

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



**BCA (Research)  
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, The third year provides the specialization and the project work and fourth year focused on initiate research bing at startup level. Students will be awarded certificate in computer application after one-year completion, diploma in computer application after two yearsof completion, get B.C.A. degree after three years completion and B.C.A. (research)degree after completion of four years.

A four-year degree (Eight -semesters) in Computer Applications will get skills and information not only about Computer and Information Technology but also in communication, organization,research and management with multidisciplinary approach. 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 research areas of computer application and IT Enabled industry.

### **1. Applicability**

These regulations shall apply to the Bachelor of Computer Application (Research) 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 (Research) 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, academic and research.
- 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.
- To develop research focused graduate students different research areas at the institution. Students with no prior experience will get rid of several misconceptions about the nature of research.

#### **4. 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. Starting out on their research careers in research

#### **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. To have an ability for the local and global impact of research solutions on individuals, organizations, and society.

#### **6. Course Structure**

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

**Certificate in Computer Application (One Year) / Diploma in Computer Application (Two Years) / Bachelor of Computer Application (Three Years)/ Bachelor of Computer Application (Research) (Four Years)**



**ख़्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)**  
**Khwaja Moinuddin Chishti Language University, Lucknow, Uttar Pradesh (India)**

U.P. State Government University  
 (Recognised Under Section 2(F) & 12(B) of the UGC Act 1956 & B.Tech Approved by AICTE)

**Semester-wise Course Structure / Titles of the Papers**

(as per National Education Policy-2020)

Year	Semester	Subject	Course Code	Paper Title	Theory/ Practical	Credits	{Cumulative Minimum Credits} Required for Awards of Certificate/Diploma/Degree
1	I	Core Compulsory 1	BCA 101	Fundamentals of Computer	Theory	4	<b>{46 Credits} Certificate in Computer Application</b>
		Core Compulsory 2	BCA 102	Programming Concepts and C Language	Theory	4	
		Core Compulsory 3	BCA 103	Mathematics	Theory	6	
		Core Compulsory	BCA 106	Lab: Fundamentals of Computer and Programming in C	Practical	4	
		GE1	BCA 104	Fundamentals of Computer (For other department students)  BCA Students may opt the Generic/Interdisciplinary Elective Course from the list of courses offered by other Departments / Subjects	Theory	4	
		SEC1	BCA 105	Office Automation-I	Theory	2	
		SEC1	BCA 107	Lab-Office Automation-I	Practical	1	
		AECC 1	AECC 01	Food Nutrition and Hygiene	Theory	0	
						<b>25</b>	
1	II	Core Compulsory 4	BCA 201	Object Oriented Programming Using C++	Theory	4	
		Core Compulsory 5	BCA 202	Data Structures	Theory	4	
		Core Compulsory 6	BCA 203	Statistics	Theory	6	

**Certificate in Computer Application (One Year) / Diploma in Computer Application (Two Years) / Bachelor of Computer Application (Three Years)/ Bachelor of Computer Application (Research) (Four Years)**



**ख़्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)**  
**Khwaja Moinuddin Chishti Language University, Lucknow, Uttar Pradesh (India)**

U.P. State Government University  
 (Recognised Under Section 2(F) & 12(B) of the UGC Act 1956 & B.Tech Approved by AICTE)

		Core Compulsory	BCA 206	Lab: OOP using C++, DS	Practical	4	
		GE2	BCA 204	Office Automation (For other department students)  BCA Students may opt the Generic/Interdisciplinary Elective Course from the list of courses offered by other Departments / Subjects	Theory	4	
		SEC2	BCA 205	Office Automation-II	Theory	2	
			BCA 207	Lab-Office Automation-II	Practical	1	
		AECC2	AECC 02	First Aid and Health	Theory	0	
						<b>25</b>	
2	III	Core Compulsory 7	BCA 301	Programming in JAVA	Theory	4	<b>{92 Credits} Diploma in Computer Application</b>
		Core Compulsory 8	BCA 302	Web Technology	Theory	4	
		Core Compulsory 9	BCA 303	Digital Electronics and Computer Organization	Theory	6	
		Core Compulsory	BCA 306	Lab: Programming in JAVA, Web Technology	Practical	4	
		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	Theory	4	
		SEC3	BCA 305	Computer Graphics	Theory	2	
		SEC3	BCA 307	Lab: Computer Graphics	Practical	1	
		AECC3	AECC 03	Human Values and Environmental Studies	Theory	0	
						<b>25</b>	
2	IV	Core Compulsory 10	BCA 401	PHP Programming	Theory	4	
		Core Compulsory 11	BCA 402	Database Management System	Theory	4	
		Core Compulsory 12	BCA 403	Operating Systems	Theory	6	

**Certificate in Computer Application (One Year) / Diploma in Computer Application (Two Years) / Bachelor of Computer Application (Three Years)/ Bachelor of Computer Application (Research) (Four Years)**



**ख़्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)**  
**Khwaja Moinuddin Chishti Language University, Lucknow, Uttar Pradesh (India)**

U.P. State Government University  
 (Recognised Under Section 2(F) & 12(B) of the UGC Act 1956 & B.Tech Approved by AICTE)

		Core Compulsory	BCA 406	Lab: PHP Programming, DBMS	Practical	4	
		GE 4	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	Theory	4	
		SEC4	BCA 405	Linux Fundamentals	Theory	2	
		SEC4	BCA 407	Lab: Linux Fundamentals	Practical	1	
		AECC4	AECC 04	Physical Education and Yoga	Theory	0	
						<b>25</b>	<b>{132 Credits} Bachelor of Computer Application</b>
3	V	Core Compulsory 13	BCA 501	Software Engineering	Theory	5	
		Core Compulsory 14	BCA 502	Computer Network	Theory	5	
		Core Compulsory 15	BCA 503	Graph Theory	Theory	5	
		Core Compulsory 16	BCA 504	Minor Project	Practical	5	
		AECC5	AECC 05	Analytic Ability and Digital Awareness	Theory	0	
		Industrial Training	BCA 505	Industrial Training	Training	0	
						<b>20</b>	
3	VI	Core Compulsory 17	BCA 601	Information Security and cyber Law	Theory	5	
		Core Compulsory 18	BCA 602	Introduction to Cloud Computing	Theory	5	
		Core Compulsory 19	BCA 603	Software Project Management	Theory	5	
		Core Compulsory 20	BCA 604	Project	Practical	5	
		AECC6	AECC 06	Communication Skill and Personality Development	Theory	0	
		Research Project	BCA 605	Research Project	Project	0	
						<b>20</b>	
4	VII	Core Compulsory 21	BCA 701	Advanced Software Engineering	Theory	5	<b>{184 Credits}</b>

**Certificate in Computer Application (One Year) / Diploma in Computer Application (Two Years) / Bachelor of Computer Application (Three Years)/ Bachelor of Computer Application (Research) (Four Years)**



**ख़्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)**  
**Khwaja Moinuddin Chishti Language University, Lucknow, Uttar Pradesh (India)**

U.P. State Government University  
 (Recognised Under Section 2(F) & 12(B) of the UGC Act 1956 & B.Tech Approved by AICTE)

		Core Compulsory 22	BCA 702	Research Methodology	Theory	<b>5</b>	<b>Bachelor of Computer Application (Research)</b>
		Core Compulsory 23	BCA 703	Data Science Using Python Programming	Theory/ Practical	<b>5</b>	
		Core Compulsory 24	BCA 704	Advance Statistics and probability	Theory	<b>5</b>	
		GE 5	BCA 705	E-Commerce (For other department students)  BCA Students may opt the Generic/Interdisciplinary Elective Course from the list of courses offered by other Departments / Subjects	Theory	<b>4</b>	
		Research Project (Conceptual)	BCA 706	Research Project (Conceptual)	Project	<b>4</b>	
						<b>28</b>	
4	VIII	Core Compulsory 25	BCA 801	Advanced Data Base Management System	Theory /Practical	<b>5</b>	
		Core Compulsory 26	BCA 802	Software Testing and Quality Assurance	Theory	<b>5</b>	
		Core Compulsory 27	BCA 803	Resource Management in Cloud Computing Environment	Theory	<b>5</b>	
		Core Compulsory 28	BCA 804	Research Ethics and Tool Kit	Theory	<b>5</b>	
		Research Project Report	BCA 805	Research Project Report	Project	<b>4</b>	
						<b>24</b>	

**Certificate in Computer Application (One Year) / Diploma in Computer Application (Two Years) / Bachelor of Computer Application (Three Years) / Bachelor of Computer Application (Research) (Four Years)**  
(Study and Evaluation Scheme)



**ख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)**  
**Khwaja Moinuddin Chishti Language University, Lucknow, Uttar Pradesh (India)**

U.P. State Government University  
(Recognised Under Section 2(F) & 12(B) of the UGC Act 1956 & B.Tech Approved by AICTE)

Course	Course Code	Title of the Paper	Maximum Marks			Credits Allotted				Teaching Hours
			Internal	ESE	Total	Lecture	Tutorial	Practical	Total Credits	
<b>Semester I</b>										
<b>Core Course</b>	BCA 101	Fundamentals of Computer	30	70	100	3	1	0	4	04
<b>Core Course</b>	BCA 102	Programming Concepts and C Language	30	70	100	3	1	0	4	04
<b>Core Course</b>	BCA 103	Mathematics	30	70	100	5	1	0	6	06
<b>Generic Elective (GE1)</b>	BCA 104	Fundamentals of Computer (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	4	04
<b>SEC</b>	BCA 105	Office Automation-I	30	70	100	2		0	2	02
<b>AECC</b>	AECC 01	Food Nutrition and Hygiene	30	70		3	1		0	02
<b>Practical</b>										
<b>Core Course</b>	BCA 106	Lab: Fundamentals of Computer, Programming in C	30	70	100	0	0	4	4	06
<b>SEC</b>	BCA 107	Lab-Office Automation-I	30	70	100			1	1	01
<b>Semester Total</b>					<b>700</b>				<b>25</b>	<b>29</b>
Course	Subject Code	Title of the Paper	Maximum Marks			Credits Allotted				Teaching Hours
			Internal	ESE	Total	Lecture	Tutorial	Practical	Total Credits	
<b>Semester II</b>										
<b>Core Course</b>	BCA 201	Object Oriented Programming using C++	30	70	100	3	1	0	4	04
<b>Core Course</b>	BCA 202	Data Structures	30	70	100	3	1	0	4	04
<b>Core Course</b>	BCA 203	Statistics	30	70	100	5	1	0	6	06
<b>Generic Elective (GE2)</b>	BCA 204	Office Automation (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	4	04
<b>SEC</b>	BCA 205	Office Automation-II	30	70	100	2	0	0	2	02
<b>AECC</b>	AECC 02	First Aid and Health	30	70		3	1	0	0	02
<b>Practical</b>										
<b>Core Course</b>	BCA 206	Lab: OOP using C++, DS	30	70	100	0	0	4	4	06
<b>SEC</b>	BCA 207	Lab-Office Automation-II	30	70	100			1	1	01
<b>Semester Total</b>					<b>700</b>				<b>25</b>	<b>29</b>

**Certificate in Computer Application (One Year) / Diploma in Computer Application (Two Years) / Bachelor of Computer Application (Three Years) / Bachelor of Computer Application (Research) (Four Years)**  
(Study and Evaluation Scheme)



**ख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)**  
**Khwaja Moinuddin Chishti Language University, Lucknow, Uttar Pradesh (India)**

U.P. State Government University  
(Recognised Under Section 2(F) & 12(B) of the UGC Act 1956 & B.Tech Approved by AICTE)

Course	Subject Code	Title of the Paper	Maximum Marks			Credits Allotted				Teaching Hours
			Internal	ESE	Total	Lecture	Tutorial	Practical	Total Credits	
<b>Semester III</b>										
<b>Core Course</b>	BCA 301	Programming in JAVA	30	70	100	3	1	0	4	04
<b>Core Course</b>	BCA 302	Web Technology	30	70	100	3	1	0	4	04
<b>Core Course</b>	BCA 303	Digital Electronics and Computer Organization	30	70	100	5	1	0	6	06
<b>Generic Elective (GE3)</b>	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	4	04
<b>SEC</b>	BCA 305	Computer Graphics	30	70	100	2	0	0	2	02
<b>AECC</b>	AECC 03	Human Values and Environmental Studies	30	70		3	1	0	0	02
<b>Practical</b>										
<b>Core Course</b>	BCA 306	Lab: Programming in JAVA, Web Technology	30	70	100	0	0	4	4	06
<b>SEC</b>	BCA 307	Lab-Computer Graphics	30	70	100	0	0	1	1	01
					<b>Semester Total</b>				<b>25</b>	<b>29</b>
<b>Semester IV</b>										
<b>Core Course</b>	BCA 301	PHP Programming	30	70	100	3	1	0	4	04
<b>Core Course</b>	BCA 302	Database Management System	30	70	100	3	1	0	4	04
<b>Core Course</b>	BCA 303	Operating Systems	30	70	100	5	1	0	6	06
<b>Generic Elective (GE4)</b>	BCA 304	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	4	04
<b>SEC</b>	BCA 305	Linux Fundamentals	30	70	100	2			2	02
<b>AECC</b>	AECCC 04	Physical Education and Yoga	30	70		2			0	02
<b>Practical</b>										
<b>Core Course</b>	BCA 306	Lab: PHP Programming, DBMS	30	70	100	0	0	4	4	06
<b>SEC</b>	BCA 307	Lab: Linux Fundamentals	30	70	100	0	0	1	1	01
					<b>Semester Total</b>				<b>25</b>	<b>29</b>
<b>Semester V</b>										
<b>Core Course</b>	BCA 501	Software Engineering	30	70	100	4	1	0	5	05

**Certificate in Computer Application (One Year) / Diploma in Computer Application (Two Years) / Bachelor of Computer Application (Three Years)/ Bachelor of Computer Application (Research) (Four Years)  
(Study and Evaluation Scheme)**



**ख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)  
Khwaja Moinuddin Chishti Language University, Lucknow, Uttar Pradesh (India)**

U.P. State Government University  
(Recognised Under Section 2(F) & 12(B) of the UGC Act 1956 & B.Tech Approved by AICTE)

<b>Core Course</b>	BCA 502	Computer Network	30	70	100	4	1	0	5	05
<b>Core Course</b>	BCA 503	Elective-I	30	70	100	4	1	0	5	05
<b>Core Course</b>	BCA 504	Minor Project	30	70	100	4	1	0	5	07
<b>Industrial Training</b>	BCA 505	Industrial Training	30	70				0	0	00
<b>AECC</b>	AECCC 05	Analytic Ability and Digital Awareness	30	70		2			0	02
		<b>Semester Total</b>			<b>400</b>				<b>20</b>	<b>24 Hours</b>
<b>Semester VI</b>										
<b>Core Course</b>	BCA 601	Information Security and cyber Law	30	70	100	4	1	0	5	05
<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>			<b>400</b>				<b>20</b>	<b>24 Hours</b>
		<b>GRAND TOTAL (for BCA)</b>			<b>3600</b>				<b>140</b>	
<b>Semester VII</b>										
<b>Core Course</b>	BCA 701	Advanced Software Engineering	30	70	100	4	1		5	05
<b>Core Course</b>	BCA 702	Research Methodology	30	70	100	4	1		5	05
<b>Core Course</b>	BCA 703	Data Science Using Python Programming	30	70	100	3		2	5	05
<b>Core Course</b>	BCA 704	Advance Statistics and probability	30	70	100	4	1		5	05
<b>Generic Elective (GE5)</b>	BCA 705	E-Commerce (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		4	04
<b>Research Project (Conceptual)</b>	BCA 706	Research Project (Conceptual)	30	70	100				4	
<b>Core Course</b>		<b>Semester Total</b>			<b>600</b>				<b>28</b>	<b>24 Hours</b>
<b>Semester VIII</b>										
<b>Core Course</b>	BCA 801	Advanced Data Base Management System	30	70	100	3		2	5	05
<b>Core Course</b>	BCA 802	Software Testing and Quality Assurance	30	70	100	4	1		5	05

**Certificate in Computer Application (One Year) / Diploma in Computer Application (Two Years) / Bachelor of Computer Application (Three Years)/ Bachelor of Computer Application (Research) (Four Years)**  
(Study and Evaluation Scheme)



ख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)  
**Khwaja Moinuddin Chishti Language University, Lucknow, Uttar Pradesh (India)**

U.P. State Government University  
(Recognised Under Section 2(F) & 12(B) of the UGC Act 1956 & B.Tech Approved by AICTE)

<b>Core Course</b>	BCA 803	Resource Management in Cloud Computing Environment	30	70	100	4	1		5	05
<b>Core Course</b>	BCA 804	Research Ethics and Tool Kit	30	70	100	4	1		5	05
Research Project Report	BCA 805	Research Project Report	30	70	100				04	
		<b>Semester Total</b>			500				24	20 Hours
		<b>GRAND TOTAL (for BCAR)</b>			4700				192	

- 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 MOOC01 – MOOCs (any course of same credit)
--	--



## BCA Semester I

### BCA 101: Fundamentals of Computer

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

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

#### OBJECTIVES OF THE COURSE:

1. To understand the functional components of computers.
2. To differentiate between hardware and software.
3. To understand the concept of data representation.
4. To introduce & understand various operating systems.
5. To understand the concept of data communication, networking and internet.

#### UNIT-I

**Lectures: 11**

**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: 11**

**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: 11**

**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: 12**

**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:

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



ख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)  
**Khwaja Moinuddin Chishti Language University, Lucknow, Uttar Pradesh (India)**

U.P. State Government University  
(Recognised Under Section 2(F) & 12(B) of the UGC Act 1956 & B.Tech Approved by AICTE)

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1. To understand basic component of computer.	K1, K2
2	CO2. To learn number systems and number representation	K1, K2
3	CO3. To understand the concept of Operating system	K1, K2
4	CO4. Introduction to Data Communication and computer Networking	K1, K2
5	CO5. To learn usage and understanding of internet technologies	K1, K2

### Suggested Readings:

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



## BCA Semester I

### BCA 102: Programming Concepts and C Language

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

**Lectures: 45 Hours, Tutorials: 15 Hours**

#### OBJECTIVES OF THE COURSE:

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

#### UNIT-I

**Lectures: 11**

**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: 11**

**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: 12**

**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: 11**

**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.**

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



ख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)  
**Khwaja Moinuddin Chishti Language University, Lucknow, Uttar Pradesh (India)**

U.P. State Government University  
(Recognised Under Section 2(F) & 12(B) of the UGC Act 1956 & B.Tech Approved by AICTE)

**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.	K1, K2
2	CO2. To learn types of operators, Precedence and Associativity, Expression, etc.	K2, K3
3	CO3. Concept of Control structures, Strings and Arrays.	K2, K3
4	CO4. Familiarize with concepts of Functions and Pointers	K2, K3
5	CO5. Learn usage of Structures, Union and file handling.	K2, K3

### Suggested Readings:

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.



## BCA Semester I

### BCA 103: Mathematics

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

**Lectures: 75 Hours, Tutorials: 15 Hours**

#### OBJECTIVES OF THE COURSE:

1. To develop the understanding of the determinants operations.
2. To introduce the basic concept limit & continuity.
3. To recognize the derivative of differentiation and integration.
4. To understand the concept of vector algebra.
5. To learn the differentiation of functions of several variables.

#### UNIT-I

**Lectures: 19**

**Determinants & Matrices:** Definition, Minors, Cofactors, Properties of Determinants, MATRICES: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoin, Inverse, Cramer's Rule, Rank of Matrix Dependence of Vectors, Eigen Vectors of a Matrix, Caley-Hamilton Theorem (without proof).

#### UNIT-II

**Lectures: 20**

**Limits, Continuity & Differentiation:** Limit at a Point, Properties of Limit, Computation of Limits of Various Types of Functions, Continuity at a Point, Continuity Over an Interval. Derivative, Derivatives of Sum, Differences, Product & Quotients, Chain Rule, Derivatives of Composite Functions, Logarithmic Differentiation. Expansion of Functions (Maclaurin's & Taylor's), Indeterminate Forms, L'Hospital's Rule, Maxima & Minima, Successive Differentiation & Leibnitz Theorem.

#### UNIT-III

**Lectures: 18**

**Integration, Differentiation of functions of several variables:** Integral as Limit of Sum, Fundamental Theorem of Calculus (without proof.), Indefinite Integrals, Methods of Integration: Substitution, By Parts, Partial Fractions, Reduction Formulae for Trigonometric Functions. Partial Differentiation, Change of Variables, Chain Rule, Extrema of Functions of 2 Variables, Euler's Theorem.

#### UNIT-IV

**Lectures: 18**

**Vector Algebra:** Definition of a vector in 2 and 3 Dimensions; Double and Triple Scalar and Vector Product, Gradient, Divergence & Curl. Physical interpretation of area and volume.

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

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1. Understand, remember and solve problems related to determinants and matrices.	K1, K2, K3
2	CO2. Understand the concepts of limit theory, continuity	K3, K4

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



ख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)  
**Khwaja Moinuddin Chishti Language University, Lucknow, Uttar Pradesh (India)**

U.P. State Government University  
(Recognised Under Section 2(F) & 12(B) of the UGC Act 1956 & B.Tech Approved by AICTE)

	and differentiation and be able to solve problems related to them.	
3	CO3. Explain the concept of integral and differential calculus and be able to solve problems related to them.	K2, K3
4	CO4. Describe concepts of vectors and be able to solve qualitative problems based on vector algebra.	K2, K3

### Suggested Readings:

1. B.S. Grewal, “Elementary Engineering Mathematics”.
2. Shanti Narayan, “Integral Calculus”, S. Chand & Company.
3. H.K. Dass, “Advanced Engineering Mathematics”, S. Chand & Company.
4. Shanti Narayan, “Differential Calculus”, S.Chand & Company.



## BCA Semester I

### GE1: BCA 104: Fundamentals of Computer

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

#### OBJECTIVES OF THE COURSE:

1. To understand the functional components of computers.
2. To differentiate between hardware and software.
3. To introduce & understand various operating systems.
4. To understand the concept of data communication, networking and internet.

#### 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, Classification of computers, Types of Memory (Primary and Secondary), Advantages and limitations of computer.

#### UNIT-II

**Lectures: 11**

**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: 11**

**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: 12**

**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.	K1, K2

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



ख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)  
**Khwaja Moinuddin Chishti Language University, Lucknow, Uttar Pradesh (India)**

U.P. State Government University  
(Recognised Under Section 2(F) & 12(B) of the UGC Act 1956 & B.Tech Approved by AICTE)

2	CO2. Effectively explains the basic concepts of Hardware: Input and out- put devices.	K1, K2
3	CO3. To understand Software and its types	K1, K2
4	CO4. Able to understand Operating system, Functions of Operating System.	K1, K2
5	CO5 Able to get overview of Data Communication and Internet	K1, K2

### Suggested Readings:

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



## BCA Semester I

### BCA 105: Office Automation-I

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

#### OBJECTIVES OF THE COURSE:

1. To explore various features of MS-Word and its applications.
2. To explore various features of MS-Excel and its applications.

#### UNIT-I

**Lectures: 07**

**MS-Word: Working with Documents:** Opening & Saving files, Editing text documents, Inserting, Deleting, Cut, Copy, Paste, Undo, Redo, Find, Search, Replace, Formatting page & setting Margins, Converting files to different formats, Importing & Exporting documents, Sending files to others, Using Tool bars, Ruler, Using Icons, using help.

**Formatting Documents:** Setting Font styles, Font selection- style, size, colour, etc, Type face - Bold, Italic, Underline, Case settings, Highlighting, Special symbols, Setting Paragraph style, Alignments, Indents, Line Space, Margins, Bullets & Numbering.

#### UNIT-II

**Lectures: 08**

**MS-Word: Setting Page style:** Formatting Page, Page tab, Margins, Layout settings, Paper tray, Border & Shading, Columns, Header & footer, Setting Footnotes & end notes – Shortcut Keys; Inserting manual page break, Column break and line break, Creating sections & frames, Anchoring & Wrapping, Setting Document styles, Table of Contents, Index, Page Numbering, date & Time, Author etc., Creating Master Documents, Web page.

**Creating Tables:** Table settings, Borders, Alignments, Insertion, deletion, Merging, Splitting, Sorting, and Formula, Drawing – Inserting ClipArts, Pictures/Files etc.,

**Tools:** Word Completion, Spell Checks, Mail merge, Templates, Creating contents for books, Creating Letter/Faxes, Creating Web pages, Using Wizards, Tracking Changes, Security, Digital Signature. **Printing Documents:** Shortcut keys.

#### UNIT-III

**Lectures: 07**

**MS-Excel:** Spread Sheet & its Applications, Opening Spreadsheet, Menus - main menu, Formula Editing, Formatting, Toolbars, Using Icons, Using help, Shortcuts, Spreadsheet types. Working with Spreadsheets- opening, Saving files, setting Margins, Converting files to different formats (importing, exporting, sending files to others), Spread sheet addressing - Rows, Columns & Cells, Referring Cells & Selecting Cells – Shortcut Keys.

**Entering & Deleting Data:** Entering data, Cut, Copy, Paste, Undo, Redo, Filling Continuous rows, columns, Highlighting values, Find, Search & replace, Inserting Data, Insert Cells, Column, rows & sheets, Symbols, Data from external files, Frames, Clipart, Pictures, Files etc, Inserting Functions, Manual breaks.



#### UNIT-IV

Lectures: 08

**MS-Excel: Setting Formula:** finding total in a column or row, Mathematical operations (Addition, Subtraction, Multiplication, Division, Exponentiation), Using other Formulae.

**Formatting Spreadsheets:** Labeling columns & rows, Formatting- Cell, row, column & Sheet, Category - Alignment, Font, Border & Shading, Hiding/ Locking Cells, Anchoring objects, Formatting layout for Graphics, Clipart etc., Worksheet Row & Column Headers, Sheet Name, Row height & Column width, Visibility - Row, Column, Sheet, Security, Sheet Formatting & style, Sheet background, Colour, etc, Borders & Shading – Shortcut keys.

**Working with Sheets:** Sorting, Filtering, Validation, Consolidation, and Subtotal.

**Creating Charts:** Drawing, Printing.

**Using Tools:** Error checking, Spell Checks, Formula Auditing, Creating & Using Templates, Pivot Tables.

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

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1. Acquire knowledge about MS-Word: Starting MS-Word, Creating and Formatting a document.	K1, K2, K3
2	CO2. Acquire knowledge about MS-Word: different formatting styles used in that, creating page styles, creating tables and learning related tools.	K2, K3
3	CO3. To understand MS-Excel: spreadsheets and various operations on them, working on data in spreadsheets.	K2, K3
4	CO4. To understand MS-Excel: setting formula, formatting spreadsheets, creating charts and using tools.	K2, K3

#### Suggested Readings:

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.



**BCA 106: Lab: Fundamentals of Computer, Programming in C**

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

**OBJECTIVES OF THE COURSE:**

1. To understand the booting & shutting down process of computer.
2. To understand the hardware components of computer.
3. To understand the concept of operating systems.
4. To acquire skills of using basic internal/external MS-DOS commands.
5. To acquire skills of using windows operating system and its applications.
6. To understand the use of internet and its applications.
7. To understand the basic terminology used in C programming.
8. To learn programs in C language by writing, compiling and debugging.
9. To develop programs involving simple statements, conditional statements, iterative statements, array, strings, functions, recursion, structure and union.
10. To learn implementation of call by value and call by reference.
11. To develop programs by using of pointers and basic operations on a file.

Learn fundamentals of computers:

- 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.

Programming exercise in C:

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

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	CO1. To understand computers basics, hardware/ software components demonstration, internet and technologies.	K2, K3

Detailed Syllabus – BCA Semester I (Three Year Course)



ख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)  
**Khwaja Moinuddin Chishti Language University, Lucknow, Uttar Pradesh (India)**

U.P. State Government University  
(Recognised Under Section 2(F) & 12(B) of the UGC Act 1956 & B.Tech Approved by AICTE)

2	CO2. To learn working with Windows GUI, MS-DOS, DOS commands, application software, etc.	K2, K3
3	CO3. To understand Data types, operators and expressions, control structures, input/output functions.	K3
4	CO4. Write programs for handling Strings, Arrays, .etc.	K3
5	CO5. Write programs for implementing Functions and parameter passing.	K3
6	CO6. To understand and implement Pointers, structures, union, File Handling.	K3



**BCA 107: Lab: Office Automation-I**

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

**OBJECTIVES OF THE COURSE:**

1. To understand the use of various features of MS-Word through its applications.
2. To develop the understanding of working with MS-Excel.

**MS-WORD:** Creating, Editing, Formatting: Font name, size, color, alignment, changing, paragraph settings, change case, setting page style, Creating Tables, editing tables, alignment settings in tables, learning tool and shortcut keys.

**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, working with formulae, creating charts and using tools.

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

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1. Learn MS-WORD: working with documents, styles, tables and tools.	K3, K2
2	CO2. Learn MS-EXCEL: working with spreadsheets, operations on them, working with data in spreadsheets, charts, setting formula and other tools.	K3, K2



## BCA Semester II

### BCA 201: Object Oriented Programming Using C++

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

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

#### OBJECTIVES OF THE COURSE:

1. To understand the functional components of computers.
2. To understand the need and significance of OOP.
3. To develop, debug and document programs using OOP paradigms.
4. To apply concepts and techniques for implementation using C++.
5. To Implement the Real Life Problems using Object Oriented Techniques.

#### UNIT-I

**Lectures: 11**

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: 12**

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: 11**

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: 11**

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, basic structure of C++ program.	K1, K2

Detailed Syllabus – BCA Semester II (Three Year Course)



ख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)  
**Khwaja Moinuddin Chishti Language University, Lucknow, Uttar Pradesh (India)**

U.P. State Government University  
(Recognised Under Section 2(F) & 12(B) of the UGC Act 1956 & B.Tech Approved by AICTE)

2	CO2. Creating simple program, compiling file, learn about expressions and control structures.	K2, K3
3	CO3. Understand concepts of classes and objects, functions in C++, constructors and destructors.	K2, K3
4	CO4. Implement Object Oriented Programming Concepts in C++ as Inheritance, Polymorphism, Operator Overloading, etc.	K2, K3
5	CO5. Understand concepts of Type Conversions, Pointers, Virtual Functions, etc and be able to solve different problems based on them.	K2, K3
6	CO6. Able to understand and implement console based I/O operations, file handling, exception handling.	K2, K3

**Suggested Readings:**

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.



**BCA Semester II**  
**BCA 202: Data Structures**

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

**OBJECTIVES OF THE COURSE:**

1. To develop the understanding of data structures.
2. To learn the applications of various data structures.
3. To be familiar with utilization of data structure techniques in problem solving.
4. To implement them using C programming language.

**UNIT-I**

**Lectures: 11**

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: 11**

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: 11**

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: 12**

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. Understand data structure concepts, characteristics, describe data organization schemes such as arrays, stacks and their applications.	K1, K2
2	CO2. To learn about queue data structure, types of queue, operations on queue.	K2, K3
3	CO3. Familiarize with concepts of linked lists and	K2, K3

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



ख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)  
**Khwaja Moinuddin Chishti Language University, Lucknow, Uttar Pradesh (India)**

U.P. State Government University  
(Recognised Under Section 2(F) & 12(B) of the UGC Act 1956 & B.Tech Approved by AICTE)

	operations on them.	
4	CO4. Learn about non-linear data-structure tree, its terminologies, tree traversal and other operations.	K2, K3
5	CO5. Learn about binary search tree, B-tree working and its application.	K2, K4
6	CO6. Learn and understand various searching and sorting techniques.	K2, K3

### Suggested Readings:

1. E.Horowitz and S.Sahani, “ Fundamentals of Data structures”, Galgotia Book source Pvt. Ltd.
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.



**BCA Semester II**  
**BCA 203: Statistics**

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

**OBJECTIVES OF THE COURSE:**

1. To understand the scope of statistics and concept of population, sample and data condensation.
2. To learn the concept of measures of central tendency and dispersion.
3. To know the concept of correlation and regression.
4. To get the idea and applications of permutations and combinations.
5. To learn about sample space, events and probability.
6. To know the concept of statistical quality control.

**UNIT-I**

**Lectures: 15**

**Population, Sample and Data Condensation:** Definition and scope of statistics, concept of population and sample with Illustration, Raw data, attributes and variables, classification, frequency distribution, Cumulative frequency distribution. Bar chart, Pie Chart and Histogram.

**UNIT-II**

**Lectures: 18**

**Measures of Central Tendency and Dispersion:** Concept of central Tendency, requirements of a good measure of central tendency, Arithmetic mean, Median, Mode, Harmonic Mean, Geometric mean for grouped and ungrouped data.

Concept of dispersion, absolute and relative measure of dispersion, range, mean deviation from mean, standard deviation, variance, coefficient of variation.

**UNIT-III**

**Lectures: 20**

**Correlation, Regression, Permutations and Combinations:** Correlation – Karl Pearsons correlation coefficients, Rank correlation coefficients, Regression lines, Properties of regression coefficients. Permutations and Combinations: Permutations of ‘n’ dissimilar objects taken ‘r’ at a time (with or without repetitions).  $nPr = n!/(n-r)!$  (without proof). Combinations of ‘r’ objects taken from ‘n’ objects.  $nCr = n!/(r!(n-r)!)$  (without proof) . Simple examples and applications.

**UNIT-IV**

**Lectures: 22**

**Sample space, Events, Probability and Statistical Quality Control**

Experiments and random experiments, Ideas of deterministic and non-deterministic experiments; Definition of sample space, discrete sample space, events; Types of events, Union and Intersections of two or more events, mutually exclusive events, Complementary event, Exhaustive event; Simple examples. Classical definition of probability, Addition theorem of probability without Proof (upto three events are expected). Definition of conditional probability Definition of independence of two events, simple numerical problems.

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



ख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)  
**Khwaja Moinuddin Chishti Language University, Lucknow, Uttar Pradesh (India)**

U.P. State Government University  
(Recognised Under Section 2(F) & 12(B) of the UGC Act 1956 & B.Tech Approved by AICTE)

Statistical Quality Control: Introduction, control limits, specification limits, tolerance limits, process and product control; Control charts for X and R; Control charts for number of defective {n-p chart}, control charts for number of defects {c - chart}.

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

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1. Describe and discuss basics of statistical analysis, concepts of population, sample and data condensation.	K1, K2
2	CO2. Calculate and interpret concepts of central tendency and dispersion.	K2, K3
3	CO3. Ability to interpret correlation and regression concepts and solve problems related to them.	K2, K3
4	CO4. Understand fundamentals of permutations and combinations and solve problems related to these techniques.	K2, K3
5	CO5. Demonstrate knowledge of basic concepts of sample space, events and Statistical Quality Control techniques.	K2, K4
6	CO6. Use the basic probability rules, including additive and multiplicative laws, using the terms, independent and mutually exclusive events.	K3, K4

### Suggested Readings:

1. S.C. Gupta - Fundamentals of statistics - Sultan chand & sons , Delhi.
2. D.N. Elhance - Fundamentals of statistics - Kitab Mahal, Allahabad.
3. Montgomery D.C. – Statistical Quality Control - John Welly and Sons
4. Goon, Gupta And Dasgupta - Fundamentals of statistics - The world press private ltd. , Kolkata.
5. Probability theory and random process by S.P. Eugene Xavier, S. Chand & company Pvt. Ltd.
6. Mathematics and statistics by Ajay Goyal, Taxman Allied Service Pvt. Ltd.



## BCA Semester II

### GE2: BCA 204: Office Automation

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

**Lectures: 45 Hours, Tutorials: 15 Hours**

#### OBJECTIVES OF THE COURSE:

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.
5. To design the presentation using MS-power Point.

#### 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**

**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: 12**

**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: 11**

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

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1. Understand Functional Components of Computers, software and hardware, memory, networking and internet basics.	K1, K2

Detailed Syllabus – BCA Semester II (Three Year Course)



ख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)  
**Khwaja Moinuddin Chishti Language University, Lucknow, Uttar Pradesh (India)**

U.P. State Government University  
(Recognised Under Section 2(F) & 12(B) of the UGC Act 1956 & B.Tech Approved by AICTE)

2	CO2. Acquire knowledge about MS-Word and various related functionalities.	K2, K3
3	CO3. Acquire knowledge about MS-Excel and various related functionalities.	K2, K3
4	CO4. Acquire knowledge about MS-Powerpoint and various related functionalities.	K2, K3

**Suggested Readings:**

1. Fundamental of Computers – By V.Rajaraman, B.P.B. Publications
2. Fundamental of Computers – By P.K. Sinha
3. Comdex windows 7 with Office 2010 – By Vikas Gupta, Dreamtech Press
4. MS-Office 2000 (For Windows) – By Steve Sagman.
5. Office 2007 – By Shelly, Cengage Publication.



**BCA Semester I**

**BCA 205: Office Automation-II**

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

**OBJECTIVES OF THE COURSE:**

1. To design the presentation using MS-Power Point.
2. To explore various features of MS-Access and its applications.

**UNIT-I**

**Lectures: 07**

**MS-Power Point:** Introduction to Presentation, Opening New Presentation, Different Presentation Templates, Setting Backgrounds, Selecting Presentation Layouts. Creating a Presentation: Setting Presentation style, Adding text to the Presentation, Creating, Saving and Printing a presentation, Adding a slide to presentation, Navigating through a presentation, Slide-sorter, Slide-show.

**UNIT-II**

**Lectures: 08**

**MS-Power Point:** Formatting a Presentation: Adding style, Colour, gradient fills, Arranging objects, Adding Header & Footer, Slide Background, Slide layout. **Adding Graphics to the Presentation-** Inserting pictures, movies, tables etc into presentation, Drawing Pictures using Draw. **Adding Effects to the Presentation:** Setting Animation & transition effect. Printing Handouts: Generating Standalone Presentation viewer.

**UNIT-III**

**Lectures: 08**

**MS-Access:** Data and information – Limitations of Manual Data Processing – Advantages of databases. Introduction to MS-Access: Creating Tables, Modifying Table Structures, Data Entity, Edit, Delete, Importing – Exporting table.

**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.

**UNIT-IV**

**Lectures: 07**

**MS-Access: Forms and Reports: Forms** – functions and uses – creating, Modifying labels List Boxes, Dialog Boxes, finding data using form, managing table data using form, filtering data.

**Reports:** Creating, Modifying reports, Creating Reports, grouping data within a report, summarizing data in a report, formatting report detail and printing reports.

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

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1. Acquire knowledge about MS-Power Point: new	K1, K2, K3

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



ख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)  
**Khwaja Moinuddin Chishti Language University, Lucknow, Uttar Pradesh (India)**

U.P. State Government University  
(Recognised Under Section 2(F) & 12(B) of the UGC Act 1956 & B.Tech Approved by AICTE)

	presentation, adding slides, working with presentation templates, setting styles, slide-show functionalities.	
2	CO2. Acquire knowledge about MS-Power Point: different formatting styles used in that, working with graphics and animation.	K2, K3
3	CO3. To understand MS-Access: concept of data and information, advantages of database.	K1, K2
4	CO4. Acquire knowledge about MS-Access: working with tables: creating, modifying, data manipulation, exporting tables, etc. and working with queries on tables.	K2, K3
5	CO5. Acquire knowledge about MS-Access: working with reports and forms.	K2, K3

### Suggested Readings:

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.



**BCA 206: Lab: OOP using C++, Data Structures**

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

**OBJECTIVES OF THE COURSE:**

1. To differentiate between structures oriented programming and object oriented programming.
2. To understand and apply various object oriented features like inheritance, data abstraction, encapsulation and polymorphism to solve various computing problems using C++ language.
3. To apply concepts of operator-overloading, constructors and destructors.
4. To apply object-oriented concepts in real world applications.
5. To make programs that use array, linked structures, stacks, queues.
6. To compare and contrast the benefits of dynamic and static data structures implementations.
7. To demonstrate organization of information using Trees and also to perform different operations on these data structures.

Programming in C++ for following:

- 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.

Program in C or C++ for data structures:

- Data types, operators and expressions.
- 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).

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

Detailed Syllabus – BCA Semester II (Three Year Course)



ख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)  
**Khwaja Moinuddin Chishti Language University, Lucknow, Uttar Pradesh (India)**

U.P. State Government University  
(Recognised Under Section 2(F) & 12(B) of the UGC Act 1956 & B.Tech Approved by AICTE)

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

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1. Be able to implement basic statements, control statements, looping statements, various I/O statements and various data structures in C++	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. Implement programs representing concepts of data hiding, function overloading and operator overloading.	K3
5	CO5. Implement programs representing concepts of Inheritance, virtual functions and polymorphism, File Handling.	K3
6	CO6. Write and execute programs to implement different searching algorithms.	K3
7	CO7. Write and execute programs to implement different sorting algorithms.	K3
8	CO8. Write and execute programs to implement linear data structures as Stack, Queue, and Linked List using array and dynamic memory allocation.	K3
9	CO9. Implement Binary tree and tree traversal algorithms	K3



**BCA 207: Lab: Office Automation-II**

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

**OBJECTIVES OF THE COURSE:**

1. To understand the use of various features of MS- POWERPOINT through its applications.
2. To develop the understanding of working with MS-Excel.

**MS-POWERPOINT:** Creating, Editing, Formatting: font name, size, color, alignment, changing, Inserting table, picture, background, graph, symbol, hyperlink, object, diagram, Adding Graphics to the Presentation, Adding Effects to the Presentation, Setting Presentation style, templates.

**MS-ACCESS:** Creating database, table, querying tables, report. Insert, retrieve & edit data, working with Forms and Reports: modifying, creating, summarizing and managing them.

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

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1. Learn MS- POWERPOINT: Creating, Editing, Formatting, etc., adding graphics, effects , working with templates, slide-show, layout, etc.	K3, K2
2	CO2. Learn MS-ACCESS: working with database, table, query, report etc.	K3, K2