. To acquire knowledge of shell and various shell commands.

**UNIT-I**

**Lectures: 07**

**Introduction:** Overview of Linux, Advantage of Linux, Linux History, Linux Features, Unix vs Linux, Linux vs Windows, Installation of Linux OS, Set Environment Variables, Linux Set Command, Linux Export Command

**Linux Directories:** Linux Directories, Linux pwd, Linux cd, Linux Absolute Relative, Linux Path Completion, Linux ls, Linux mkdir, Linux rmdir, Rename Folder in Linux

**UNIT-II**

**Lectures: 07**

**Linux Files:** Linux File Command, Linux Touch Command, Linux rm Command, Linux cp Command, Linux mv Command, Linux rename Command

**Linux Man Pages:** Linux man, Linux man -a, Linux man -aw, Linux man -f

**Linux File Contents Command:** Linux File Contents, Linux head, Linux tail, Linux cat

**Simple filter commands**

**UNIT-III**

**Lectures: 08**

**Linux File Hierarchy:** Linux File Hierarchy, Binary Directories, Configuration Directories, Data Directories, Memory Directories, User Directory, var Directory, Non-standard directories

**Linux File Security:** Linux File Ownership, Linux Permission, Linux Advanced Permission, Linux File Links: Linux Inodes, Linux Link Directories, Linux Hard links, Linux Soft links, Linux Remove link

**UNIT-IV**

**Lectures: 08**

**Linux Shell Commands:** Basics of shell, various types of shell available in Linux, Comparisons between various shells, Linux Commands, Linux Aliases, Linux Arguments, Linux Displaying Shell, Linux Control Operators, Linux File Globbing, Linux Shell Embedding, Linux Shell History, Linux History Commands, Linux History Size, Linux Bang Bang

**Linux vi editor:** Vi Editor, Vi Commands

**Process and Process management commands**

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

S. No.	Course Outcome	Bloom's Taxonomy
1	Learn about various types of operating systems including UNIX, Linux and windows, Linux Installation and Linux directories	K1, K2

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2	Effectively use Linux Environment using file system and execute simple filter commands.	K2, K3
3	Effectively use Linux File hierarchy and file security	K1, K2
4	Perform various commands related to shell, vi editors and process management	K2, K3

### **Suggested Readings:**

1. Unix and Shell Programming – B. M. Harwani, OXFORD University Press.
2. Linux Administration : A Beginner's Guide – Wale Soyinka , McGraw HillPublication
3. Unix Concepts and Applications – Sumitabha Das, McGraw Hill Publication
4. Cristopher Negus – Red Hat Linux Bible, Wiley Dreamtech India.
5. YeswantKanethkar – UNIX Shell Programming, First edition, BPB.
6. Official Red Hat Linux Users guide by Redhat, Wiley Dreamtech India
7. Graham Glass & King Ables – UNIX for programmers and users, Third Edition, Pearson Education.
8. Neil Mathew & Richard Stones – Beginning Linux Programming, Fourth edition, Wiley Dreamtech India.



**BCA 406: Lab: PHP Programming, DBMS**

**Credit: 04, IA Marks: 30, ESE Marks: 70**

**PHP Programming**

**OBJECTIVES OF THE COURSE:**

1. To give basic Knowledge of PHP.
  2. To Learn about PHP Syntax.
  3. To understand & work with PHP Arrays, PHP Loops.
  4. To handle MySQL connectivity.
  5. 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.

**DBMS**

**OBJECTIVES OF THE COURSE:**

1. To understand the fundamental concepts of database management system.
  2. To understand the concept of entity-relationship.
  3. To create and manage database/tables.
  4. To create and querying of database tables for various cases.
  5. To retrieve data from multiple tables.
  6. To handle the aggregate functions.
  7. 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.

Note: The Instructor may add/delete/modify experiments, wherever he/she feels in a justified manner.

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

S. No.	Course Outcome	Bloom's Taxonomy
1	To understand the fundamental concepts of database management system.	K1
2	To understand the concept of entity-relationship.	K1

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3	To create and manage database/tables.	K2, K3
4	To create and querying of database tables for various cases.	K3
5	To retrieve data from multiple tables.	K3
6	To handle the aggregate functions.	K3
7	To understand the concept of normalization and dependencies.	K1, K2

### BCA 407: Lab: Linux Fundamentals

**Credit: 01, IA Marks: 30, ESE Marks: 70**

#### OBJECTIVES OF THE COURSE:

- 1) To write shell script programs to solve problems.
  - 2) To implement some standard Linux utilities such as ls.cpetc using system calls.
  - 3) To develop network-based applications.
- Write a shell script that accept a file name starting and ending line numbers as arguments and display all the lines between given line no:
  - Write a shell script that delete all lines containing a specified word.
  - Linux commands- PATH, man, echo, printf, script, passwd, uname, who.
  - Filters: Filters and Pipes, concatenating files
  - Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count Characters, Words or Lines, Comparing Files.
  - Linux commands- date, stty, pwd, cd, mkdir, rmdir,
  - Linux commands- ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip,
  - Linux commands- file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, unlink, du, df, mount, umount,

Note: The Instructor may add/delete/modify experiments, wherever he/she feels in a justified manner.

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

S. No.	Course Outcome	Bloom's Taxonomy
1	Ability to understand the LINUX Operating System and the working of the built-in commands.	K1
2	Analyze the duties of the system administration	K2, K4
3	To implement some standard Linux utilities such as ls.cp etc. using system calls.	K2, K3