BACHELOR OF COMPUTER APPLICATION (BCA)

(ONLINE LEARNING)

PROGRAMME PROJECT REPORT (PPR)

DRONACHARYA-CENTER FOR ONLINE AND DISTANCE EDUCATION [D-CODE]

CHHATRAPATI SHAHU JI MAHARAJ UNIVERSITY

KALYANPUR, KANPUR (UP)-208024

Accredited with Grade A++ by NAAC & UGC Category-I University

ABOUT THE UNIVERSITY

Chhatrapati Shahu Ji Maharaj University Kanpur, a premier landmark of higher education in Uttar Pradesh is named after the great social reformer Chhatrapati Shahu Maharaj also known as Rajarshi Shahu. It is a well-established and respected educational community where students of all backgrounds study and work together in a congenial and encouraging academic atmosphere. The university is geared to provide maximum scholastic benefit to each individual student and nurture them to achieve their full potential and evolve as a responsible global citizen

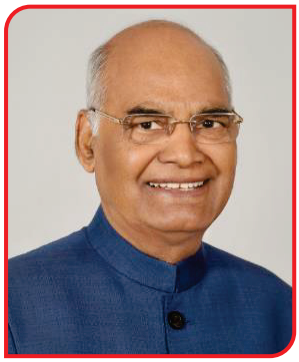
VISION

To enlighten and empower humanity by nurturing future leaders and change agents for universal development and societal transformation.

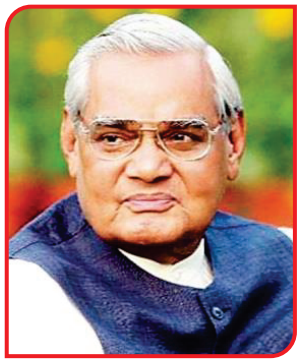
MISSION

To work towards sustainable excellence in global standards of academia, technology-centric learning, robust research ecosystem, institutional distinctiveness and harmonious social diversity.

OUR ALUMNI



Shri Ram Nath Kovind
Former President of India

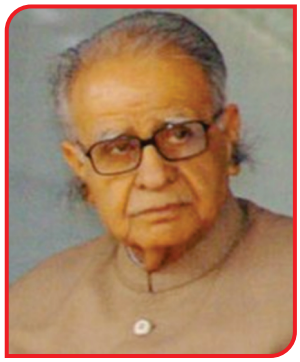


Bharat Ratna Shri Atal Bihari Bajpai
Former Prime Minister of India

Dr. Harsh Vardhan
Union Cabinet Minister

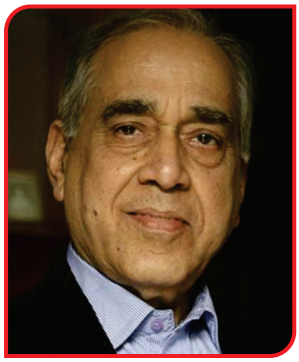
Shri Gopal Das Neeraj
Indian poet; Author of Hindi literature

Shri Ajeet Doval
National Security Advisor of India
to Prime Minister

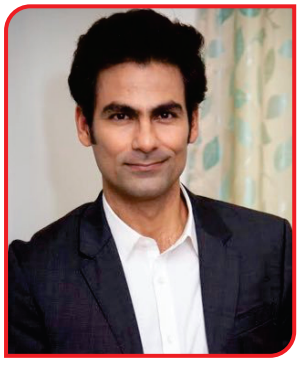


Shri T.N Chaturvedi
Governor of Karnataka & Comptroller &
Auditor General of India

Shri Sanjay Kothari
Secretary to the President
& Central Vigilance Commissioner



Shri Nripendra Misra
Principal Secretary to
the Prime Minister of India



Shri Mohammad Kaif
Former Indian Cricketer

Shri David Dhawan
Director of Hindi films

Shri Abhijeet Bhattacharya
Indian Playback Singer

Shri Irshad Mirza
Indian Industrialist

About the programme

The Bachelor of Computer Application (BCA) open and distance learning programme offered by Chhatrapati Shahu Ji Maharaj University, Kanpur allowing students to study remotely without the need to attend traditional in- person classes. These programs are often designed to accommodate the needs of working professionals or individuals who are unable to commit to a full-time, on-campus program due to various reasons such as job commitments, family responsibilities, or geographical constraints. CSJM University, a category-1 and NAAC A++ university is offering those students a best and easy path to develop their skills. The university has experienced faculty members, excellent library, and other modern facilities to provide a proper learning environment to the students. This programme is very well received by the industry. This is a 3 years of 6 semester programme. This programme is designed in such a way to equip students with a holistic set of skills and competencies essential for success in the field of business and information technology and focuses on imparting to students the ability to demonstrate leadership, understand human relationships, and problem-solving abilities essential for success in any business endeavour.

Vision of the University

To enlighten and empower humanity by nurturing future leaders and change agents for universal development and societal transformation.

Mission of the University

To work towards sustainable excellence in global standards of academia, technology-centric learning, robust research ecosystem, institutional distinctiveness and harmonious social diversity.

I. Mission & Objective of BCA Programme:

1. Mission Statement:

To provide a comprehensive and innovative BCA programs aim to prepare students for success in the information technology industries all over world by equipping them with relevant knowledge, skills, and competencies. The mission is to foster not only academic growth but also personal and professional development. This may include opportunities for internships, industry partnerships, and career services support.

2. Programme Objectives:

1. Accessibility: To offer high-quality education in computer applications to individuals who face obstacles attending traditional on-campus programmes due to geographical constraints,

work commitments, or personal circumstances.

2. **Flexibility:** To offer flexible scheduling options that accommodate the diverse needs of distance learners, allowing them to balance their studies with work, family, and other responsibilities.

3. **Engagement:** To foster active engagement and collaboration among students, instructors, and course content through the effective use of online learning technologies, discussion forums, virtual classrooms, and interactive multimedia resources.

4. **Skill Development:** This programme aims to enhance students' analytical, critical thinking, problem-solving, communication, and teamwork skills, ensuring they are well-equipped to excel in the dynamic field of computer applications.

5. **Technological Proficiency:** To equip students with advanced skills in utilizing digital tools and technologies essential for various business and industry applications. This includes proficiency in utilizing online learning platforms, mastering data analysis software, and effectively leveraging communication tools to thrive in the rapidly evolving landscape of information technology and business operations.

6. **Global Perspective:** To expose BCA students to a diverse range of global perspectives in the field of computer applications, including exploring emerging technologies, international IT markets, and cultural nuances. This includes understanding the impact of globalization on technology-driven businesses, adapting to cross-cultural communication and collaboration, and navigating the complexities of global IT ecosystems.

7. **Carrier Readiness:** To equip BCA students with the necessary skills and knowledge for entry-level positions in diverse fields of the IT industry or to pursue further education at the graduate level. This is achieved through the provision of comprehensive career development resources, opportunities for internships, and avenues for networking with industry professionals.

8. **Continuous Improvement:** To continuously evaluate and improve the program based on feedback from students, instructors, employers, and industry trends, ensuring that it remains relevant and effective in meeting the needs of learners and the demands of the business and industry environment.

Programme Outcomes:

1. The programme equips students with comprehensive knowledge and practical skills required by the IT industry, enabling them to meet the demands of the rapidly evolving technological landscape.

2. BCA students are provided with a supportive environment that encourages and nurtures their

entrepreneurial ambitions, fostering innovation and creativity in the field of information technology.

3. The curriculum is designed to be industry-driven, facilitated by experienced faculty members, and emphasizes contemporary approaches to launching and managing businesses effectively on local, national, and global scales.

4. BCA students receive a diverse education encompassing various aspects of computer science and information technology, including writing skills, negotiation and dispute resolution, human resource management, business laws, marketing management, production management, international business, social media, and digital marketing. This comprehensive approach ensures that students are well-prepared for the multifaceted challenges of the IT industry.

5. Through theoretical study and practical application, BCA students acquire a deep understanding of quantitative and qualitative techniques, providing them with a strong foundation in the field of computer science and information technology.

II. Relevance of BCA Programme in Chhatrapati Shahu Ji Maharaj University Kanpur's Mission and Objectives:

Bachelor of Computer Application (BCA) program with the mission and objectives of Chhatrapati Shahu Ji Maharaj University, Kanpur, it's essential to consider how the program contributes to the university's overarching goals and values. Here's how the relevance of a BCA program could be articulated in relation to the mission and objectives of the university:

1. Promoting Access to Education: The BCA programme plays a crucial role in promoting access to quality education by offering flexible learning options, including distance and online education. This ensures that individuals from diverse backgrounds and locations, aspiring to pursue a career in the field of computer applications, can access high-quality education regardless of their geographical constraints or personal circumstances.

2. Preparing Students for Carriers and Leadership: The BCA programme is dedicated to preparing students for successful careers and leadership roles in the dynamic field of information technology. Through a well-rounded curriculum and a range of practical experiences, students are equipped with essential knowledge, skills, and competencies to excel in various sectors of the IT industry.

3. Emphasizing Resesrch: The BCA programme prioritizes research, fostering critical thinking and intellectual curiosity among students and faculty. By engaging in research projects, students contribute to the advancement of knowledge in computer science and information technology, preparing them to be innovative problem solvers in the industry.

BCA program with the mission and objectives of Chhatrapati Shahu Ji Maharaj University, Kanpur, it not only enhances the relevance and effectiveness of the program but also strengthens the overall impact of the university in serving its stakeholders and society at large.

III. Nature of prospective target group of learners:

The prospective target group of learners for a Bachelor of Computer Application (BCA) program can vary depending on factors such as the program's focus, delivery mode, and institutional context. However, there are several common characteristics and attributes that are often associated with the typical demographic profile of BCA students:

1. **Secondary Education Graduates:** The BCA programme appeals to students who have recently completed their secondary education and are eager to pursue undergraduate studies in the field of computer science and information technology. These students typically possess a solid academic foundation and are driven by the desire to acquire a degree that will equip them with the necessary skills and knowledge to embark on a successful career in the IT industry or related fields.
2. **Carrier Aspirations:** Prospective BCA students aim for careers in IT and computer science, including roles like software developer, systems analyst, or IT consultant. Some aspire to start tech start-ups, lead in top companies, or specialize in areas like cybersecurity or data science.
3. **Motivated and Ambitious:** BCA students are often characterized by their ambition, motivation, and drive to succeed. They are willing to put in the effort required to excel academically and take advantage of opportunities for professional development and networking.
4. **Diverse Backgrounds:** BCA programs often attract students from diverse cultural, ethnic, and socioeconomic backgrounds. This diversity enriches the learning environment and provides students with opportunities to interact with peers from different perspectives and experiences.
5. **Entrepreneurial Spirit:** Some prospective BCA students may have an entrepreneurial spirit and aspirations to start their own businesses or ventures. They are interested in learning about business concepts, strategies, and practices that will help them succeed as entrepreneurs.

IV. Appropriateness of program to be conducted in Open and Distance Learning mode to acquire specific skills and competence:

Conducting a Bachelor of Computer Application (BCA) program in Open and Distance Learning (ODL) mode can be highly appropriate for acquiring specific skills and competencies, particularly for learners who require flexibility, accessibility, and personalized learning

experiences. Here's why the ODL mode can be beneficial for acquiring skills and competence in a BCA program:

1. Flexibility: ODL programs offer learners the flexibility to study at their own pace and convenience. This flexibility is particularly valuable for individuals who may have work commitments, family responsibilities, or other constraints that make attending traditional on-campus classes challenging. As a result, learners can balance their studies with other commitments, allowing them to acquire skills and competence in a BCA program without disrupting their personal or professional lives.

2. Accessibility: ODL programs make education more accessible to a broader range of learners, including those who are geographically isolated or unable to attend traditional on-campus classes due to mobility issues or other barriers. By removing geographical constraints, ODL programs enable learners from diverse backgrounds and locations to participate in a BCA program and acquire the skills and competence needed for success in the business world.

3. Personalized Learning: ODL programs often utilize technology-enabled learning platforms that allow for personalized learning experiences. Learners can access a variety of resources, including multimedia content, online lectures, discussion forums, and interactive simulations, tailored to their individual learning styles and preferences. This personalized approach can enhance engagement, comprehension, and retention of key concepts and skills in the BCA program.

4. Technology Integration: BCA programs conducted in ODL mode leverage technology to facilitate learning, collaboration, and communication among learners and instructors. Through online platforms, learners can engage in virtual classrooms, participate in group discussions, submit assignments, and receive feedback from instructors in real-time. This integration of technology not only enhances the learning experience but also prepares learners for the digital workplace, where technology skills are increasingly essential.

5. Self-Directed Learning Skills: ODL programs promote the development of self-directed learning skills, including time management, organization, and self-motivation. Learners in a BCA program conducted in ODL mode take greater responsibility for their learning journey, setting goals, managing their study schedules, and seeking out resources to enhance their skills and competence. These self-directed learning skills are highly valuable in the dynamic and rapidly changing business environment.

6. Cost Effectiveness: ODL programs often offer cost-effective alternatives to traditional on-campus education, as they eliminate the need for expenses such as commuting,

accommodation, and campus facilities. This affordability makes acquiring skills and competence in a BCA program more accessible to learners from diverse socioeconomic backgrounds, thereby promoting inclusivity and equity in education.

Overall, conducting a BCA program in Open and Distance Learning mode can be highly appropriate for acquiring specific skills and competencies, offering flexibility, accessibility, personalized learning experiences, technology integration, self-directed learning skills, and cost-effectiveness. These advantages make ODL programs an attractive option for learners seeking to acquire business knowledge and skills while balancing their personal and professional commitments.

V. Instructional Design of Open and Distance Learning mode to acquire specific skills and competence:

A. Curriculum Design:

1. The curriculum of the BCA programme is meticulously designed with inputs from industry experts, Bloom's taxonomy, and faculty knowledge to offer students a comprehensive and contemporary education in computer applications. By integrating the latest industry insights and trends, the curriculum ensures students are well-prepared for the dynamic demands of the modern IT landscape. Employing Bloom's Taxonomy, the curriculum focuses on developing higher-order thinking skills such as critical analysis, problem-solving, and evaluation, enabling students to tackle complex challenges with confidence. The expertise of faculty members enriches the curriculum, providing students with practical wisdom and industry insights. Through interactive lectures, hands-on projects, and engaging discussions, faculty members equip students with the tools needed to excel in their future careers. With a strong emphasis on practical learning and real-world applications, the BCA curriculum ensures students acquire the skills essential for success in today's competitive IT environment, bridging the gap between theory and practice to empower students to make meaningful contributions to the ever-evolving world of technology.

Semester-wise Titles of the Papers in B.C.A.

B.C.A 1st Year (1st Semester)

Year	Sem.	Course Code	Paper Title	Theory/ Practical	Credits
1st	1st	BCA-1001	Computer Fundamental & Problem solving Techniques	Theory	3
1st	1st	BCA-1002	C Programming	Theory	3
1st	1st	BCA-1003	Principle of Management	Theory	4
1st	1st	BCA-1004	Business Communication	Theory	4
1st	1st	BCA-1005	Mathematics –I	Theory	4
1st	1st	BCA-1001P	Computer Laboratory and Practical Work of Office Automation	Practical	2
1st	1st	BCA-1002P	Computer Laboratory and Practical Work of C Programming	Practical	2

B.C.A 1st Year (2nd Semester)

Year	Sem.	Course Code	Paper Title	Theory/ Practical	Credits
1st	2nd	BCA-2001	Object Oriented Programming Using C++	Theory	3
1st	2nd	BCA-2002	Internet Technology and Web Design	Theory	4
1st	2nd	BCA-2003	Organization Behavior	Theory	4
1st	2nd	BCA-2004	Financial Accounting & Management	Theory	4
1st	2nd	BCA-2005	Mathematics II	Theory	4
1st	2nd	BCA-2001P	Computer Laboratory and Practical Work of C++ Programming	Practical	3

B.C.A 2nd Year (3rd Semester)

Year	Sem.	Course Code	Paper Title	Theory/ Practical	Credits
2nd	3rd	BCA-3001	Python Programming	Theory	3
2nd	3rd	BCA-3002	Data Structure Using C & C++	Theory	3
2nd	3rd	BCA-3003	Operating System	Theory	4
2nd	3rd	BCA-3004	Digital Electronics & Computer Organization	Theory	4
2nd	3rd	BCA-3005	Elements of Statistics	Theory	4
2nd	3rd	BCA-3001P	Computer Laboratory and Practical Work of Python	Practical	2
2nd	3rd	BCA-3002P	Computer Laboratory and Practical Work of DS	Practical	2

B.C.A 2nd Year (4th Semester)

Year	Sem.	Course Code	Paper Title	Theory/ Practical	Credits
2nd	4th	BCA-4001	Computer Graphics & Animation Database Management System	Theory	4
2nd	4th	BCA-4002	Database Management System	Theory	3
2nd	4th	BCA-4003	Software Engineering	Theory	4
2nd	4th	BCA-4004	Optimization Techniques	Theory	4
2nd	4th	BCA-4005	Mathematics-III	Theory	4
2nd	4th	BCA-4001P	Computer Graphics & DBMS Laboratory	Practical	3

B.C.A 3rd year (5th semester)

Year	Sem.	Course Code	Paper Title	Theory/ Practical	Credits
3rd	5th	BCA-5001	Knowledge Management	Theory	4
3rd	5th	BCA-5002	Java Programming and Dynamic Webpage Design	Theory	3
3rd	5th	BCA-5003	Computer Network	Theory	4
3rd	5th	BCA-5004	Numerical Methods	Theory	4
3rd	5th	BCA-5005	Minor Project	Practical	2
3rd	5th	BCA-5006P	Viva-Voice on Summer Training	Practical	1
3rd	5th	BCA-5002P	Computer Laboratory and Practical Work of Java Programming & Dynamic Webpage design	Practical	3

B.C.A 3rd Year (6th Semester)

Year	Sem.	Course Code	Paper Title	Theory/ Practical	Credits
3rd	6th	BCA-6001	Information & Cyber Security	Theory	4
3rd	6th	BCA-6002	Internet Of Things	Theory	4
3rd	6th	BCA-6003	E-Commerce	Theory	4
3rd	6th	BCA-6004	Data Science and Machine Learning	Theory	4
3rd	6th	BCA-6005	Major Project	Practical	5
3rd	6th	BCA-6006	Presentation/Seminar based on Major Project	Practical	1

B. Detailed Syllabus - Annexure-1

C. Duration of the Programme: 03 years; divided into 06 semesters.

D. Faculty and Support Staff requirement:

Academic Staff

1-Programme Coordinator, 1- Course Coordinator, 1-Course Mentor per batch of 50 students

E. Instructional Delivery mechanisms & Identification of Media

The methodology of instruction in this course will be different from that of the other conventional (regular / physical) courses run in the University. A student-centric and student-convenient approach is required in the distance / online courses. This is also important because learning/instruction is imparted through print and/or audio-visual media rather than face-to-face communication.

F. Self-learning materials (SLM) should be developed in print media.

a. Self-Learning Materials (SLM), in print media, shall be developed.
b. SLM would be self-explanatory, self-contained, self-directed, self-motivating and self-evaluating.
c. There shall be a description of the credit value of each module or unit in the course.
d. There shall be clear guidelines on academic integrity and netiquette (internet etiquette) expectations regarding activities, discussions and plagiarism.
e. The audio-visual material will supplement and complement the Self Learning Materials and will be based on the curriculum structure.
f. The level and style of presentation and language should be simple and appropriate to facilitate e-learning.
g. The content must be interactive with the appropriate use of graphics, animationsimulations, etc. to keep students interested.

G. Student support service systems

The main goal of student support service systems is to promote independent or independent study. Study among distance learners in the absence of regular face-to-face teaching. All the time Educational support will be provided to students. Support will be available all the time in the following areas:

- Information, tips and advice about the programme.
- Advice before admission, during admission, and after admission.
- Introduction for new students.

- Provide academic advising schedules and practice schedules.
- Evaluate students and exchange feedback.
- Support with other academic and administrative inquiries such as registration andexamination Rating, comments, etc**.**

VI. Procedure for Admissions, Curriculum Transaction and Evaluation

The purpose of online and distance education is to provide flexible learning opportunities to students to attain qualification, wherever learners are not able to attend the regular classroom teaching. The programme termed online mode for award of Degree.

A. Procedure for Admission

Passed 10+2 with Mathematics from recognized board.

B. Curriculum Transaction and Evaluation

The marking is divided into two parts:

A. For continuous internal assessment (CIA) through projects and assignment writings, and
B. For end semester evaluation through offline examination.

VII. Library Resources:

Online Study Material and its availability is one most identified concern for the students to have access to online course material and resources.

VIII. Cost estimate of the program and the provisions

Suggested Fee for BCA program is as per the CSJM University norms.

IX. Quality Assurance Mechanism and Programme Learning Outcomes:

A. Quality Assurance Mechanism:

The online and distance BCA program is agreed to the latest pedagogies and prepares you for many contours your professional life might take.

The key points which make our offered programme much better in terms evaluation criteria:

I. The programme is being offered by NAAC A++ ranked Chhatrapati shahu Ji Maharaj University,Kanpur.
II. Highly qualified faculty who bring professional experience into the classroom.
III. Relevant courses those are immediately applicable to the workplace.
IV. Dedicated student support services.
V. Flexible ways to learn.

B. Programme Learning Outcomes:

1. Upon completion of the degree, graduates will proficiently demonstrate skills in various areas including Business Communication, Business Statistics, Marketing Management, Finance, Organizational Behaviour, Human Resource Management, International Business, and Business Analytics.
2. The curriculum and extracurricular activities are meticulously designed to provide students with a comprehensive understanding of managing businesses across the globe. Through a blend of theoretical knowledge and practical application, students gain insights into the diverse aspects of business management in an international context.
3. Graduates of this degree will possess the ability to make critical decisions within organizations they are associated with or in their own ventures. They will be equipped with the analytical skills, strategic thinking, and problem-solving abilities necessary to navigate complex business environments and drive organizational success.

Annexure-1

BCA Syllabus

BCA I Semester: I Paper -1 (03 credits)			
Core Course: BCA-1001 Computer Fundamental &Problem Solving Techniques			
Credit:03	**CIA:25**	**ESE:75**	**Max. Marks:100**
This course will introduce Computer Fundamentals in BCA programs to establish crucial basics: hardware, software, operating systems, and networks. Practical exercises enhance problem-solving. Proficiency in these fundamentals boosts employability and fosters innovation. Mastery of these concepts is vital for students to excel in the tech-driven world.			
Block I	**Unit 1:** Introduction, Characteristics of Computers, Block diagram of computer. **Unit 2:** Types of computers and features, Mini Computers, Micro Computes, Mainframe Computers, Super Computers. **Unit 3:** Types of Programming Languages (Machine Languages, Assembly Languages, High Level Languages). **Unit 4:**Data Organization, Drives,Files, Directories, Number Systems Introduction to Binary, Octal, Hexadecimal system Conversion, Binary Arithmetic Simple Addition, Subtraction, Multiplication		
Block II	**Unit 1** Introduction of memory organization. **Unit 2:** Types of Memory (Primary And Secondary) RAM, ROM, PROM, EPROM. **Unit 3:** Secondary Storage Devices (FD, CD, HD, Pen drive) I/O Devices (Scanners, Plotters, LCD, Plasma Display). **Unit 4:** Cache, Virtual memory, RAID.		
Block III	**Unit 1:** Introduction to operating system and services in O.S **Unit 2:** History, Files and Directories, DOS (Internal and External Commands). **Unit 3:** Batch Files, Types of Operating System, File Management System. **Unit 4:** Introduction to Linux – Features of Linux , Components of Linux		
Block IV	**Unit 1 Problem solving techniques** **Unit 2:** Understanding the problem, Analyzing the problem, Developing the solution. **Unit 3: Algorithm and Flowcharts -** Definition, Characteristics, Expressing Algorithms, Analysis of Algorithms, Advantages and disadvantages,. **Unit 4:** Examples Flowchart: Definition, Define symbols of flowchart, Limitations of Using Flowcharts, Advantages and disadvantages, Activities involved in Program Design, Coding and implementation.		
Block V	**Unit 1: Windows Operating Environment& Office Automation** **Unit 2** Windows, Control Panel, Taskbar, Desktop, Windows Application, Icons, Windows Accessories, Notepad, Paintbrush, **Unit 3:** MS-Word, Purpose, usage, command, MS-Excel. **Unit 4** MS-Access, MS-PowerPoint.		

Suggested Readings:

1. Fundamental of Computers – By V. Rajaraman B.P.B. Publications
2. Fundamental of Computers – By P.K. Sinha
3. Computer Today- By Suresh Basandra

BCA I Semester I : Paper II (03 credits)			
Core Course: BCA-1002 C Programming			
Credit:03	**CIA:25**	**ESE:75**	**Max. Marks:100**
This course will introduce C programming is crucial in BCA curriculum for teaching foundational coding principles. It enhances problem-solving skills, prepares for software development careers, and lays a strong programming foundation for advanced studies and real-world applications.			
Block I	**Unit 1: Fundamentals of C programming:** History, Structure of a C program, C Conventions, Character Set, Identifiers, Keywords **Unit 2 :** Simple Data types, Modifiers, Variables, Constants, Operators, Operator precedence. Input and Output operation **Unit 3 :** Single character input and output, formatted input and output. Control Structures, Conditional statement and switch statement **Unit 4 :** Goto statement. Looping statement, break and continue, nested for statement		
Block II	**Unit 1: Arrays and Functions:** Introduction (One and multi-dimensional), Declaration of arrays, Initialization of arrays, processing with arrays. **Unit 2 :** String manipulation, declaration of string arrays, string operations. **Unit 3 :** Functions: Introduction, advantages of functions, Function definition, function call, Actual and formal arguments, local and global variables **Unit 4 :** Function prototypes, types of functions, recursive functions, arrays and functions.		
Block III	**Unit 1: Searching and Sorting:** selection sort, bubble sort, insertion sort **Unit 2 :** quick sort, merge sort **Unit 3:** linearand binary search methods **Unit 4 :** comparison of sorting and searching methods.		
Block IV	**Unit 1 Structures** Introduction to structures, Advantages of structures, accessing elements of a structure **Unit 2:** nested structures, array of structures, functions and structures. **Unit 3:** Pointers: Introduction, pointer variable, pointer operator, pointer arithmetic, pointers and arrays **Unit 4 :** pointers and strings, array pointers, dynamic allocation.		
Block V	**Unit 1: Files, Preprocessor, standard library and header files:** Files: Introduction, File data type, opening and closing a file. **Unit 2:** file functions (getc, putc, getw, putw, fscanf, fprintf, fread, fwrite, fgets, fputs, feof) **Unit 3:** Preprocessor: #define, #include, #undef, Conditional compilation directives, C standard library and header **Unit 4:** files: Header files, string functions, mathematical functions, Date and Time functions		

Suggested Readings:

1. Let us C-Yashwant Kanetkar.
2. Programming in C-Balguruswamy
3. The C programming Lang., Pearson Ecl – Dennis Ritchie

BCA I Semester I : Paper III (04 credits)			
Core Course: BCA-1003 Principle of Management			
Credit:04	**CIA:25**	**ESE:75**	**Max. Marks:100**

Principles of Management in BCA curriculum develop essential managerial skills, including leadership, decision-making, and organizational behavior, preparing students for leadership roles in IT industries and entrepreneurship endeavors.

Block I	**Unit 1:** Nature of Management: Meaning, Definition, nature purpose, importance & Functions. **Unit 2:** Management as Art,Science & Profession **Unit 3:** Management as social System Concepts of management Administration- Organization **Unit 4:**Management Skills, Levels of Management.
Block II	**Unit 1:** Evolution of Management Thought. **Unit2:** Contribution of F.W. Taylor, Henri Fayol, Elton Mayo, Chester Bernard & Peter Drucker to the management thought **Unit 3:** Business Ethics, Social Responsibility of business
Block III	**Unit 1:** Functions of Management: Part-I Planning – Meaning- Need & Importance, types, Process of Planning, Barriers to Effective Planning, **Unit 2:** levels – advantages & limitations. Forecasting- Need & Techniques Decisionmaking- Types - Process of rational decision making & techniques of decision making **Unit 3:** Organizing – Elements of organizing & processes: Types of organizations **Unit 4:** Delegation of authority – Need, difficulties Delegation – Decentralization Staffing – Meaning & Importance Direction – Nature – Principles.
Block IV	**Unit 1:** Functions of Management: Part-II Motivation – Importance – theories **Unit 2:** Leadership – Meaning –styles, qualities & function of leader **Unit 3:** Controlling - Need, Nature, importance, Process & Techniques **Unit 4:** Total QualityManagement Coordination – Need – Importance.
Block V	**Unit 1:** Management of Change: Meaning, Features of change, **Unit 2:** Force for Change, Models for Change, Resistance tochange , **Unit 3:** overcoming resistance to change , New Trends in Organization Change **Unit 4:** Stress Management

Suggested Readings:

1. Essential of Management – Horold Koontz and Iteinz Weibrich- McGraw Hills International
2. Management Theory & Practice –J.N. Chandan
3. Essential of Business Administration – K. Aswathapa, Himalaya Publishing House

BCA I Semester I : Paper IV (04 credits)			
Core Course: BCA-1004 Business Communication			
Credit:04	**CIA:25**	**ESE:75**	**Max. Marks:100**
Business Communication in BCA curriculum fosters effective communication skills vital for professional success. It prepares students for collaboration, client interactions, and presenting technical information clearly, enhancing employability in diverse IT roles.			
Block I	**Unit 1: Means of Communication:** Meaning and Definition – Process **Unit 2:**Functions – Objectives, **Unit 3:** Importance – Essentials of good communication **Unit 4:** Communication barriers, 7C's of Communication		
Block II	**Unit 1: Types of Communication**: Oral Communication: Meaning, nature and scope **Unit 2:** Principle of effective oral communication **Unit 3:** Techniques of effective speech – Media of oral communication (Face-to-face conversation – Teleconferences – Press Conference **Unit 4:** Video Conferencing– Demonstration – Radio Recording –Meetings – Grapevine – Group Discussion – Mobile Phone Conversation– Oral report). The art of listening – Principles of good listening.		
Block III	**Unit 1: Written Communication**: Purpose of writing, Clarity in Writing **Unit2**:Principles of Effective writing, Writing an e-mail, SMS		
Block IV	**Unit 1: Business Letters & Reports:** Need and functions of business letters – Planning & layout of business letter **Unit 2:** Kinds of business letters – Essentials of effective correspondence, Purpose, Kind and Objective of Reports, Writing Reports		
Block V	**Unit 1 Drafting of business letters :** Enquiries and replies – Placing and fulfilling orders – Complaints **Unit 2:** follow-up Sales letters – Circular letters Application for employment and resume		

Suggested Readings:

1. Business Communication – K.K. Sinha – Galgotia Publishing Company, New Delhi.
2. Media and Communication Management – C.S. Rayudu – Himalaya Publishing House, Bombay.
3. Essentials of Business Communication – Rajendra Pal and J.S. Korlhalli- Sultan Chand & Sons, NewDelhi.
4. Business Communication (Principles, Methods and Techniques) Nirmal Singh – Deep &DeepPublications Pvt. Ltd., New Delhi.

BCA I Semester I : Paper V (04 credit)			
Core Course: BCA 1005 Mathematics –I			
Credit:04	**CIA:25**	**ESE:75**	**Max. Marks:100**
Mathematics-I in BCA curriculum lays a foundation for problem-solving and analytical thinking. It's essential for understanding algorithms, data structures, and mathematical modeling used in computer science applications, enhancing students' computational skills for various IT fields.			

Block I	**Unit 1: Matrices and Determinants:** Matrix, Types of matrices, Addition, subtraction **Unit 2:**scalar multiplication of a matrix, product of two matrices **Unit 3:** Determinants of a square matrix, Co-factor of element of a square matrix, Adjoint **Unit 4:** Inverse of a Square Matrix, Cayley Hamilton theorem (statement only) and problems.
Block II	**Unit 1: Limits and Continuity:** Limit at a Point, Properties of Limit **Unit 2:**Computation of Limits of Various **Unit 3:** Types of Functions, Indeterminate Forms, L' Hospitals Rule **Unit 4:**Continuity at a Point, Continuity Over an Interval.
Block III	**Unit 1: Differentiation:** Derivatives of Sum, Differences, Product & Quotients **Unit 2:**Chain Rule, Derivatives ofComposite Functions **Unit 3:** Logarithmic Differentiation, Rolle's Theorem, Mean Value Theorem), **Unit 4:**Maxima & Minima. Taylor's and Maclaurin's Theorem
Block IV	**Unit 1: Integration:** Fundamental Theorem of Calculus (without proof), Indefinite Integrals **Unit 2:** Methods of Integration Substitution, By Parts Of Partial Fractions.
Block V	**Unit 1: Vector Algebra:** Definition of a vector in 2 and 3 Dimensions **Unit 2:** Double and Triple Scalar and Vector Product.

Suggested Readings:

B.S. Grewal, "Elementary Engineering Mathematics", 34th Ed., 1998.

1. "Advanced Engineering Mathematics", S. Chand & Company, 9th Revised Edition, 2001.
2. Shanti Narayan, "Integral Calculus", S. Chand & Company, 1999.
3. Shanti Narayan, "Differential Caluculs", S.Chand & Company, 1998.

BCA II Semester: 1 Paper -1(03credits)			
Core Course:BCA-2001 Object Oriented Programming Using C++			
Credit:3	**CIA:25**	**ESE:75**	**Max. Marks:100**
This course will introduce Understanding Object-Oriented Programming using C++ is crucial for BCA students as it forms the foundation of modern software development. It equips them with essential skills to design, develop, and maintain robust software systems. Mastery of OOP concepts in C++ fosters problem-solving abilities and prepares students for diverse career opportunities in the tech industry.			
Block I	**Unit 1:** Introduction Introducing Object – Oriented Approach **Unit 2:** Relating to other paradigms {Functional, Data decomposition}. Basic terms and ideas Abstraction **Unit 3:** Encapsulation, Inheritance, Polymorphism, Review of C **Unit 4:** Difference between C and C++ - cin, cout, new, delete, operators		
Block II	**Unit 1:** Classes and Objects Encapsulation, information hiding **Unit 2:** abstract data types, Object & classes, attributes, methods, C++ class declaration **Unit 3:** State idendity and behaviour of an object, Constructors and destructors, instantiation of objects, Default parameter value **Unit 4:** object types, C++ garbage collection, dynamic memory allocation, abstract classes.		
Block III	**Unit 1:** Inheritance and Polymorphism Inheritance **Unit 2:** Class hierarchy, derivation – public, private & protected, Aggregation **Unit 3:** composition vs classification hierarchies, Polymorphism, Categorization of polymorphism techniques **Unit 4:** , Method polymorphism, Operator overloading.		
Block IV	**Unit 1:** Generic function Template function **Unit 2:** function name overloading **Unit 3:** Overriding inheritance methods, **Unit 4:** Run time polymorphism, Multiple Inheritance.		
Block V	**Unit 1:** Files and Exception Handling Streams and files. **Unit 2:** Exception handling.		

Suggested Readings:

1. A.R. Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH, 1997.
2. S.B. Lippman & J. Lajoie, “ C++ Primer”, 3rd Edition, Addison Wesley, 2000.
3. R. Lafore, “Object Oriented Programming using C++”, Galgotia Publications, 2004
4. D. Parasons, “Object Oriented Programming using C++”, BPB Publication

BCA II Semester:: Paper II (04 credits)			
Core Course: BCA 2002 Internet Technology and Web Design			
Credit:4	**CIA:25**	**ESE:75**	**Max. Marks:100**

This course aims to provide Internet Technology and Web Design are vital for BCA students as they provide a comprehensive understanding of web development principles, protocols, and technologies. Mastery in this subject equips students with skills to create dynamic websites, understand client-server architecture, and navigate the evolving landscape of digital technologies, preparing them for lucrative careers in web development and IT industries.

Block I	**Unit 1:** Introduction to Internet: Internet, Growth of Internet, Owners of the Internet **Unit 2:** Anatomy of Internet, ARPANET and Internet history of the World Wide Web, basic Internet Terminology, Net etiquette **Unit 3:** Internet Applications – Commerce on the Internet, Governance on the Internet, Impact of Internet on Society – Crime on/through the Internet.
Block II	**Unit 1:** Internet Connectivity & Network: Connectivity types: level one, level two and level three connectivity, modem, dedicated connections through the telephone system **Unit 2:** ISDN, Protocol options – Shell, SLIP, PPP, Service options – E-mail, WWW, News Firewall etc. Network definition **Unit 3:** Common terminologies: LAN, WAN, Node, Host, Workstation, bandwidth **Unit 4:** Interoperability, Network administrator, network security.
Block III	**Unit 1:** Internet Security Management Concepts: Overview of Internet Security **Unit 2:** Firewalls, Internet Security **Unit 3:** Management Concepts and Information Privacy.
Block IV	**Unit 1:** Introduction to Java: The JDK Directory Structure, Java History; Java Features; Structure of Java Program; Compiling and Interpreting Applications **Unit 2:** Java Tokens; Java Character set; Keywords and Identifiers, Primitive Data types Declarations, Non-Primitive data types; Operators and Expressions; **Unit 3:** Implicit and Explicit Type Conversions: The Cast Operator; Control Statements: If- else – if statement and Switch-case; Loops: While, Do While and For; Object Oriented Concepts: Abstraction and Encapsulation, Data Hiding; Introduction to Classes and Object; Access Controls; **Unit4:** Implementation of Inheritance and Polymorphism; Methods in Java; Access Modifiers; Constructors and its types.HTML Programming Basics:HTML page structure, HTML Text, HTML links, HTML document tables, HTML Frames, HTML Images.
Block V	**Unit 1:** Web Publishing and Browsing: Overview, SGML, Web hosting, HTML. CGL **Unit 2:** Documents Interchange Standards, Components of Web Publishing **Unit 3:** Document management, Web Page Design Consideration and Principles, Search and Meta Search Engines, **Unit 4:** WWW, Browser, HTTP, Publishing Tools.

Suggested Readings:

1. Greenlaw R and Hepp E “Fundamentals of Internet and www” 2nd EL, Tata McGrawHill,2007.
2. Godbole AS & Kahate A, “Web Technologies”, Tata McGrawHill,2008.
3. B. Patel & Lal B. Barik, ” Internet & Web Technology “, Acme Learning Publishers
4. Leon and Leon, “Internet for Everyone”, Vikas Publishion

BCA II Semester::Paper III (04 credits)			
Core Course: BCA 2003 Organization Behavior			
Credit:4	**CIA:25**	**ESE:75**	**Max. Marks:100**
This course aims to provide Organizational Behavior is essential for BCA students as it offers insights into workplace dynamics, communication, and leadership within tech organizations. Understanding human behavior in professional settings fosters effective teamwork, conflict resolution, and decision-making skills, preparing students to thrive in collaborative environments and assume leadership roles in the IT industry.			
Block I	**Unit 1:** Fundamentals of Organizational Behavior : Nature, Scope, Definition, Fundamental Concepts of Organizational Behavior; **Unit 2:** Models of Organizational Behavior; Emerging aspects of Organizational Behavior **Unit 3:** Meaning Cultural Diversity		
Block II	**Unit 1:** Perception, Attitude, Values and Motivation: Concept, Nature, Process, Importance, Management, Behavioral aspect of Perception **Unit2:** Effects of employee attitudes; Job Satisfaction; Nature and Importance of Motivation; Achievement Motive **Unit 3:** Theories of Work Motivation: Maslow's Need Hierarchy Theory, Mc Gregors's Theory 'X' and Theory 'Y		
Block III	**Unit 1:** Personality : Definition of Personality, Determinants of Personality **Unit 2:** Theories of Personality- Trait and Type Theories, The Big Five Trait Theory, Myres-Briggs Indicator; **Unit 3** Locus of Control, Type A and Type B Theory of Personality		
Block IV	**Unit 1:** Work Stress : Meaning and definition of Stress, Symptoms of Stress; **Unit 2:** Sources of Stress: Individual Level, Group Level, Organizational Level; Stressors **Unit 3:** Extra Organizational Stressors; Effect of Stress – Burnouts; Stress Management – Individual Strategies, **Unit 4:** Organizational Strategies		
Block V	**Unit 1:** Group Behavior and Leadership : Nature of Group, Types of Groups; **Unit 2:** Nature and Characteristics of team; **Unit 3:** Team Building, Effective Teamwork; Nature of Leadership **Unit 4:** Leadership Styles; Traits of Effective Leaders		

Suggested Readings:

1. Organizational Behavior Text, Cases and Games- By K. Aswathappa, Himalaya Publishing House, Mumbai, Sixth Edition (2005)
2. Organizational Behavior Human Behavior at Work By J.W. Newstrom, Tata McGraw Hill Publishing Company Limited, New Delhi, 12th Edition (2007)
3. Organizational Behavior – Fred Luthans
4. Organizational Behavior – Super Robbins

BCA II Semester: Paper IV (04 credits)			
Core Course: BCA-2004 Financial Accounting &Management			
Credit:4	**CIA:25**	**ESE:75**	**Max. Marks:100**

This course will introduce Financial Accounting & Management is crucial for BCA students as it imparts fundamental knowledge of financial principles and management techniques essential for business operations. Understanding financial statements, budgeting, and cost management enables students to make informed decisions, analyze business performance, and contribute effectively to the financial aspects of technology enterprises.

Block I	**Unit 1:** Overview - Meaning and Nature of Financial Accounting **Unit 2:** Scope of Financial Accounting, Financial Accounting & Management Accounting, **Unit 3:** Accounting concepts & convention, Accounting standards in India.
Block II	**Unit 1:** Basics of accounting – Capital & Revenue items, Application of Computer in Accounting Double Entry System, **Unit 2:** Introduction to Journal, Ledger and Procedure for Recording and Posting **Unit 3:** Introduction to Trail Balance, Preparation of Final Account, Profit & Loss Account and related concepts **Unit 4:** Balance Sheet and related concept. Ratio analysis.
Block III	**Unit 1:** Definition nature and Objective of Financial Management, Long Term Sources of Finance, Introductory idea about capitalization, Capital Structure **Unit 2:** Concept of Cost of Capital, introduction, importance, explicit & implicit cost, **Unit 3:** Measurement of cost of capital, cost of debt
Block IV	**Unit 1:** Concept & Components of working Capital. Factors Influencing the Composition of working Capital **Unit 2:** Objectives of working Capital Management – Liquidity Vs. Profitability and working capital policies. **Unit 3:** Theory of working capital: Nature and concepts
Block V	**Unit 1:** Cash Management **Unit 2:** Inventory Management and Receivables Management

Suggested Readings:

1. Maheshwari & Maheshwari, "An Introduction to Accountancy", 8th Edition, Vikas Publishing House, 2003
2. Gupta R.L., Gupta V.K., "Principles & Practice of Accountancy", Sultan Chand & Sons,1999.
3. Khan & Jain, "FinancialAccounting"
4. Maheshwari S.N., "Principles of Management Accounting", 11th Edition, Sultan Chand & Sons, 2001.
5. Shukla and Grewal, "Advanced Accounts", 14th Edition, Sultan Chand &Sons.

BCA II Semester: Paper V(04 credit)			
Core Course: BCA-2005 Mathematics II			
Credit:4	**CIA:25**	**ESE:75**	**Max. Marks:100**
This course will introduce Mathematics II is integral for BCA students as it reinforces core mathematical concepts essential for computer science. Topics like calculus, linear algebra, and discrete mathematics form the backbone of algorithm analysis, cryptography, and data structures. Proficiency in Mathematics II equips students with analytical skills crucial for software development and problem-solving in the digital realm.			
Block I	**Unit 1:** Sets, Subsets, Equal Sets Universal Sets, **Unit 2:** Finite and Infinite Sets, Operation on Sets, Union, Intersection and Complements of Sets, Cartesian Product **Unit 3:** Cardinality of Set, Simple Applications.		
Block II	**Unit 1:** Properties of Relations, Equivalence Relation, Partial Order Relation Function: **Unit 2:** Domain and Range, **Unit 3:** Onto, Into and One to One Functions, **Unit 4:** Composite and Inverse Functions.		
Block III	**Unit 1:** Partial Order Sets, Representation of POSETS using Hasse diagram, **Unit 2:** Chains, Maximal and Minimal Point, Glb, lub, Lattices & Algebric Systems, Principle of Duality, **Unit 3:** Basic Properties, Sublattices, Distributed & Complemented Lattics.		
Block IV	**Unit 1:** Partial Differentiation, Chain Rule, **Unit 2:** Extrema of Functions of 2 Variables, Euler's Theorem.		
Block V	**Unit 1:** Double Integral in Cartesian and Polar Coordinates to find Area **Unit 2:** Change of Order of Integration **Unit 3:** Triple Integral to Find Volume of Simple Shapes in Cartesian Coordinates		

Suggested Readings:

1. Kolman, Busby and Ross, "Discrete Mathematical Structure", PHI,1996.
2. S.K. Sarkar, "Discrete Maths"; S. Chand & Co.,2000
3. "Discrete Mathematics", Schaum's Outlines

B C A - Semester: 3 Paper -I (03 credits)			
Core Course: BCA 3001 Python Programming			
Credit:3	**CIA:25**	**ESE:75**	**Max. Marks:100**
This course will introduce Python programming offers simplicity, versatility, and power. With its clear syntax and extensive libraries, Python is utilized in web development, data analysis, AI, and more. Its dynamic typing and memory management streamline coding, while its popularity and community support make it a valuable skill in diverse industries.			
Block I	**Unit 1:** Features of Python, Environmental setup, Installation and tools required for running **Unit 2:** Basic Types Variable types and operators : Assigning values to variables Multiple Assignments Standard Data Types Set Map Single line comments using Multi- line comments using triple quote **Unit 3:** Data Type Conversion Operators, Types of Operator, Conditional statement **Unit 4:** Looping statements with else-Pass-Break continue.		
Block II	**Unit 1:** Number and List: Accessing values in List-Delete, update List element-Basic List operations Indexing **Unit 2:** Slicing and Matrices Built in methods and Functions for List-Accessing values in Tuple Delete, **Unit 3:** List element-Basic Tuple operations Indexing, **Unit 4:** Slicing and Matrices Built in methods and Functions for Tuple.		
Block III	**Unit 1:** Accessing values in Dictionary **Unit 2:** y-Updating Dictionary-Deleting Dictionary –elements Properties of Dictionary keys-Built in Dictionary **Unit 3:** y Functions and Methods Defining Function-Calling function- Pass by reference vs value, **Unit 4:** Function Arguments-Required arguments-Keyword arguments-Default arguments-Variable length arguments Recursion.		
Block IV	**Unit 1:** The Time Module and its functions **Unit 2:** -Calendar modules and its functions Other modules and Functions Sum and Difference **Unit 3:** f time and date Import From import statement From import statement Executing modules **Unit 4:** , Local functions-Reload function Packages in Python.		
Block V	**Unit 1:** Exception handling and assertions-Standard Exceptions-Assertions in Python **Unit 2:** -Handling an exception. **Unit 3:** n-Except clause with no exception-Except Clause with multiple exception-Try-Finally Clause **Unit 4:** Argument of an Exception Raising an Exception..		

Suggested Readings:

1. Tony Gaddis, Starting Out with Python, 3rd edition, Pearson
2. Y. Daniel Liang, Introduction to Programming Using Python, Pearson
3. Budd T A, Exploring Python , 2011, Tata McGraw Hill Education
4. Learning Python, Fourth Edition, Mark Lutz, O'Reilly publication

B C A Semester: 3 Paper -II (03 credits)			
Core Course: BCA 3002 Data Structure Using C & C++			
Credit:3	**CIA:25**	**ESE:75**	**Max. Marks:100**
This course will introduce C and C++, data structures play a crucial role in organizing and manipulating data efficiently. Arrays, linked lists, stacks, and queues are commonly implemented using pointers and memory management techniques. Understanding data structures in these languages is fundamental for optimizing algorithms and solving complex problems in software development.			
Block I	**Unit 1:** Representation of single and multidimensional arrays **Unit 2:** Sparse arrays – lower and upper triangular matrices **Unit 3:** Tri-diagonal matrices with Vector Representation also.		
Block II	**Unit 1:** Introduction and primitive operations on stack **Unit 2:** Stack application; Infix, postfix, prefix expressions. **Unit 3:** Evaluation of postfix expression; Conversion between prefix. **Unit 4:** Infix and postfix, introduction and primitive operation on queues, D- queues and priority queues.		
Block III	**Unit 1:** Introduction to linked lists **Unit 2:** Sequential and linked lists, **Unit 3:** operations such as traversal, insertion, deletion searching **Unit 4:** two way lists and Use of headers		
Block IV	**Unit 1:** Introduction and terminology; **Unit 2:** Traversal of binary trees; **Unit 3:** Recursive algorithms for tree operations such as traversal, **Unit4:** insertion, deletion; Binary Search Tree.		
Block V	**Unit 1:** Graph terminology, Representation of graphs, **Unit 2:** path matrix, BFS (breadth first search), **Unit 3:** DFS (depth first search), topological sorting, **Unit 4:** Warshall's algorithm (shortest path algorithm.)		

Suggested Readings:

1. E. Horowiz and S. Sahani, " Fundamentals of Data structures", Galgotia Book source Pvt. Ltd., 2003
2. R.S. Salaria, " Data Structures & Algorithms" , Khanna Book Publishing Co. (P)Ltd..,2002
3. Y. Langsam et. Al., " Data Structures using C and C++" , PHI,1999

BCA Semester 3 : Paper III (04 credits)			
Core Course: BCA 3003 Operating System			
Credit:4	**CIA:25**	**ESE:75**	**Max. Marks:100**

An Operating System course covers foundational concepts like process management, memory management, file systems, and device management. It delves into OS design principles, algorithms, and implementation techniques. Topics may include concurrency, virtualization, and security. Hands-on experience with OS internals and system programming is often a key component of the syllabus.

Block I	**Unit 1:** Introduction, What is an operating system, **Unit 2:** Simple Batch Systems, Multi-programmed Batch systems, TimeSharing Systems, Personal – Computer Systems, **Unit 3:** Parallel systems, Distributed systems, Real- Time Systems. **Unit 4:** Memory Management: Background, Logical versus physical Address space, swapping, Contiguous allocation, Paging, Segmentation, **Unit 5:** Virtual Memory: Demand Paging, Page Replacement, Page- replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing, Other Considerations
Block II	**Unit 1:** Processes: Process Concept, Process Scheduling, Operation on Processes **Unit2:** CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms,, **Unit 3:** Multiple – Processor Scheduling.
Block III	**Unit 1:** Deadlocks: System Model, Deadlock Characterization, **Unit 2:** Methods for Handling Deadlocks, **Unit 3:** Deadlock prevention, Deadlock Avoidance, **Unit 4:** Deadlock Detection, Recovery from Deadlock
Block IV	**Unit 1:** Device Management: Techniques for Device Management **Unit 2:** Dedicated Devices, Shared Devices, **Unit 3:** Virtual Devices; Input or Output Devices, **Unit 4:** Storage Devices, Buffering..
Block V	**Unit 1:** Information Management: Introduction, A Simple File system, General Model of a File System **Unit 2:** Symbolic File System, Basic File System, **Unit 3:** Access Control Verification, Logical File System, Physical File system File – System Interface; File Concept, **Unit 4:** Access Methods, Directory Structure, Protection

Suggested Readings:

1. Silbersachatz and Galvin, " Operating System Concepts", Person, 5th Ed.2001
2. Madnick E., Donovan J., " Operating Systems, Tata McGrawHill,2001

BCA Semester 3 : Paper IV (04 credits)			
Core Course: BCA 3004 Digital Electronics & Computer Organization			
Credit:4	**CIA:25**	**ESE:75**	**Max. Marks:100**
A Digital Electronics & Computer Organization course explores the basics of digital systems, logic gates, and Boolean algebra. It covers topics such as combinational and sequential circuits, memory systems, and CPU organization. Assembly language programming, instruction set architecture, and computer arithmetic are also typically included. Practical labs reinforce theoretical concepts.			
Block I	**Unit 1:** Number System & Boolean Algebra Number System: Binary, Octal, Decimal, Hexadecimal; Conversion of Number System; Binary Arithmetic & Complement, **Unit 2:** Binary Codes: Weighted & Non Weighted, Gray Code, Excess-3 Code. Boolean Function, **Unit 3:** Boolean Postulates; De-Morgan's Theorem; Boolean Expressions: Sum of Product, Product of Sum. **Unit 4:** Minimization of Boolean Expressions using K-Map; Logic Gates: AND, OR, NOT, NAND, NOR, XOR, XNOR; **Unit 5:** Implementations of Logic Functions using Gates; NAND- NOR Implementations; Multilevel gate Implementations.		
Block II	**Unit 1:** Combinational Circuits Adders & Subtractors: Half Adder, Full Adder, Binary Adder, Half Subtractor, Full Subtractor, Adder Subtractor; **Unit2:** Magnitude Comparator: Two Bit Magnitude Comparator, Three Bit Magnitude Comparator; Multiplexer & De-Multiplexer: **Unit 3**: 4*1 Multiplexer, 8*1 Multiplexer; Decoder & Encoder; Parity Checker & Generator; Code Converter.		
Block III	**Unit 1:** Sequential Circuit: Introduction to Flip Flops: SR, JK, T, D, Master Slave Flip Flops; Conversion of Flip Flops; **Unit 2:** ; Characteristic Table & Equation; Edge Triggering & Level Triggering; Excitation Table, **Unit 3:** State Diagram; State Table;, **Unit 4:** State Reduction; Design of Sequential Circuits.		
Block IV	**Unit 1:** Registers Introduction of Registers; Classification of Registers; Register with Parallel Load; **Unit 2:** Shift Registers; Bidirectional Shift Register with Parallel Load. Counters Introduction of Counter; **Unit 3:** Asynchronous/Ripple Counters; Synchronous Counters; BCD Counter; **Unit 4:** 4-bit Binary Counter with Parallel Load; Design of Synchronous Counters; Ring Counter; Johnson Counter		
Block V	**Unit 1:** Basic cell of static and dynamic RAM; **Unit 2:** Building large memories using chips; Associative memory; **Unit 3:** Cache memory organization and Virtual memory organization.		

Suggested Readings:

1. Digital Logic and Computer design (PHI) 1998 : M.M. Mano
2. Computer Architecture (PHI) 1998 : M.M. Mano
3. Digital Electronics (TMH) 1998 : Malvino and Leach

BCA Semester 3 : Paper V (04 credits)			
Core Course: BCA 3005 Elements of Statistics			
Credit:4	**CIA:25**	**ESE:75**	**Max. Marks:100**

The Elements of Statistics course introduces fundamental statistical concepts and methods. Topics include descriptive statistics, probability theory, hypothesis testing, and inferential statistics. Students learn techniques for data analysis, sampling methods, and estimation. Practical applications and interpretation of statistical results are emphasized, often utilizing software like R or Python.

Block I	**Unit 1**: Population, Sample and Data Condensation Definition and scope of statistics **Unit 2:** concept of population and simple with Illustration, **Unit 3:** Raw data, attributes and variables, classification, **Unit 4:** frequency distribution, Cumulative frequency distribution.
Block II	**Unit 1:** Measures of Central Tendency Concept of central Tendency **Unit2:** requirements of a good measures of central tendency: **Unit 3:** Arithmetic mean, Median, Mode, Harmonic Mean, Geometric mean for grouped and ungrouped data..
Block III	**Unit 1:**Measures of Dispersion: Concept of dispersion, **Unit 2:** Absolute and relative measure of dispersion, range variance, **Unit 3:** Standard deviation, Coefficient of variation.
Block IV	**Unit 1:** Permutations and Combinations Permutations of 'n' dissimilar objects taken 'r' at a time (with or without repetitions) **Unit 2:** nPr = n!/(n-r) !(without proof). Combinations of 'r' objects taken from 'n' objects. nCr = n!/(r!(n-r)!) (without proof) . **Unit 3:** Simple examples, Applications.
Block V	**Unit 1:** Sample space, Events and Probability Experiments and random experiments, Ideas of deterministic and non-deterministic experiments; **Unit 2:** Types of events, Union and intersections of two or more events, mutually exclusive events, Complementary event, Exhaustive event; Simple examples. **Unit 3:** 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.
Block VI	**Unit 1:** Statistical Quality Control Introduction, control limits, **Unit 2:** specification limits, tolerance limits, process and product control; **Unit 3:** Control charts for X and R; **Unit 4:** Control charts for number of defective {n-p chart} ,control charts for number of defects {c - chart}

Suggested Readings:

1. S.C. Gupta - Fundamentals of statistics - Sultan Chand & sons ,Delhi.
2. D.N. Elhance - Fundamentals of statistics - Kitab Mahal, Allahabad
3. Montogomery D.C. – Statistical Quality Control - John Welly andSons
4. Hogg R.V. and Craig R.G. – Introduction to mathematical statistics Ed 4 {1989} – Macmillan Pub. Co. New York.

BCA Semester 4: Paper -1 (04 credits)			
Course core - BCA- 4001 Computer Graphics and Animation			
Credit:4	**CIA:25**	**ESE:75**	**Max. Marks:100**
This course will introduce Computer graphics and animation encompass the creation, manipulation, and rendering of visual content using computer technology. It involves techniques such as modeling, texturing, lighting, and rendering to produce images or sequences of images that simulate motion. These tools are utilized across various industries, including entertainment, gaming, advertising, and education.			
Block I	**Unit 1:** Introduction: Interactive Computer Graphics, Advantages of Interactive Graphics **Unit 2:** Representative Uses of Computer Graphics **Unit 3:** Conceptual Framework for Interactive Graphics **Unit 4:** Classification of Application Development of Hardware and software for computer Graphics.		
Block II	**Unit 1:** Scan Conversion: Scan Converting Lines, Scan Converting Circles, Scan Converting Ellipses. **Unit 2:** Clipping: point clipping, Cohen-Sutherland line clipping Algorithm, **Unit 3:** Midpoint Subdivision Algorithm, **Unit 4:** polygon clipping (Sutherland-Hodgeman)		
Block III	**Unit 1:**Geometrical Transformation: 2D Transformation (translation, rotation, scaling, reflection and shearing) **Unit 2:** Homogeneous Coordinates and Matrix Representation of 2D Transformations **Unit 3:** Successive and composite 2D Transformations, the Window-to-Viewport Transformations **Unit 4:** Introduction to 3D Transformations Matrix.		
Block IV	**Unit 1**:Introduction to Curves & Surfaces **Unit 2:** Polygon Surfaces and polygon meshes, **Unit 3:** Quadratic and super quadrics surfaces, **Unit 4:** Spline curve and representation.		
Block V	**Unit 1:** Computer Animation: introduction, Application of animation, **Unit2:** Morphing, Keyframe system, Motion specifications in Animation, **Unit 3:** Types of animation **Unit 4:** Sequencing of Animation Design and Fundamental principles of animation.		

Referential Books:

1. Foley, Van Dam, Feiner, Hughes, Computer Graphics Principles& practice,2000.
2. D.J. Gibbs & D.C. Tsichritzs: Multimedia programming Object Environment& Frame work, 2000
3. Ralf Skinmeiz and Klana Naharstedt, Multimedia: computing, Communication and Applications, Pearson, 2001 4. D. Haran & Baker. Computer Graphics Prentice Hall of India,1986.

BCA Semester 4 : Paper 2 (03 credits)			
Core Course: BCA- 4002 Database Management System			
Credit:3	**CIA:25**	**ESE:75**	**Max. Marks:100**
This course will provide a Database Management System (DBMS) is software designed to efficiently store, retrieve, and manage data. It provides functionalities for defining, creating, querying, updating, and administering databases. DBMSes ensure data integrity, security, and concurrency control. Popular examples include MySQL, Oracle, SQL Server, and PostgreSQL, used in diverse applications spanning business, research, and more.			
Block I	**Unit 1:** Introduction: Characteristics of database approach, **Unit 2:** data models, **Unit 3:** DBMS architecture and data independence.		
Block II	**Unit 1:**E-R Modeling: Entity types, Entity set, attribute and key, relationships, **Unit 2:** relation types, roles and structural constraints, weak entities, **Unit 3:** enhanced E-R and object modeling, Sub classes; Super classes **Unit 4:** inheritance, specialization and generalization.		
Block III	**Unit 1:** Data Normalization: Functional Dependencies **Unit 2:** Normal form up to 5th normal form **Unit 3:** Data base design using EER to relational language.		
Block IV	**Unit 1:** Relational Data Model: Relational model concepts **Unit 2:** relational constraints, **Unit 3:** relational algebra **Unit 4**: SQL queries, programming using SQL.		
Block V	**Unit 1:** Concurrency Control: Transaction processing **Unit 2:** locking techniques and associated **Unit 3:** database recovery, security and authorization. **Unit 4:** Recovery Techniques, Database Security		

Referential Books:

1. Abraham Silberschatz, Henry Korth, S.Sudarshan, “Database Systems Concepts”, 4th Edition, McGraw Hill,1997.
2. Jim Melton, Alan Simon, “Understanding the new SQL: A complete Guide”, Morgan Kaufmann Publishers, 1993.
3. A.K. Majumdar, P. Bhattacharya, “Database Management Systems”, TMH, 1996.
4. Bipin Desai, “An Introduction to database systems”, Galgotia Publications, 1991

BCA Semester 4 : Paper 3 (04 credits)			
Core Course: BCA 4003 Software Engineering			
Credit:4	**CIA:25**	**ESE:75**	**Max. Marks:100**

This course will provide Software engineering involves applying systematic, disciplined, and quantifiable approaches to the development, operation, and maintenance of software systems. It encompasses various methodologies, tools, and practices to ensure software quality, reliability, and efficiency. Software engineers analyze requirements, design solutions, code, test, deploy, and maintain software to meet user needs effectively.

Block I	**Unit 1:** Software Engineering: Definition and paradigms **Unit 2:** A generic view of software engineering.
Block II	**Unit 1:** Requirements Analysis: Statement of system scope **Unit 2:** isolation of top level processes and entitles and their allocation to physical elements **Unit 3:** refinement and review.
Block III	**Unit 1:**Designing Software Solutions: Refining the software Specification; **Unit 2:** Application of fundamental design concept for data **Unit 3:** architectural and procedural designs using software blue print methodology and object oriented design paradigm **Unit 4:** Creating design document.
Block IV	**Unit 1:** Software Implementation: Relationship between design and implementation **Unit 2:** Implementation issues and programming support environment **Unit 3:** Coding the procedural design, Good coding style.
Block V	**Unit 1:** Software Maintenance: Maintenance as part of software evaluation, reasons for maintenance **Unit 2:** types of maintenance (Perceptive, adoptive, corrective) **Unit 3:** designing for maintainability, techniques for maintenance.
Block VI	**Unit 1:** Comprehensive examples using available software platforms/case tools, **Unit 2:** , Configuration Management.

Referential Books:

1. K.K. Aggarwal & Yogesh Singh “Software engineering”, 2nd Ed., New Age International 2005.
2. I. Sommerville, “Software Engineering”, Addison Wesley,2002.
3. James Peter, W. Pedrycz, “Software Engineering: An Engineering Approach” John Wiley & Sons.

BCA Semester 4 : Paper 4 (04 credits)			
Core Course – BCA 4004 Optimization Techniques			
Credit:4	**CIA:25**	**ESE:75**	**Max. Marks:100**
This course will provide Operational Technology (OT) refers to hardware and software systems used to control industrial processes, such as manufacturing, transportation, and utilities. Unlike IT, OT focuses on real-time operations and often involves specialized protocols and equipment. It ensures the reliable and efficient operation of critical infrastructure, including SCADA systems and industrial control systems.			
Block I	**Unit 1:**Linear programming Central Problem of linear Programming various definitions included Statements of basic theorem and also their properties **Unit 2:** simplex methods, primal and dual simplex method, transport problem **Unit 3:** Assignment problem and its solution. **Unit 4:** Graphical Method Formulation, Linear Programming Problem.		
Block II	**Unit 1:** Game theory Introduction, Two-person zero-sum game, pure strategies (Min-max and Max-min principles),Mixed strategies **Unit 2:** The rules principles of Dominance, Algebraic method to solve games without saddle point, **Unit 3:** Graphical method to solve the games.		
Block III	**Unit 1:** Replacement Theory: Replacement of item that deteriorates replacement of items that fail **Unit 2:** Group replacement and individual replacement.		
Block IV	**Unit 1:** PERT and CPM: Project management origin and use of PERT, origin and use of CPM **Unit 2:** Applications of PERT and CPM, Project Network, Diagram representation **Unit 3:** Critical path calculation by network analysis and critical path method (CPM).		
Block V	**Unit 1:** Job Sequencing: Introduction **Unit 2:** solution of sequencing problem Johnson s algorithm for n jobs through 2 machines		

Referential Books:

1. Gillet B.E. “Introduction to Operation Research”
2. Taha, H.A. “Operation Research – An Introduction”
3. Kanti Swarup “Operation Research” 4. S.D. Sharma “Operation Research”
5. Hira & Gupta “Operation Research”

BCA Semester 4 : (Paper 5) credit 4			
Core Course: BCA-4005 Mathematics-III			
Credit:4	**CIA:25**	**ESE:75**	**Max. Marks:100**
This course will introduce , Mathematics is the study of patterns, structures, and relationships using logical reasoning and abstraction. It encompasses various branches like algebra, geometry, calculus, and statistics, with applications in science, engineering, economics, and beyond. Mathematical principles underpin diverse fields, enabling modeling, prediction, problem-solving, and understanding of the natural world.			

Block I	**Unit 1:** Complex Number System, Algebra of Complex Numbers **Unit 2:** Polar Form, Powers and Roots, **Unit 3:** Functions of Complex Variables, Elementary Functions.
Block II	**Unit 1:**Vector Calculus: Differentiation of Vectors, Scalar and Vector Fields **Unit 2:** Gradient, Directional Derivatives, Divergence and Curl and their Physical Meaning.
Block III	**Unit 1:** Fourier Series: Periodic Functions, Fourier series **Unit 2:** Fourier Series of Even and Odd Functions, Half Range Series.
Block IV	**Unit 1:** Ordinary Differential Equations Of First Order: Variable- Separable Method **Unit 2:** Homogeneous Differential Equations, Exact Differential Equations, Linear Differential Equations, Bernoulli's Differential Equations, **Unit 3:** Differential Equations of First Order and First Degree by Integrating Factor.
Block V	**Unit 1:**Ordinary Differential Equations Of Second Order: Homogenous Differential Equations with Constant Coefficients **Unit 2:** Cases of Complex Roots and Repeated Roots, Differential Operator **Unit 3:** Solutions by Methods of Direct Formulae for Particular Integrals **Unit 4:** Operator Method for Finding Particular Integrals, (Direct Formulae)

Referential Books:

1. A.B. Mathur and V.P. Jaggi, "Advanced Engineering Mathematics", Khanna Publishers, 1999.
2. 2. H.K. Dass, "Advanced Engineering Mathematics", S. Chand & Co., 9th Revised Ed.

BCA Semester: V Paper -1(04credits)			
Core Course:BCA- 5001 Knowledge Management			
Credit:4	**CIA:25**	**ESE:75**	**Max. Marks:100**
This course will introduce Knowledge Management is indispensable for BCA students as it teaches efficient handling of information within organizations. Understanding knowledge creation, storage, retrieval, and dissemination optimizes workflow and decision-making in tech environments. Proficiency in Knowledge Management equips students to harness data effectively, fostering innovation and competitiveness in the ever-evolving digital landscape.			
Block I	**Unit 1:** Business Intelligence and Business Decisions: Modeling Decision Process **Unit 2:** Decision support systems; **Unit 3:** Group decision support and Groupware Technologies.		
Block II	**Unit 1:** Executive Information and support Systems: Business Expert System and AI, OLTO & OLAP **Unit 2:** Tools for data warehousing.		
Block III	**Unit 1:** Multi- Dimensional analysis: Data mining and knowledge discovery **Unit 2:** Data mining and Techniques **Unit 3:** Data mining of Advance Databases.		
Block IV	**Unit 1:** Knowledge Management Systems: Concept and Structure KM systems **Unit 2: T**echniques of knowledge management appreciation & limitation.		

Suggested Readings:

1. Decision support system, EIS, 2000
2. W.H.Inmon, "Building Data Warehousing", Willey,1998.
3. Han, Jiawei, Kamber, Michelinal, " Data Mining Concepts & Techniques", Harcourt India, 2001

BCA Semester:: V Paper II (03 credits)			
Core Course: BCA 5002 Java Programming and Dynamic Webpage Design			
Credit:3F	**CIA:25**	**ESE:75**	**Max. Marks:100**
This course aims to provide Java Programming and Dynamic Webpage Design are essential for BCA students as they provide hands-on experience in developing robust and interactive web applications. Mastery in Java enables students to build scalable backend systems, while expertise in dynamic webpage design equips them to create engaging user interfaces. These skills are vital for pursuing careers in web development and software engineering.			
Block I	**Unit 1:** Java Programming: Data types, control structured **Unit 2:** Arrays, strings **Unit 3:** Vector, classes (inheritance, package, exception handling) **Unit 4:** Multithreaded programming.		
Block II	**Unit 1:** Java applets, AWT controls (Button, Labels, Combo box, list and other Listeners, menu bar) layout manager **Unit 2:** string handling (only main functions)		
Block III	**Unit 1:** JDBC: JDBC Fundamentals, Establishing Connectivity and Working with Connection Interface **Unit 2:** Working with Statements, Creating and Executing SQL Statements **Unit 3:** Working with ResultSet Objects.		
Block IV	**Unit 1:** Java Servlets: Introduction, HTTP Servlet Basics **Unit 2:** The Servlet Lifecycle, Retrieving Information, Sending HTML Information **Unit 3:** Session Tracking		
Block V	**Unit 1: J**ava Server Pages: Introducing Java Server Pages, JSP Overview **Unit 2:** Setting Up the JSP Environment, **Unit 3:** Generating Dynamic Content, Using Custom Tag Libraries and the JSP Standard Tag Library **Unit 4:** Processing Input and Output.		

Suggested Readings:

1. Patrick Naughton and Herbertz Schildt, “Java-2 The Complete Reference” 199,TMH.
2. Shelley Powers, “Dynamic Web Publishing” 2nd Ed. Techmedia,1998.
3. Ivor Horton, “Beginning Java-2” SPDPublication
4. Jason Hunter, “Java Servlet Programming”O’Reilly
5. Shelley Powers, “Dynamic Web Publishing” 2nd Ed. Techmedia,1998
6. Hans Bergsten, “Java Server Pages”, 3rd Ed.O’reill

BCA Semester::V Paper III (04 credits)			
Core Course: BCA-5003 Computer Network			
Credit:4	**CIA:25**	**ESE:75**	**Max. Marks:100**

This course aims to provide Java Computer Network is crucial for BCA students as it combines Java programming with network fundamentals. Understanding socket programming, network protocols, and distributed systems empowers students to develop networked applications. Mastery in this subject enables students to create efficient, scalable, and secure network solutions, preparing them for roles in network administration and software development.

Block I	**Unit 1:** Basic Concepts: Components of data communication, distributed processing **Unit 2:** standards and organizations. Line configuration, topology **Unit 3:** Transmission mode, and categories of networks. **Unit 4:** OSI and TCP/IP Models: Layers and their functions, comparison of models **Unit 5:** Digital Transmission: Interfaces and Modems: DTE-DCE Interface, Modems, Cable modems.
Block II	**Unit 1:** Transmission Media: Guided and unguided, Attenuation, distortion **Unit2:** noise, throughput, propagation speed and time, wavelength **Unit 3:** Shannon capacity, comparison of media.
Block III	**Unit 1:** Telephony: Multiplexing, error detection and correction: Many to one, One to many **Unit 2:** WDM, TDM, FDM, Circuit switching, packet switching and message switching. **Unit 3:** Data link control protocols: Line discipline, flow control, error control, synchronous and asynchronous protocols, character and bit oriented protocols, Link access procedures. **Unit 4:** Point to point controls: Transmission states, PPP layers, LCP, Authentication, NCP. **Unit 5:** ISDN: Services, Historical outline, subscriber's access, ISDN Layers and broadcast ISDN.
Block IV	**Unit 1:** Devices: Repeaters, bridges, gateways, routers, The Network Layer; **Unit 2:** Design issues, Internetworking, Network-Layer in the internet.
Block V	**Unit 1:** Transport and upper layers in OSI Model: Transport layer functions, connection management, **Unit 2:** functions of session layers, presentation layer and application layer;

Suggested Readings:

1. A.S.Tanenbaum, "Computer Networks"; Pearson Education Asia, 4th Ed.2003.
2. Behrouz A.Forouzan, "Data Communication and Networking", 3rd Ed. Tata MCGraw Hill, 2004.
3. William stallings, "Data and computer communications", Pearson education Asia, 7th Ed., 2002

BCA Semester: V Paper IV (04 credits)			
Core Course: BCA-5004 Numerical Methods			
Credit:4	**CIA:25**	**ESE:75**	**Max. Marks:100**
This course will introduce Numerical Methods is essential for BCA students as it equips them with techniques to solve complex mathematical problems using computers. Understanding numerical analysis algorithms like interpolation, integration, and differential equations enables students to develop efficient computational solutions. Mastery in this subject enhances problem-solving skills, crucial for various applications in software development and data analysis.			
Block I	**Unit 1:** Roots of Equations: Bisections Method, False Position Method **Unit 2:** Newton's Raphson Method, Rate of convergence of Newton's method		
Block II	**Unit 1:** Interpolation and Extrapolation : Finite Differences, The operator E, Newton's Forward and Backward Differences **Unit 2:** Newton's dividend differences formulae, **Unit 3:** Lagrange's Interpolation formula for unequal Intervals.		
Block III	**Unit 1:** Numerical Differentiation Numerical Integration : Introduction, direct methods, maxima and minima of a tabulated function **Unit 2:** , General Quadratic formula		
Block IV	**Unit 1:** Solution of Linear Equation: Gauss's Elimination method and Gauss's Siedel iterative method		
Block V	**Unit 1:** Solution of Differential Equations: Euler's method, Picard's method, Fourth-order Ranga – Kutta method.		

Suggested Readings:

1. Scarbourogh, "Numerical Analysis".
2. Gupta & Bose S.C. "Introduction to Numerical Analysis, "Academic Press, Kolkata, S.S.Shashtri, " Numerical Analysis", PH

Course Code	Course name (BCA Semester: V Paper V (02 credits)
BCA-5005	Minor project - Evaluation will be based on Summer Training held after fourth semester and will be Conducted by the college committee only.

Course Code	Course name (BCA Semester: V Paper VI (01 credits)
BCA-5006	Viva-Voice on Summer Training- The viva will be conducted based on summer training of four weeks after the end of fourth Semester and will be Conducted by the college committee only.

BCA Semester: VI Paper -1 (04 credits)			
Core Course: BCA-6001 Information & Cyber Security			
Credit:04	**CIA:25**	**ESE:75**	**Max. Marks:100**

Studying Information & Cyber Security in BCA equips students with skills to mitigate digital risks, protect data integrity, ensure confidentiality, maintain availability, comply with legal requirements, implement best practices, understand emerging technologies, explore career opportunities, navigate ethical considerations, and contribute to societal security in an increasingly interconnected world.

Block I	**Unit 1:** Concept of Cyberspace: Netizens Technology, Law and Society Object, Scope of the Information Technology Act, 2000, Electronic Records and Electronic Commerce. **Unit 2:** Intrusion Detection System, Intrusion Prevention System, Public Key Infrastructure.
Block II	**Unit 1** Internet Security: Computer Security and Threats, Hacking, Cracking, sneaking, Viruses, Trojan Horses, malicious code, Worms and Logic Bombs. **Unit 2:** Network attack and Defense Most Common Attacks, Scripts Kiddies and Packaged Defense.
Block III	**Unit 1:** Wireless Network Security: Wireless Network Components, Security issues in Wireless Networks, Securing a Wireless Network, Mobile Security, The Smartphone Pentest Framework
Block IV	**Unit 1** Cyber Laws and Standards: ISO 27001, Cyber Law (Information Technology Act, 2000) **Unit 2:** International Standards maintained for Cyber Security, Security Audit, Investigation on by Investing Agency, Cyber Security Solution**s.**
Block V	**Unit 1:** Security Management: Disaster Recovery, Digital Signature, Ethical Hacking, Penetration Testing, Computer Forensics.

Suggested Readings:

1. Gautam Kumawat, Ethical Hacking & Cyber Security Course : A Complete Package, Udemy Course, 2017 2.
   Georgia Weidman , Penetration testing A Hands-On In t r o d u c t i o n to Hacking, no starch press, 2014
3. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Security in Computing, 5th Edition , Pearson Education , 2015
4. William Stallings-Cryptography and Network Security: Principles and Practice Publication

BCA Semester VI : Paper II (04 credits)			
Core Course: BCA-6002 Internet Of Things			
Credit:04	**CIA:25**	**ESE:75**	**Max. Marks:100**
C programming is crucial in BCA curriculum, teaching foundational coding principles. It enhances problem-solving skills, prepares for software development careers, and lays a strong programming foundation for advanced studies and real-world applications.			
Block I	**Unit 1:** Internet of Things (IoT): Vision, Definition, Conceptual Framework, Architectural view **Unit 2:** Technology behind IoT, Sources of the IoT, M2M Communication, IoT Examples.		
Block II	**Unit 1:** M2M vs IoT An Architectural Overview:Building architecture, Main design principles and needed capabilities, **Unit 2:** An IoT architecture outline, standards considerations. Reference Architecture and Reference Model of IoT.		
Block III	**Unit 1**Hardware for IoT: Sensors, Digital sensors, actuators, radio frequency identification (RFID) technology **Unit 2:** Wireless sensor networks, participatory sensing technology **Unit 3**: Embedded Platforms for IoT: Embedded computing basics, Overview of IOT supported Hardware platforms.		
Block IV	**Unit 1** Network & Communication aspects in IoT: Wireless Medium access issues **Unit 2:** MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery		
Block V	**Unit 1:** Domain specific applications of IoT: Home automation **Unit 2:** Industry applications, Surveillance applications, Other IoT application.		

Suggested Readings:

1. ArshdeepBahga, Vijay Madisetti “Internet of Things (A hands on approach)” 1ST edition, VPI publications,2014
2. Jeeva Jose, Internet of Things, Khanna Publishing House
3. Michael Miller “The Internet of Things” by Pearson
4. Raj Kamal “INTERNET OF THINGS”, McGraw-Hill, 1ST Edition, 2016

BCA Semester VI : Paper III (04 credits)			
Core Course: BCA-6003 E-Commerce			
Credit:04	**CIA:25**	**ESE:75**	**Max. Marks:100**

Principles of Management in BCA curriculum develop essential managerial skills, including leadership, decision-making, and organizational behavior, preparing students for leadership roles in IT industries and entrepreneurship endeavors.

Block I	**Unit 1:** Introduction to E-Commerce: The Scope of Electronic Commerce **Unit 2:**Definition of Electronic Commerce, Electronic **Unit 3:** E-commerce and the Trade Cycle, Electronic Markets electronic Data Interchange **Unit 4:** Internet Commerce, E-Commerce in Perspective.
Block II	**Unit 1:** Business-to-Business Electronic Commerce: Characteristics of B2B EC, Models of B2B Ec **Unit 2:**Procurement Management Using the Buyer's Internal Marketplace, Just in Time Deliver **Unit 3:** Other B2B Models, Auctions and Services from Traditional to Internet Based EDI, Integration with Back-end Information System. **Unit 4:** The Role of Software Agents for B2B EC, Electronic marketing in B2B, Solutions of B2B EC, Managerial Issues **Unit 5:**Electronic Data Interchange (EDI), EDI: The Nuts and Bolts, EDI & Business.
Block III	**Unit 1:** Internet and Extranet : Automotive Network Exchange, The Largest Extranet, Architecture of the Internet, Intranet and Extranet, Intranet software, **Unit 2**, Applications of Intranets, Intranet Application Case Studies, Considerations in Intranet Deployment **Unit 3:** The Extranets, The structures of Extranets, Extranet products services, Applications of Extranets, Business Models of Extranet Applications, Managerial Issues. **Unit 4:** Electronic Payment Systems : Is SET a failure, Electronic Payments & Protocols, Security Schemes in Electronic payment systems, Electronic Credit card system on the Internet, Electronic Fund transfer and Debit cards on the Internet, Stored – value Cards and E- Cash, Electronic Check Systems, Prospect of Electronic Payment Systems, Managerial Issues.
Block IV	**Unit 1:** Public Policy: From Legal Issues to Privacy : EC- Related Legal Incidents, Legal Incidents, Ethical & Other Public Policy Issues, Protecting Privacy, **Unit 2:** Protecting Intellectual Property, Free speech, Internet Indecency & Censorship, Taxation & Encryption Policies, Other Legal Issues: Contracts, Gambling & More, Consumer & Seller Protection In EC..
Block V	**Unit 1:** Infrastructure For EC : It takes more than Technology, A Network Of Networks, Internet Protocols. **Unit 2:** WebBased client/ Server, Internet Security, selling on the web, Chatting on the Web, Multimedia delivery, Analyzing Web Visits, Managerial Issues.

Suggested Readings:

1. David Whiteley, " E-Commerce", Tata McGraw Hill,2000
2. Eframi Turban, Jae Lee, David King, K. Michale Chung, "Electronic Commerce", Pearson Education, 20007.

BCA Semester VI : Paper IV (04 credits)			
Core Course: BCA-6004 Data Science and Machine Learning			
Credit:04	**CIA:25**	**ESE:75**	**Max. Marks:100**

Business Communication in BCA curriculum fosters effective communication skills vital for professional success. It prepares students for collaboration, client interactions, and presenting technical information clearly, enhancing employability in diverse IT roles.

Block I	**Unit 1:** Introduction to Data Science: Evolution of Data Science, Data Science Roles, Stages in a Data Science Project **Unit 2:** Applications of Data Science in various fields, Data Security Issues.
Block II	**Unit 1:** Data Collection and Data Pre-Processing: Data Collection Strategies, Data Pre-Processing Overview **Unit 2:** Data Cleaning, Data Integration and Transformation, Data Reduction.
Block III	**Unit 1:** Exploratory Data Analytics: Descriptive Statistics - Mean Standard Deviation, **Unit 2:** Skewness and Kurtosis – Box Plots – Pivot Table – Correlation Statistics – ANOVA.
Block IV	**Unit 1:** Introduction: Idea of Machines learning from data **Unit 2:** Classification of problem – Regression and Classification, Supervised and Unsupervised learning.
Block V	**Unit 1:** Neural Networks: History, Artificial and biological neural networks, Artificial intelligence and neural networks **Unit 2:** Biological neurons, Models of single neurons, Different neural network models.

Suggested Readings:

1. Cathy O'Neil and Rachel Schutt , "Doing Data Science", O'Reilly, 2015.
2. David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big data Analytics", EMC 2013
3. Machine Learning, Tom M. Mitchell
4. Introduction to Machine learning, Nils J.Nilsson

Course Code	Course name (BCA Semester: VI Paper V (05 credits)
BCA-6005	Major Project-Evaluation will be based on held after fourth semester and will be Conducted by the college committee only.

PROGRAMME UNDER D-CODE, CSJM UNIVERSITY, KANPUR

ONLINE MODE

- ☑ Master of Computer Applications (MCA)
- ☑ Bachelor of Computer Application (BCA)
- ☑ M.Com
- ☑ B.Com.
- ☑ Master of Business Administration (MBA)
- ☑ Bachelor of Business Administration (BBA)

OPEN AND DISTANCE LEARNING MODE (ODL)

- ☑ Master of Computer Applications (MCA)
- ☑ Bachelor of Computer Application (BCA)
- ☑ Master of Business Administration (MBA)
- ☑ Bachelor of Business Administration (BBA)
- ☑ M.Com., B.Com.
- ☑ MA (Education, MA Economics, MA Philosophy, MA Hindi, MA English)
- ☑ MA Political Science
- ☑ BA (Education, History, Economics, Hindi, Sociology Political Science, English)

PROGRAMME UNDER REGULAR MODE AT CSJM UNIVERSITY CAMPUS, KANPUR

ATAL BIHARI VAJPAYEE SCHOOL OF LEGAL STUDIES

L.L.B. (Hons.), L.L.M., B.A. L.L.B. (Hons.), B.B.A. L.L.B. (Hons.), Certificate Course in Intellectual Property Rights (IPR)

SCHOOL OF ADVANCED AGRICULTURE SCIENCES & TECHNOLOGY

M.Sc. (Ag) Horticulture (Fruit Science)/ Agronomy/Horticulture (Vegetable Science)/Horticulture (Floriculture & Land Scaping)
M.Sc. (Food Science & Technology), B.Sc. (Hons.) Agriculture

SCHOOL OF ARTS, HUMANITIES & SOCIAL SCIENCES

MA in Rural Management & Extension, M.A. (Hindu Studies), Master of Arts in Public Health, M.A. (Journalism and Mass Communication), Lateral entry, M.A. (Film Making), M.A. (Digital Journalism), M.A. Economics, Master of Social Work, M.A. Sociology, M.A. Jyotirvigyan, Master of Library & Information Science, (M. Lib. & I.Sc.), B.A. (Hons.) Sociology, B.A. (Hons.) Psychology, B.A. (Hons.) Economics, B.A. (Hons) Philosophy, B.A. Political Science (Hons), B.A. (Combination), Bachelor of Library & Information Science (B. Lib. & I.Sc.), B.A. (Journalism and Mass Communication), PG Diploma in Guidance and Counselling, Diploma in Digital Humanities, Post Graduate Diploma in Journalism and Mass Communication (PGDJMC), Certificate in Social Media, Certificate in TV Journalism, Diploma in Karmkand

SCHOOL OF BASIC SCIENCES

M.Sc. Physics/Chemistry/Industrial Chemistry/Mathematics, M.Sc./MA Geography, B.Sc. (Hons.) Physics,/Chemistry,/Mathematics, B.Sc. (Physics, Chemistry, Mathematics). B.Sc. (Physics, Chemistry, Geography), B.Sc. (Physics, Chemistry, Computer Applications), B.Sc. (Chemistry, Mathematics, Geography), B.Sc. (Chemistry, Mathematics, Computer Applications), B.Sc. (Physics, Mathematics, Computer Applications), B.Sc. (Physics, Mathematics, Geography), B.Sc. (Physics, Mathematics, Statistics)

SCHOOL OF BUSINESS MANAGEMENT

MBA, M.Com, Master of Hospital Management (MHA), BBA, B.Com. (Hons.)

SCHOOL OF CREATIVE & PERFORMING ARTS

Master of Fine Arts (Painting/Applied Arts/Sculpture), Master of Arts (Drawing & Painting), M.A. Music (Vocal/Instrumental-Tabla/Instrumental-Sitar), Master of Performing Arts (Kathak), Bachelor of Fine Arts (Painting/Applied Art/Sculpture), Bachelor of Performing Arts (Kathak, Bachelor of Performing Arts (Tabla), Bachelor of Performing Arts (Vocal), Certificate Course (Painting/Applied Art/Sculpture/Photography/Graphic Design/3D Animation/3D Modelling), Diploma in Kathak

SCHOOL OF ENGINEERING AND TECHNOLOGY

M.Tech. Program in Nano-Science and Nano Technology, M. Tech. in Computer Science and Engineering, M. Tech. in Electronics and Communication Engineering, Master of Computer Application (MCA), Integrated M.Sc. Electronics (Specialization in VLSI and IOT), B. Tech. in Computer Science and Engineering, B. Tech. in Computer Science and Engineering (Artificial Intelligence), B. Tech. in Information Technology, B. Tech. in Electronics and Communication Engineering, B. Tech. in Chemical Engineering, B. Tech. in Chemical Engineering (Lateral entry), B. Tech. in Mechanical Engineering, B. Tech. in Mechanical Engineering (Lateral entry), Bachelor in Computer Application (BCA), B.Voc. (Interior Design), Bachelor of Design (B.Des. Interior Design), Diploma in Chemical Engineering, Diploma in Electrical Engineering, Diploma in Mechanical Engineering, Diploma in Metallurgy and Material Technology, Diploma in Fashion Technology

SCHOOL OF HEALTH SCIENCES

Master of Physiotherapy (M.P.T.) in Orthopaedics/Sports/Cardiopulmonary Disorders/ Neurology, M.Sc. Human Nutrition (M.Sc. HN), M.Sc. Medical Laboratory Technology, (M.Sc.MLT) in Clinical Biochemistry/Medical Microbiology and Immunology /Pathology, Bachelor of Physiotherapy (BPT), B.Sc. in Medical Laboratory Technology (B.Sc. MLT), B.Sc. Medical Microbiology (B.Sc. MM), Bachelor in Medical Radiologic and Imaging Technology (BMRIT). Bachelor of Optometry (B. Optom.), B.Sc. in Human Nutrition (B.Sc. HN), Certificate Course in Garbh Sanskar.

SCHOOL OF HOTEL MANAGEMENT

Master of Hotel Management and Catering Technology (MHMCT), Bachelor of Hotel Management and Catering Technology (BHMCT), Diploma in Front Office/Food & Beverage Service/Food Production/Bakery & Confectionery

SCHOOL OF LANGUAGES

M.A. English, M.A. Hindi, M.A. Sanskrit, B.A. (Hons.) English, B.A. (Hons.) Hindi, B.A. (Hons.) Sanskrit, B.A. Combination, Certificate Course in Russian/German/French

SCHOOL OF LIFE SCIENCES AND BIOTECHNOLOGY

M.Sc. Integrated Biotechnology, M.Sc. Life Sciences, M.Sc. Biotechnology, M.Sc. Biochemistry, M.Sc. Microbiology, M.Sc. Environmental Science and Technology, M.Sc. Environmental Science and Technology (Lateral Entry), M.Sc. Botany (Plant Sciences),B.Sc. (Hons) Biotechnology, B.Sc. (Hons) Biological Sciences, B.Sc. (Biochemistry, Botany, Zoology), B.Sc.- Integrated Biotechnology

SCHOOL OF PHARMACEUTICAL SCIENCES

M. Pharm. (Pharmaceutics), M. Pharm. (Pharmaceutical Chemistry), M. Pharm. (Pharmacology, B. Pharm., B. Pharm. (lateral entry), D. Pharm

SCHOOL OF TEACHER EDUCATION

M.Ed., M.P.Ed. (Master of Physical Education, M.Sc. Yoga, M.A. Yoga, B.Ed., B.P.Ed. (Bachelor of Physical Education, B.P.E.S. (Bachelor of Physical Education & Sports), B.Sc. Yoga, P.G.D.Y.ED. (Post Graduate Diploma in Yoga Education)


स्वर्ण जयंती पुरुष छात्रावास
Swarn Jayanti Boys Hostel


स्टेडियम | Stadium