

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



**BCA Course Structure (Study and Evaluation Scheme)**  
**Regulations 2022**

**As Per**  
**National Education Policy 2020**  
**(Effective from the Session: 2022-23)**

## 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. Students will be awarded **certificate in computer application after one-year completion, diploma in computer application after two years of completion** and get **B.C.A. degree after three years of completion**.

A three-year degree (6 -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 etc 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 in ever growing 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 2022-23.

### 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, 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.

#### **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** programme shall be as under:

**Bachelor of Computer Application (Three Years) // Diploma in Computer Application (Two Years) / Certificate in Computer Application (One Year)**  
(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	
Major (Own Faculty)	BCA 101	Fundamentals of Computer	25	75	100	3	1	0	4	04
Major (Own Faculty)	BCA 102	Programming Concepts and C Language	25	75	100	3	1	0	4	04
Major (Own/Other Faculty)	BCA 103	Mathematics	25	75	100	5	1	0	6	06
Minor Elective / Generic Elective (ME1/GE1)	BCA 104	Fundamentals of Computer (For other department students)	25	75	100	3		2	4	05
		BCA Students may opt the Generic/Interdisciplinary Elective Course from the list of courses offered by other Departments / Subjects								
AECC	AECC 01	Food Nutrition and Hygiene	25	75					0	
Practical										
Major (Own Faculty)	BCA 105	Lab: Fundamentals of Computer and Programming in C	25	75	100	0	0	4	4	04
SDC-1	BCA 106	Office Automation-I / Fundamentals of Programming -I	25	75	100	2		2	3	04
Semester Total					600				25	
Course	Subject Code	Title of the Paper	Maximum Marks			Credits Allotted				Teaching Hours
	Semester II									
			Internal	ESE	Total	Lecture	Tutorial	Practical	Total Credits	
Major (Own Faculty)	BCA 201	Object Oriented Programming using C++	25	75	100	3	1	0	4	04
Major (Own Faculty)	BCA 202	Data Structures	25	75	100	3	1	0	4	04
Major (Own/Other Faculty)	BCA 203	Statistics	25	75	100	5	1	0	6	06
Minor Elective / Generic Elective (ME1/GE1)	BCA 204	Fundamentals of Computer (For other department students)	25	75	100	3		2	4	05
		BCA Students may opt the Generic/Interdisciplinary Elective Course from the list of courses offered by other Departments / Subjects								
AECC	AECC 02	First Aid and Health	25	75					0	
Practical										
Core Course	BCA 205	Lab: OOP using C++, DS	25	75	100	0	0	4	4	04
SDC-2	BCA 206	Office Automation-II / Fundamentals of Programming -II	25	75	100	2		2	3	04
Semester Total					600				25	
Course	Subject Code	Title of the Paper	Maximum Marks			Credits Allotted				Teaching Hours
	Semester III									
			Internal	ESE	Total	Lecture	Tutorial	Practical	Total	

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						e	l	l	Credits	
Major (Own Faculty)	BCA 301	Programming in JAVA	25	75	100	3	1	0	4	04
Major (Own Faculty)	BCA 302	Digital Electronics and Computer Organization	25	75	100	5	1	0	6	06
Major (Own/Other Faculty)	BCA 303	Optimization Techniques	25	75	100	5	1	0	6	06
Minor Elective / Generic Elective (ME2/GE2)	BCA 304	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	25	75	100	3		2	4	05
AECC	AECC 03	Human Values and Environmental Studies	25	75					0	
<b>Practical</b>										
Core Course	BCA 305	Lab: Programming in JAVA	25	75	100	0	0	4	2	04
SDC-3	BCA 306	Introduction to Web Technology	25	75	100	2	0	2	3	04
		<b>Semester Total</b>			<b>600</b>				<b>25</b>	
<b>Semester IV</b>										
<b>Course</b>	<b>Subject Code</b>	<b>Title of the Paper</b>	<b>Maximum Marks</b>			<b>Credits Allotted</b>				<b>Teaching Hours</b>
			<b>Internal</b>	<b>ESE</b>	<b>Total</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Total Credits</b>	
Major (Own Faculty)	BCA 401	Database Management System	25	75	100	3	1	0	4	04
Major (Own Faculty)	BCA 402	Operating Systems	25	75	100	5	1	0	6	06
Major (Own/Other Faculty)	BCA 403	Ecommerce	25	75	100	5	1	0	6	06
Minor Elective / Generic Elective (ME2/GE2)	BCA 304	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	25	75	100	3		2		05
AECC	AECC 04	Physical Education and Yoga	25	75					0	
<b>Practical</b>										
Core Course	BCA 405	Lab: DBMS	25	75	100	0	0	4	2	04
SDC-4	BCA 406	Introduction to Python Programming / Introduction to Database and MySql	25	75	100	2	0	2	3	04
		<b>Semester Total</b>			<b>600</b>				<b>25</b>	
<b>Semester V</b>										
Major (Own Faculty)	BCA 501	Software Engineering	25	75	100	4	1	0	5	05
Major (Own Faculty)	BCA 502	Computer Network	25	75	100	4	1	0	5	05
Major (Own Faculty)	BCA 503	Elective-I	25	75	100	4	1	0	5	05
Major (Own Faculty)	BCA 504	Minor Project	25	75	100	4	1	5	5	05
Industrial Training	BCA 505	Industrial Training	25	75				0	0	00
AECC	AECC 05	Analytic Ability and Digital Awareness	25	75					0	
		<b>Semester Total</b>			<b>400</b>				<b>20</b>	

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<b>Semester VI</b>										
Major (Own Faculty)	BCA 601	Information Security and cyber Law	25	75	100	4	1	0	5	05
Major (Own Faculty)	BCA 602	Elective-II	25	75	100	4	1	0	5	05
Major (Own Faculty)	BCA 604	Project	50	150	200				10	
Industrial Trainging	BCA 605	Industrial Training	25	75					0	00
AECC	AECCC 06	Communication Skill and Personality Development	25	75					0	
		<b>Semester Total</b>			<b>400</b>				<b>20</b>	
		<b>GRAND TOTAL (BCA)</b>			<b>2800</b>				<b>140</b>	

- 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=75, IA=25, P=75 (30 Marks for Practical Problems, 35 Marks for Viva-Voce, 10 Marks for Lab Record)
- The weight age of Internal Assessment and External Assessment will be in the ratio of 25% and 75% 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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**Bachelor of Computer Application Program (under CBCS) Ordinances 2022**

**1. Applicability**

These ordinances shall apply to all three years/six semesters, **Bachelor of Computer Application** programme in the Khwaja Moinuddin Chishti Language University from the session 2022-23.

The **Bachelor of Computer Application** is a three years full time under graduate program that has been designed to develop and cultivate the knowledge of computer and its software application to the Bachelor's graduates. The course has been designed keeping in view the modern trends in Computer Science and Information Technology so that it can be made industry/research oriented.

**Course Highlights**

Highlights of the course and its execution are described in the following table:

1.	Name of the Course	<b>Bachelor of Computer Application (Research)</b>
2.	Nature	Regular and Full Time, Semester System
3.	Duration	Three Years (6 Semesters)
4.	Medium of Instruction and Examination	English
5.	<b>Eligibility Criteria for Admission</b> Intermediate or equivalent examination from recognized Board/Institution with Mathematics as one of the subjects of study with 50% for General/OBC and 45% for SC/ST candidates.	
6.	Special Features	Industry Oriented Curriculum
7.	Mode of Admission	By Merit or Test
8.	Number of seats (Intake)	60

**2. Definitions of Keys Words:**

- Academic Year:** Two consecutive (one odd, July to December + one even, January to June) semesters shall constitute one academic year.
- Choice Based Credit System (CBCS):** The CBCS provides choice for students to select from the prescribed courses (core, elective, value added, inter-departmental, and intra-departmental).
- Course:** Sometimes referred to, as 'papers' is a component of a programme. A course may be designed to comprise lectures/tutorials/laboratory work/field work/project work/vocational training/viva/ seminars/term papers/assignments/ presentations/ self-study etc. or a combination of some of these.
- Credit Based System (CBS):** Under the CBS, the requirement for awarding a degree or diploma or certificate is prescribed in terms of number of credits to be completed by the students.
- Credit:** A unit by which the weightage of course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching(lecture or tutorial) or two hours of practical work/field work per week.
- Cumulative Grade Point Average (CGPA):** It is a measure of overall cumulative academic performance of a student in all semesters.
- Grade Point:** It is a numerical value allotted to each letter grade.
- Grade Card:** The grade cards will be given to all students upon completion of academic work of any semester of a program and will display the course details (code, title, number of credits) grade obtained in each course, and SGPA/CGPA.
- Letter Grade:** It is an index of the performance of students in a said course. Grades are denoted by letters O, A+, A, B+, B, C, P and F, Ab.
- Programme:** An academic programme leading to award of a Degree, diploma or certificate.





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**k) Semester Grade Point Average (SGPA):** It is a measure of academic performance in a semester.

**l) Semester:** Each semester will consist of academic work equivalent to 90 teaching days. The odd semester will be from July to December and even semester from January to June in every academic year.

**m) Transcript:** The transcript will be given to all students upon completion of academic work of all semester of a program and will display the course details (code, title, number of credits) and grade obtained in each course, and CGPA.

**3. Types of Courses:**

- a) Core Course:-** These are courses which are to be compulsorily studied by a student.
- b) Minor (Generic) Elective Course:-** Elective course is a course which can be chosen from a pool of elective courses offered in different programmes. (Intake – 60)
- c) Skill Development) Course:-** These are courses offered by the department for skill enhancement of students. (Intake – 60)
- d) Ability Enhancement Compulsory Course (Co-Curricular Course) (Qualifying):-** These are courses which are for ability enhancements of students. The performance in these courses shall not be counted for computation of 'SGPA' and 'CGPA'
- e) Elective Course:-** Elective course is a course which can be chosen from a pool of elective courses offered in different programmes.
- f) Value added non Credit Course:** These courses add value through enhanced employability skills but do not have credits assigned to them. The performance in these courses shall not be counted for computation of 'SGPA' and 'CGPA'.
- g) Industrial Training (Qualifying):** All students of BCA shall be required to undertake an Industrial Training of four to six weeks during the summer vacation after fourth semester. The performance in this course shall not be counted for computation of 'SGPA' and 'CGPA'.

**4. Minimum Eligibility for admission**

Intermediate or equivalent examination from recognized Board/Institution with Mathematics as one of the subjects of study with 50% for General/OBC and 45% for SC/ST candidates.

**5. Program Duration and Credit requirements**

- a) The graduate degree programme shall be spread over 3 years / 6 semesters of 15 weeks for studies and 2 weeks for examination spread over two academic sessions.
- b) The maximum duration for completing the BCA undergraduate degree programme in one go, shall be six academic sessions. However, students who wish to become Entrepreneurs and float their own ventures, would be permitted one year leave for the same, after successfully completing the first year of the Programme.
- c) The method of teaching adopted shall be a combination of Lectures, Seminars, case discussions, student presentations, flipped classes, use of audio-visual aids, computers etc.

**6. Fees**

The fee charged from the students of BCA programme shall be as approved by the Finance Committee.

**7. Course Structure**

The course structure of the BCA undergraduate degree programme shall be as under:





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**The first, second, third & fourth Semesters shall consist of:**

eight courses (Theory & Practical) including 4 major courses of 4 credits each and 1 major courses of 4 credits, one minor elective of 4 credits, skill development course of 3 credits and ability enhancement compulsory course (qualifying – non credit).

**The fifth Semesters shall consist of:**

4 major courses of 5 credits each & one ability enhancement compulsory course (qualifying – non credit).

**The sixth Semesters shall consist of:**

2 major courses of 5 credits each, one project of 10 credits & one ability enhancement compulsory course (qualifying – non credit).

The details of the programme objectives, programme outcomes, programme Specific Outcomes, course objectives and course outcomes of the BCA undergraduate degree programme shall be as laid down in the respective regulations.

The list of Elective courses to be offered in a particular semester shall be notified at the beginning of the semester. An elective course would be offered on first come first served basis if a minimum of 30 students opt for it and the required Faculty is available.

The Registration and fee etc. would be the responsibility of the student who would inform the HOD and the COE at the beginning of the semester. The student will be responsible for applying, making required payment as well as submitting the grades to the University.

In the third year of the B.C.A. Programme, the students shall be required to prepare a Minor Project (in semester-V) & Project- Dissertation/ Thesis (in semester-VI). During the fourth semester, the Head/ Director shall allocate Minor Project/ Project supervisors (faculty) to the students depending upon the number of vacancies allocated to individual faculty members, the choice of the students and their merit based on performance in the first/second year of the B.C.A. programme. The topic/ title of the Minor Project / Project to be submitted by the students in the fourth/fifth semester (respectively) shall be finalised in the fourth/fifth semester in consultation with the faculty supervisor. The Dissertation report shall be submitted not later than 12 weeks after the commencement of the fifth/sixth semester respectively.

After completing the fourth & fifth semester of the BCA Programme, each student shall undertake an Industrial Training (Qualifying). The Industrial Training can be undertaken in a corporate entity, NGO, Government Undertaking, Cooperative sector or a Business firm in India or abroad. A student shall submit a written structured report on the basis of work done during Internship within four weeks of the commencement of the fifth/sixth semester.

**8. Attendance Requirement**

Students with less than 75% attendance shall not be eligible to appear in the End Semester Examination. However, in exceptional cases the Head/Director may grant a relaxation in required percentage of attendance by not more than 15% on the basis of genuine reason.

Provided that, relaxation in attendance may be allowed to students who get placed and the employer desires for early joining during the sixth semester. However, such students shall be required to complete assignments and other requirements of internal evaluation in consultation with the respective faculty members.

**9. Examination(s) and Assessment /Evaluation:**

The evaluation of Internship Report and Dissertation/Thesis in the fourth semester shall be on the



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basis of report/thesis presentation by the students and/or viva-voce examination. In comprehensive viva-voce if applicable, 25% weightage shall be given for participation in seminars, workshops, special lectures, etc.

The Dissertation/ Master's Thesis shall be evaluated out of 25% marks of total marks by the Faculty supervisor and out of 75% marks of total marks by the evaluation panel.

Each evaluation panel for the evaluation of project reports/ Dissertations/ thesis and comprehensive viva-voce shall have an external examiner as recommended by the Board of Studies and one or two internal examiners (the Head or his/her nominee).

In all other credit courses, there shall be continuous internal assessment of the students and semester end examination as per the scheme of examination.

The semester end examination shall have a weightage of 75% marks of total marks. Questions for this examination shall be set by a panel of examiners approved by the Board of Studies and duly moderated by the moderation committee. The scheme of examination shall ensure that no student has to appear for examinations in more than two courses on any single day.

The continuous internal assessment shall have a weightage of 25 marks and shall be based on factors such as 10 marks class tests test that will be organized as per schedule, 10 marks for participation in seminars, case discussions and group activities, quizzes, individual and group assignments/presentations, term papers, class participation, co-curricular and extracurricular activities, viva-voce etc. Apart from these 5 marks has been assigned for overall behavior of the student during the semester as well as for his attendance performance in the class concerned.

It shall be the duty of the Teacher teaching a particular course, to conduct internal assessment. In case more than one teacher is sharing the teaching work in a course, each teacher shall evaluate independently and a weighted average would be taken.

For the ease of evaluation, assessment/evaluation of each course of a semester will be held for maximum marks of 100 irrespective of number of credits allotted to the course (25 for internal assessment and 75 for end semester examination). The marks will be converted to grades as per the following table:

Grade Point (G)	Grade	Range of Marks (M)*	Numeric value of grade
10	O (Outstanding)	$90 \leq M \leq 100$	10
9	A <sup>+</sup> (Excellent)	$80 \leq M < 90$	9
8	A (Very good)	$70 \leq M < 80$	8
7	B <sup>+</sup> (Good)	$60 \leq M < 70$	7
6	B (Above average)	$50 \leq M < 60$	6
5	C (Average)	$45 \leq M < 50$	5
4	P (Pass)	$40 \leq M < 45$	4
0	F (Fail)	$0 \leq M < 40$	0
0	Ab (Absent)	--	0

**Computation of SGPA and CGPA, and issue of Grade Card /Transcript**

The Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA) will be computed as follows:

**Credit Point (P)**

It is the value obtained by multiplying the grade point (G) by the credit (C) of the course:



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$$P_n = G_n \times Cr_n$$

where,

‘P<sub>n</sub>’ is the Credit point for the ‘n’th course,

‘G<sub>n</sub>’ is the Grade point awarded in the ‘n’th course,

‘Cr<sub>n</sub>’ is the number of credits assigned to the ‘n’th course,

‘n’ is the number of course in which a student is appearing in a semester.

**a. Semester Grade point Average (SGPA)**

It is the weighted average of the grade points of all courses during the semester. After the successful completion of a semester, Semester Grade Point Average (SGPA) of a student in that semester is calculated using the formula given below.

$$SGPA = (P_1 + P_2 + \dots + P_n) / (Cr_1 + Cr_2 + \dots + Cr_n)$$

**b. Cumulative Grade Point Average (CGPA)**

The Cumulative Grade Point Average (CGPA) of a student is calculated at the end of a programme. For the computation of CGPA, only the best performed courses with maximum credit points (P) alone shall be taken subject to the minimum credits requirements. The CGPA of a student determines the overall academic level of the student in a programme and is the criterion for ranking the students. CGPA can be calculated by the following formula:

$$CGPA = [(SGPA)_1 S_1 + (SGPA)_2 S_2 + \dots + (SGPA)_n S_n] / [S_1 + S_2 + \dots + S_n]$$

Where (SGPA)<sub>n</sub> is the SGPA of the nth semester and S<sub>n</sub> is the total credits taken in the n<sup>th</sup> semester.

**Promotion and Re appearing Rules:**

- In a programme of four-semester duration, a student will automatically be promoted from the odd semester to the even semester, provided that he/she has fulfilled the minimum requirement of attendance, failing which he/she may be permitted to appear as an ex-student in the next odd/even semester examination, as the case may be.
- If a student fails in the Internal Assessment of any of the semester courses, in spite of being given the additional chance before the Semester-End Examination as per the provision of this Ordinance, he/she will not be allowed to appear in the Semester-End Examination of the said course and will be considered as failed in that course.
- For promotion from the 2<sup>nd</sup> semester to the 3<sup>rd</sup> semester, a student shall have to pass at least one-half (50%) of the total of compulsory and optional courses, including practical courses, if any, of the 1<sup>st</sup> and 2<sup>nd</sup> semesters combined.
- For promotion from the 4<sup>th</sup> semester to the 5<sup>th</sup> semester, a student shall have to pass at least 75% of the total of compulsory and optional courses, including practical courses, if any, of the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> semesters combined.
- For promotion from the 6<sup>th</sup> semester to the 7<sup>th</sup> semester, a student shall have to pass at least 83% of the total of compulsory and optional courses, including practical courses, if any, of the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> semesters combined.
- A student shall have to obtain a minimum passing marks/grade not less than 40% of marks or Grade 'P' in Internal Assessment and 40% of marks or Grade 'P' in End-Semester Examination.
- A student will be declared as passed if he/she has obtained the minimum passing marks/grade in each subject separately and that his/her grand total of marks is not less than 40% or Grade 'P'
- Those students who reappear in any course/s in any semester or repeat a semester, shall have



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to pay the prescribed fee.

- i) Those students who could not complete a semester due to shortage of attendance or any other reason, would have to re-register for the Semester by paying the prescribed fee.

**Grade Card:** A copy of the grade report shall be issued to each student at the end of every semester.

**Transcript:** A Transcript shall be issued to a student on successful completion of the programme.

**With holding of Grade Card/Transcript**

The grade Card/Transcript of a student shall be with held if he/she have not paid his/her dues, or if there is a case of indiscipline pending against him/her.

**10. Exit option and award of Certificate/ Diploma / Degree**

In case a student wishes to leave after completing the first year of any graduate programme, he/she shall be awarded a **Certificate in Computer Application**, if the student has:

- a) Pursued the prescribed courses of study and has earned **46** credits as prescribed under the relevant regulations.
- b) Obtained a minimum CGPA of 4.50 without 'F' or 'AB' in any course.
- c) Paid all the dues of the University and has no pending case of indiscipline.

In case a student wishes to leave after completing the second year of any graduate programme, he/ she shall be awarded a **Diploma in Computer Application**, if the student has:

- a) Pursued the prescribed courses of study and has earned **92** credits as prescribed under the relevant regulations.
- b) Obtained a minimum CGPA of 4.50 without 'F' or 'AB' in any course.
- c) Paid all the dues of the University and has no pending case of in discipline.

In case a student wishes to leave after completing the third year of any graduate programme, he/ she shall be awarded a **Bachelor of Computer Application**, if the student has:

- a) Pursued the prescribed courses of study and has earned **132** credits as prescribed under the relevant regulations.
- b) Obtained a minimum CGPA of 4.50 without 'F' or 'AB' in any course.
- c) Paid all the dues of the University and has no pending case of in discipline.

**11. Conversion of CGPA to equivalent marks**

As and when required, the following formula may be used for converting CGPA into Percentage of Marks:

$$\text{Percentage (\%)} \text{ of Marks} = (\text{CGPA} - 0.5) \times 10$$

**12. Interpretation Clause**

In case of any difficulty arising during the course of implementation of these ordinances or in case of any unforeseen circumstance, the interpretation/ decision of the Vice-Chancellor shall be final.



## BCA Semester I

### BCA 101: Fundamentals of Computer

**Credit: 04, IA Marks: 25, ESE Marks: 75**

**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)



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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.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: 25, ESE Marks: 75**

**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.**





**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. 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: 25, ESE Marks: 75**  
**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

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	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 (Minor Elective)**

**ME1: BCA 104: Fundamentals of Computer**

**Credit: 04, IA Marks: 25, ESE Marks: 75**

**Lectures: 45 Hours, Practical: 15 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
2	CO2. Effectively explains the basic concepts of Hardware:	K1, K2

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	Input and out- put devices.	
3	CO3. To understand Software and its types	K1, K2
4	CO4. Able to understand Operating system, Functions of Operating System. 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

### **Lab: BCA 104 - 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.



**BCA 105: Lab: Fundamentals of Computer, Programming in C**

**Credit: 04, IA Marks: 25, ESE Marks: 75**

**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	K2, K3

Detailed Syllabus – BCA Semester I (Three Year Course)



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	components demonstration, internet and technologies.	
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. Write programs for handling Strings, Arrays, .etc.	K3
4	CO4. Write programs for implementing Functions and parameter passing. To understand and implement Pointers, structures, union, File Handling	K3





**BCA Semester I (SDC-1)**

**BCA 106: Office Automation-I**

**Credit: 03, IA Marks: 25, ESE Marks: 75**

**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: Office Automation-I

**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.



## BCA 106: Fundamentals of Programming-I

**Credit: 03, IA Marks: 25, ESE Marks: 75**  
**Lectures: 30 Hours**

### OBJECTIVES OF THE COURSE:

1. To Focus Fundamentals of Computers and Peripherals
2. To Introduce programming language and aware the students about programming paradigm
3. To Focus Concept and Methodology of Programming
4. Brief the students regarding Object Oriented Programming Features
5. To give clear idea of different strategy of basic programming with C like Looping, Decision Making, Array, Structure, Function, Pointer, etc. to solve real life problems.

### UNIT-I

**Lectures: 07**

**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, Types of Memory (RAM, ROM, PROM, EPROM, EEPROM). Secondary Storage Devices (FD, CD, HD, Pen drive).

### UNIT-II

**Lectures: 08**

**Introduction to Programming:** Types of Programming Languages (Machine Languages, Assembly Languages, High Level Languages), Flow charts and Algorithms, Definition of programming and its importance, Skills required for programming, basic recipe for writing programs, Software Categories (System Software and Application Software).

**History of 'C':** Features of C language, structure of C program, comments, Development Environment of 'C'.

### UNIT-III

**Lectures: 07**

**Fundamentals of C:** Character set, C Tokens, Keywords, Identifiers, Variables, Data Types, Arithmetic Operators, Precedence of Operators, Sample Program, Examples of Expressions, Use of Operators, Logical Operators, Increment/decrement Operators

### UNIT-IV

**Lectures: 08**

**Control Structures in C:** Conditional Statements, Repetition Structure (Loop), Overflow Condition, Infinite Loop, Properties of While loop, Do-While Statement, for Statement, Switch Statement, Break Statement, Continue Statement.

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

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1. To understand basic components of computer.	K1, K2
2	CO2. To Introduce programming language and aware the students about programming paradigm and implementing algorithms to solve problems using operators	K1, K2

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3	CO3. Demonstrate and understanding of how to handle and store data using clearly defined types..	K1, K2
4	CO4. Apply the concept of basic programming with C like Looping, Decision Making in writing the C program.	K2, K3

### Suggested Readings:

8. Fundamental of Computers – By P.K. Sinha
9. Introduction to Computers and C Programming – By D.S. Yadav & S.K. Bajpai, New Age Publication.
10. Programming in ANSI C, Forth Edition, E Balagurusamy, TMH
11. Let us C, Yashwant Kanitkar
12. C: The Complete Reference, Herbert Schildt, McGrawHill
13. Computer fundamentals and Programming in C, Pradipdey and Manas Ghosh, Oxford.

### BCA 106: Lab-Fundamentals of Programming-I

1. 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.
2. Programming Exercise in C:
  - Data types, operators and expressions.
  - Control Structure: Loop Control, Case Control.
  - Terminal Input/output Functions.



## BCA Semester II

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

**Credit: 04, IA Marks: 25, ESE Marks: 75**

**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)



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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. Implement Object Oriented Programming Concepts in C++ as Inheritance, Polymorphism, Operator Overloading, etc.	K2, K3
4	CO4. Understand concepts of Type Conversions, Pointers, Virtual Functions, etc and be able to solve different problems based on them. 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: 25, ESE Marks: 75**  
**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



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	operations on them. Learn about non-linear data-structure tree, its terminologies, tree traversal and other operations.	
4	CO54. Learn about binary search tree, B-tree working and its application. Learn and understand various searching and sorting techniques.	K2, K3, K4

**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: 25, ESE Marks: 75**  
**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)



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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. Calculate and interpret concepts of central tendency and dispersion.	K1, K2
2	CO2. Ability to interpret correlation and regression concepts and solve problems related to them.	K2, K3
3	CO3. Understand fundamentals of permutations and combinations and solve problems related to these techniques.	K2, K3
4	CO4. Demonstrate knowledge of basic concepts of sample space, events and Statistical Quality Control techniques. Use the basic probability rules, including additive and multiplicative laws, using the terms, independent and mutually exclusive events.	K2, K3

### 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 (Minor Elective)**

**ME1: BCA 204: Fundamentals of Computer**

**Credit: 04, IA Marks: 25, ESE Marks: 75**

**Lectures: 45 Hours, Practical: 15 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
2	CO2. Effectively explains the basic concepts of Hardware:	K1, K2

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



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	Input and out- put devices.	
3	CO3. To understand Software and its types	K1, K2
4	CO4. Able to understand Operating system, Functions of Operating System. 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

### **Lab: BCA 204 - 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.



**BCA 205: Lab: OOP using C++, Data Structures**

**Credit: 04, IA Marks: 25, ESE Marks: 75**

**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.

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

S. No.	Course Outcome	Bloom's Taxonomy
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Detailed Syllabus – BCA Semester II (Three Year Course)



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1	CO1. Be able to implement basic statements, control statements, looping statements, various I/O statements and various data structures in C++ Creating simple programs using classes and objects in C++. Implement Object Oriented Programming Concepts in C++.	K3
2	CO2. Implement programs representing concepts of data hiding, function overloading and operator overloading. Implement programs representing concepts of Inheritance, virtual functions and polymorphism, File Handling.	K3
3	CO3. Write and execute programs to implement different searching algorithms. Write and execute programs to implement different sorting algorithms.	K3
4	CO4. Write and execute programs to implement linear data structures as Stack, Queue, and Linked List using array and dynamic memory allocation. Implement Binary tree and tree traversal algorithms	K3





**BCA Semester II (SDC-2)**  
**BCA 206: Office Automation-II**

**Credit: 03, IA Marks: 25, ESE Marks: 75**  
**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)



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	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.
- Teach Yourself Microsoft Office 2000, Perry G., Techmedia.

### BCA 206: Lab: Office Automation-II

**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.



## BCA 206: Fundamentals of Programming-II

**Credit: 03, IA Marks: 25, ESE Marks: 75**  
**Lectures: 30 Hours**

### OBJECTIVES OF THE COURSE:

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

### UNIT-I

**Lectures: 11**

**Introduction to Computers:** Introduction, Functional Components of Computers, Block diagram of computer, Input/ Output devices, Application of Computers, Types of computers, Types of Memory (RAM, ROM, PROM, EPROM, EEPROM).

**Introduction to Programming:** Types of Programming Languages (Machine Languages, Assembly Languages, High Level Languages), Flow charts and Algorithms, Definition of programming and its importance, Skills required for programming, basic recipe for writing programs, Software Categories (System Software and Application Software).

**History of 'C':** Features of C language, structure of C program, comments, Development Environment of 'C'.

### UNIT-II

**Lectures: 11**

**Arrays:** Definition, declaration and initialization of one dimensional array; Accessing array elements; Displaying array elements; Sorting arrays; Two-Dimensional array: Declaration and Initialization, Accessing and Displaying, Memory representation of array.

### UNIT-III

**Lectures: 12**

**Functions:** Basic types of function, Declaration and definition, Function call, Types of function, Parameter passing, Call by value, Call by reference, Recursion.

### UNIT-IV

**Lectures: 11**

**Strings:** Definition, declaration and initialization of strings; standard library function.

**Structures:** Definition and declaration; Variables initialization; Accessing fields and structure operations; Nested structures; **Union:** Definition and declaration; Differentiate between Union and structure.

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

S. No.	Course Outcome	Bloom's Taxonomy
1	CO1 To understand basic components of computer and To Introduce programming language and aware the students about programming paradigm.	K1, K2
2	CO2. To learn the concept of arrays.	K2, K3
3	CO3. To learn the concept of functions.	K2, K3



4	CO4. Familiarize with concepts of strings and structures	K2, K3
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**Suggested Readings:**

7. Fundamental of Computers – By P.K. Sinha
8. Introduction to Computers and C Programming – By D.S. Yadav & S.K. Bajpai, New Age Publication.
9. Programming in ANSI C, Forth Edition, E Balagurusamy, TMH
10. Let us C, Yashwant Kanitkar
11. C: The Complete Reference, Herbert Schildt, McGrawHill
12. Computer fundamentals and Programming in C, Pradipdey and Manas Ghosh, Oxford.

**BCA 206: Lab-Fundamentals of Programming-II**

**1. Learn Fundamentals of Computers:**

- Introduction to booting & shutting down the 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.

**2. Programming Exercise in C:**

- Functions and parameter passing.
- Array handling.
- String handling.
- Structures and union.