BACHELOR OF COMPUTER APPLICATION (BCA)

(OPEN AND DISTANCE LEARNING)

PROGRAMME PROJECT REPORT (PPR)

SHAHU JI MAHARAJ UNIVE



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.



Shri Ram Nath Kovind Former President of India



Shri Ajeet Doval National Security Advisor of India Governor of Karnataka & Comptroller & to Prime Minister



Bharat Ratna Shri Atal Bihari Bajpai Former Prime Minister of India



Shri T.N Chaturvedi Auditor General of India





Dr. Harsh Vardhan Union Cabinet Minister



Shri Sanjay Kothari Secretary to the President & Central Vigilance Commissioner



Indian Playback Singer



Shri Gopal Das Neeraj Indian poet; Author of Hindi literature



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 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 oncampus 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 oncampus 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, problemsolving, 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
1 st	1 st	BCA-1001	Computer Fundamental & Problem solving Techniques	Theory	3
1 st	1 st	BCA-1002	C Programming	Theory	3
1 st	1 st	BCA-1003	Principle of Management	Theory	4
1 st	1 st	BCA-1004	Business Communication	Theory	4
1 st	1 st	BCA-1005	Mathematics – I A I I I I I I I I I I I I I I I I I	Theory	4
1 st	1 st	BCA-1001P	Computer Laboratory and Practical Work of Office Automation	Practical	2
1 st	1 st	BCA-1002P	Computer Laboratory and Practical Work of C Programming	Practical	2

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

Year	Sem.	Cours <mark>e</mark> Code	Paper Title	Theory/ Practical	Credits
1^{st}	2^{nd}	BCA-2001	Object Oriented Programming Using C++	Theory	3
1 st	2^{nd}	BCA-2002	Internet Technology and Web Design	Theory	4
1 st	2 nd	BCA-2003	Organization Behavior	Theory	4
1 st	2^{nd}	BCA-2004	Financial Accounting & Management	Theory	4
1 st	2 nd	BCA-2005	Mathematics II	Theory	4
1 st	2 nd	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
2 nd	3 rd	BCA-3001	Python Programming	Theory	3
2 nd	3 rd	BCA-3002	Data Structure Using C & C++	Theory	3
2 nd	3 rd	BCA-3003	Operating System	Theory	4
2 nd	3 rd	BCA-3004	Digital Electronics & Computer Organization	Theory	4
2 nd	3 rd	BCA-3005	Elements of Statistics	Theory	4
2 nd	3 rd	BCA-3001P	Computer Laboratory and Practical Work of Python	Practical	2
2 nd	3 rd	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
2 nd	4 th	BCA-4001	Computer Graphics & Animation Database Management System	Theory	4
2 nd	4 th	BC <mark>A</mark> -4002	Database Management System	Theory	3
2nd	4 th	BCA-4003	Software Engineering	Theory	4
2 nd	4 th	BCA-4004	Optimization Techniques	Theory	4
2 nd	4 th	BCA-4005	Mathematics-III	Theory	4
2 nd	4 th	BCA-4001P	Computer Graphics & DBMS Laboratory	Practical	3

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

Year	Sem.	Course Code	Paper Title	Theory/ Practical	Credits
3 rd	5 th	BCA-5001	Knowledge Management	Theory	4
3 rd	5 th	BCA-5002	Java Programming and Dynamic Webpage Design	Theory	3
3 rd	5 th	BCA-5003	Computer Network	Theory	4
3 rd	5 th	BCA-5004	Numerical Methods	Theory	4
3 rd	5 th	BCA-5005	Minor Project	Practical	2
3 rd	5 th	BCA-5006P	Viva-Voice on Summer Training	Practical	1
3 rd	5 th	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
3 rd	6 th	BCA-6001	Information & Cyber Security	Theory	4
3 rd	6 th	BCA-6002	Internet Of Things	Theory	4
3 rd	6 th	BCA-6003	E-Commerce	Theory	4
3 rd	6 th	BCA-6004	Data Science and Machine Learning	Theory	4
3 rd	6 th	BCA-6005	Major Project	Practical	5
3 rd	6 th	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, animation simulations, 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 and examination 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:

- 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 I Semester: I Paper -1 (03 credits)					
Co	ore Course: BCA-1001 Computer Fundamental	&Problem Solving Techniques			
Credit:03	CIA:25 ESE:75	Max. Marks:100			
This course software, op fundamental excel in the t	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, 1 Unit 2: Types of computers and features, Minit Computers, Super Computers. Unit 3: Types of Programming Languages (Machine Languages). Unit 4:Data Organization, Drives, Files, Directories, Octal, Hexadecimal system Conversion, Binary A Multiplication 	Block diagram of computer. Computers, Micro Computes, Mainframe Languages, Assembly Languages, High Level Number Systems Introduction to Binary, rithmetic Simple Addition, Subtraction,			
Block II	Unit 1 Introduction of memory organization. Unit 2: Types of Memory (Primary And Secondary) Unit 3: Secondary Storage Devices (FD, CD, HD, P LCD, Plasma Display). Unit 4: Cache, Virtual memory, RAID.	RAM, ROM, PROM, EPROM. en drive) I/O Devices (Scanners, Plotters,			
Block III	Unit 1: Introduction to operating system and services in O.SUnit 2: History, Files and Directories, DOS (Internal and External Commands).IIUnit 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 p Unit 3: Algorithm and Flowcharts - Definition, Chr of Algorithms, Advantages and disadvantages,. Unit 4: Examples Flowchart: Definition, Define syn Limitations of Using Flowcharts, Advantages and di Design, Coding and implementation.	roblem, Developing the solution. aracteristics, Expressing Algorithms, Analysis abols of flowchart, isadvantages, Activities involved in Program			
Block V	Unit 1: Windows Operating Environment& Offic Unit 2 Windows, Control Panel, Taskbar, Desktop, V Windows Accessories, Notepad, Paintbrush, Unit 3: MS-Word, Purpose, usage, command, MS-E Unit 4 MS-Access, MS-PowerPoint.	e Automation Windows Application, Icons, xcel.			

- 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 Programn	ning				
Credit:03	Max. Marks:100					
This cours	This course will introduce C programming is crucial in BCA curriculum for teaching foundational coding					
principles	s. It enhances problem-solving skills, prepares for software	e development careers, and lays a				
strong pro	rong programming foundation for advanced studies and real-world applications.					
	of a C program, C					
	Conventions, Character Set, Identifiers, Keywords					
	Unit 2 : Simple Data types, Modifiers, Variables, Constants, O	perators, Operator precedence. Input				
Block I	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	e, nested for statement				
	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.				
Block II	Unit 3 : Functions: Introduction, advantages of functions, Func	tion definition, function call,				
	Actual and formal arguments, local and global variables	8				
	Unit 4 : Function prototypes, types of functions, recursive func	tions, arrays and functions.				
	Unit 1: Searching and Sorting: selection sort, bubble sort, ins	ertion sort				
Block III	Unit 2 : quick sort, merge sort	1				
	Unit 3: linearand binary search methods					
	Unit 4 : comparison of sorting and searching methods.					
	Unit I Structures Introduction to structures, Advantages of structures	accessing elements of a				
	structure					
Block IV	Unit 2: nested structures, array of structures, functions and structures to the structure of the structure o	ctures.				
	Unit 3: Pointers: Introduction, pointer variable, pointer operato	r, pointer arithmetic, pointers and				
	arrays					
	Unit 4 : pointers and strings, array pointers, dynamic allocati	on. as Eiless Inter duction Eile date truce				
Unit I: Files, Preprocessor, standard library and header files: Files: Introduction						
	opening and closing a life.					
	Unit 2: file functions (getc, putc, getw, putw, iscani, iprinti, fre	ad, Iwrite, Igets, Iputs, IeoI)				
Dlook V	Unit 3: Preprocessor: #define, #include, #undef, Conditional co	empilation directives, C standard				
DIUCK V	library and header					
	Unit 4: files: Header files, string functions, mathematical functions	ions,				
	Date and Time functions					

- 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 Cou	rse: BCA-1003 Principle of M	anagement			
Credit:04	CIA:25	ESE:75	Max. Marks:100			
Principles of	of Management in B	CA curriculum develop essen	ntial managerial skills, including			
leadership, o	decision-making, and o	rganizational behavior, prepari	ng students for leadership roles in			
IT industries	s and entrepreneurship	endeavors.				
	Unit 1: Nature of Mana	gement: Meaning, Definition, natu	ure purpose, importance & Functions.			
	Unit 2: Management as	Art, Science & Profession				
	Unit 3: Management as	social System Concepts of manag	gement Administration- Organization			
Block I	Unit 4: Management Sk	This, Levels of Management.				
	Unit I: Evolution of M	anagement Thought.				
	Unit2: Contribution of	F.W. Taylor, Henri Fayol, Elton M	layo, Chester Bernard & Peter Drucker			
Block II	to the management thou	ught				
Unit 3: Business Ethics, Social Responsibility of business						
	Unit 1: Functions of Management: Part-I Planning – Meaning- Need & Importance, types,					
	Process of Planning, Ba	arriers to Effective Planning,	φ_{λ}			
	Unit 2: levels – advantages & limitations. Forecasting- Need & Techniques Decisionmaking-					
	Types - Process of ratio	mal decision making & techniques	s of decision making			
Block III	Unit 3: Organizing – E	lements of organizing & processes	s: Types of organizations			
	Unit 4: Delegation of	authority - Need, difficulties De	legation – Decentralization Staffing –			
	Meaning & Importance	e Direction – Nature – Principles.				
	Unit 1: Functions of M	anagement: Part-II Motivation – I	mportance – theories			
	Unit 2: Leadership – N	leaning -styles, qualities & function	on of leader			
Block IV Unit 3: Controlling - Need, Nature, importance, Process & Techniques						
	Unit 4: Total QualityManagement Coordination – Need – Importance.					
	Unit 1: Management of Change: Meaning, Features of change,					
	Unit 2: Force for Chan	ge, Models for Change, Resistance	e tochange,			
Block V	Unit 5: overcoming res	istance to change, New Trends in	Organization Change			
	Unit 4: Stress Manager	nent				

- 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)						
	C	Core Course: BCA-1004	Business Communicati	on		
Credit:04		CIA:25	ESE:75	Max. Marks:100		
Business Co	mmunication in	BCA curriculum fosters e	ffective communication sk	ills vital for professional		
success. It p	repares student	s for collaboration, client	interactions, and presentin	g technical information		
clearly, enhancing employability in diverse IT roles.						
	Unit 1: Mean	is of Communication: M	eaning and Definition – Pr	ocess		
Block I	Unit 2:Funct	ions – Objectives,	1 • .•			
	Unit 3: Impo	rtance – Essentials of good	d communication			
	Unit 4: Com	nunication barriers, /C's o	of Communication			
	Unit 1: Type	s of Communication: Ora	l Communication: Meanin	g, nature and scope		
	Unit 2: Princ	iple of effective oral comm	nunication			
	Unit 3: Techniques of effective speech – Media of oral communication					
Dia als II	(Face-to-face	(Face-to-face conversation – Teleconferences – Press Conference				
BIOCK II	Unit 4: Vide	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: Writ	ten Communication: Purj	pose of writing, Clarity in	Writing Unit2:Principles of		
DIOCK III	Effective writing, Writing an e-mail, SMS					
	Unit 1: Busir	iess Letters & Reports	: Need and functions of	o <mark>usine</mark> ss letters –		
Block IV	Planning & 1	Planning & layout of business letter				
	Unit 2: Kinds	Unit 2: Kinds of business letters – Essentials of effective correspondence Purpose Kind and				
	Objective of Reports. Writing Reports					
	Unit 1 Drafting of business letters : Enquiries and replies - Placing and fulfilling orders -					
Block V	Complaints	ing of business fetters . I	Enquiries and replies 1 la	the full full full full for the second s		
DIOCK	Unit 2: follow	un Salas lattars Circula	r latters Application for an	ployment and resume		
	Unit 2. 10110w	-up sales letters – Circula	a reacts Application for en			
1						

- 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	Aathematics-I in BCA curriculum lays a foundation for problem-solving and analytical thinking. It's				
essential for	understanding algorithms, data struct	ures, and mathematical mo	deling used in computer		
science appl	ications, enhancing students' computation	onal skills for various IT field	lds.		
	Unit 1: Matrices and Determinants:	Matrix, Types of matrices, A	Addition, subtraction		
	Unit 2:scalar multiplication of a matrix	x, product of two matrices			
	Unit 3: Determinants of a square matri	x, Co-factor of element of a	square matrix,		
Block I	Adjoint				
	Unit 4: Inverse of a Square Matrix, Cayley Hamilton theorem (statement only) and				
	problems.		•.		
	Unit 1: Limits and Continuity: Limit	at a Point, Properties of Lir	nit		
Block II	Unit 2: Computation of Limits of Vario	US	1		
	Unit 3: Types of Functions, Indetermin	v Over an Interval	le		
	Clift 4. Continuity at a Fonit, Continuit	y Over all litter val.			
	Unit 1: Differentiation: Derivatives of	Sum, Differences, Product	& Quotients		
D 1 1 111	Unit 2: Chain Rule, Derivatives of Com	posite Functions			
Block III	Unit 3: Logarithmic Differentiation, R	olle's Theorem, Mean Value	e Theorem),		
	Unit 4:Maxima & Minima. Taylor's ar	d Maclaurin's Theorem			
	Unit 1: Integration: Fundamental Theorem of Calculus (without proof), Indefinite				
Block IV Integrals			74		
	Unit 2: Methods of Integration Substitution, By Parts Of Partial Fractions.				
	Unit 1: Vector Algebra: Definition of	a vector in 2 and 3 Dimensi	ons		
Block V	Unit 2: Double and Triple Scalar and V	Vector Product.	~		

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 BCA stude essential sk in C++ fost tech indust	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 Introduc Unit 2: Relating to other par Abstraction Unit 3: Encapsulation, Inher Unit 4: Difference between	cing Object – Oriented App adigms {Functional, Data d itance, Polymorphism, Rev C and C++ - cin, cout, new,	proach lecomposition}. Basic terms and ideas view of C , delete, operators			
Block II	Ock IIUnit 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 Poly Unit 2: Class hierarchy, deri Unit 3: composition vs cla polymorphism techniques Unit 4: , Method polymorph	morphism Inheritance vation – public, private & p assification hierarchies, Po ism, Operator overloading.	protected, Aggregation olymorphism, Categorization of			
Block IV	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 Unit 2: Exception handling.	Handling Streams and files				

- 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 a	nd Web Design			
Credit:4	CIA:25 ESE:75	Max. Marks:100			
This cour provide a Mastery in architectu careers in	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, Unit 2: Anatomy of Internet, ARPANET and Internet history Internet Terminology, Net etiquette Unit 3: Internet Applications – Commerce on the Internet, Go Internet on Society – Crime on/through the Internet.	Owners of the Internet of the World Wide Web, basic vernance on the Internet, Impact of			
Block II	Unit 1: Internet Connectivity & Network: Connectivity types three connectivity, modem, dedicated connections through the Unit 2: ISDN, Protocol options – Shell, SLIP, PPP, Service op Firewall etc. Network definition Unit 3: Common terminologies: LAN, WAN, Node, Host, Wo Unit 4: Interoperability, Network administrator, network secu	: level one, level two and level e telephone system ptions – E-mail, WWW, News orkstation, bandwidth rity.			
Block III	ock 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, Ja Structure of Java Program; Compiling and Interpreting Applic Unit 2: Java Tokens; Java Character set; Keywords and Ident Declarations, Non-Primitive data types; Operators and Express Unit 3: Implicit and Explicit Type Conversions: The Cast Op – if statement and Switch-case; Loops: While, Do While and Oriented Concepts: Abstraction and Encapsulation, Data Hi Object; Access Controls; Unit4: Implementation of Inheritance and Polymorphism Modifiers; Constructors and its types.HTML Programming HTML Text, HTML links, HTML document tables, HTML Fi	va History; Java Features; cations ifiers, Primitive Data types ssions; erator; Control Statements: If- else For; Object ding; Introduction to Classes and a; Methods in Java; Access Basics:HTML page structure, rames, HTML Images.			
Block V	HTML Text, HTML links, HTML document tables, HTML Frames, HTML Images. 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 Prowser, HTTP, Publishing Tools				

- 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)					
G 14 4	Core Courses	BCA 2003 Organizati	on Behavior			
Credit:4	CIA:25	ESE:75	Max. Marks:100			
This course a	aims to provide Organization	nal Behavior is essenti	al for BCA students as it offers			
insights into	sights into workplace dynamics, communication, and leadership within tech organizations.					
Understand	ng human behavior in profes	ssional settings fosters	effective teamwork, conflict			
resolution, an	nd decision-making skills, p	reparing students to th	rive in collaborative environments			
and assume I	eadership roles in the II inc	lustry.				
	Unit I: Fundamentals of Org	anizational Behavior : N	Nature, Scope, Definition,			
Block I	Fundamental Concepts of Or	ganizational Benavior;	a aspects of Organizational Rehavior			
	Unit 2: Meaning Cultural Di	versity	ig aspects of Organizational Denavior			
	Unit 1: Perception, Attitude,	Values and Motivation: (Concept, Nature, Process, Importance,			
	Management, Behavioral asp	ect of Perception				
	Unit2: Effects of employe	e attitudes: Job Satis	faction: Nature and Importance of			
Block II	Motivation; Achievement Mo	otive				
	Unit 3: Theories of Work M	Intivation: Maslow's N	eed Hierarchy Theory Mc Gregors's			
	Theory 'X' and Theory 'Y					
	Unit 1: Personality : Definiti	on of Personality. Deter	minants of Personality			
	Unit 2: Theories of Personality, Trait and Type Theories. The Dig Five Trait Theory, Myrros					
Block III	II Briggs Indicator					
	Unit 3 Locus of Control Tyr	e A and Type B Theory	of Personality			
	Unit 1: Work Stress : Meaning	ng and definition of Stre	ss. Symptoms of Stress:			
	Unit 2: Sources of Stress: In	dividual Level, Group L	evel. Organizational Level: Stressors			
	Unit 3: Extra Organizational	Stressors: Effect of Stre	es - Burnouts: Stress			
Block IV	Block IV Management – Individual Strategies					
	Unit 4: Organizational Strategies					
	Unit 1: Group Behavior and Leadership : Nature of Group, Types of Groups;					
Block V	Unit 2: Nature and Character	ristics of team;				
DIUCK V	Unit 3: Team Building, Effec	ctive Teamwork; Nature	of Leadership			
	Unit 4: Leadership Styles; Tr	raits of Effective Leader	s			

- 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)						
	Cor	e Course: BCA	-2004 Fin	ancial Accou	inting &Man	nagement
Credit:4		CIA:25		ESE:75		Max. Marks:100
This course	will introdu	ice Financial A	ccountin	g & Manag	ement is cru	icial for BCA students as it
imparts fun	damental kr	owledge of fir	nancial p	rinciples an	d manageme	ent techniques essential for
business op	erations. Un	derstanding fin	nancial st	atements, bi	udgeting, an	d cost management enables
students to r	nake inform	ed decisions, ar	nalyze bu	siness perfo	rmance, and	contribute effectively to the
financial asp	bects of tech	nology enterpri	ses.			
	Unit 1: Ove	rview - Meaning	and Natur	e of Financia	l Accounting	
Block I	Unit 2: So	cope of Financ	cial Acco	unting, Fina	incial Accou	inting &
	Managemen	t Accounting,		-		-
	Unit 3: Acco	ounting concepts	& conven	tion, Accoun	ting standards	s in India.
	U	f	Conital.	0 D	A	tion of
	Unit I: Basi	Accounting Dou	– Capital	& Revenue I	tems, Applica	ution of
	Unit 2: Introduction to Journal Ledger and Procedure for Recording and Posting					
Block II	Unit 3: Intro	duction to Trail	Balance, H	Preparation of	f Final Accou	nt, Profit &
	Loss Accour	it and related con	ncepts	1		
	Unit 4: Bala	nce Sheet and re	lated conc	ept. Ratio an	alysis.	
				CT' ' 1		
	Unit I: Defi Sources of F	nition nature and	tory idea	e of Financial	Managemen	t, Long Ierm
Block III	Unit 2: Con	cept of Cost of C	apital, int	roduction, im	portance, exp	licit & implicit cost.
DIUCK III	Unit 3: Mea	surement of cost	of capital	, cost of debt	,,,,,,,, .	
				JE		
	Unit 1: Con	cept & Compone	ents of wor	king Capital.	Factors Influ	lencing the
	Composition	of working Cap	ital		Time dite V	a Desfitabilitas en deservaria a
Block IV	capital polic	ies	g Capital I	vianagement	- Liquidity v	s. Prollability and working
Unit 3: Theory of working capital: Nature and concepts						
	Unit 1. Cont	Monogement				S I
Block V	Unit 1: Casi	ntory Management	ent and Re	ceivables Ma	nagement	

- 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	e will introduce Mathematics	s II is integral for BCA	students as it reinforces core		
mathematic	al concepts essential for com	puter science. Topics lik	ce calculus, linear algebra, and		
discrete ma	thematics form the backbone	of algorithm analysis, cry	ptography, and data structures.		
Proficiency	in Mathematics II equips	students with analytic	al skills crucial for software		
developme	nt and problem-solving in the	digital realm.			
	Unit 1: Sets, Subsets, Equal Set	s Universal Sets,			
Block I	Unit 2: Finite and Infinite Sets,	Operation on Sets, Union,	Intersection and		
	Complements of Sets, Cartesian	Product			
	Unit 3: Cardinality of Set, Simp	ole Applications.			
Block II	Unit 1: Properties of Relations,	Equivalence Relation, Part	ial Order Relation Function:		
	Unit 2: Domain and Range,				
	Unit 3: Onto, Into and One to C	One Functions,			
	Unit 4: Composite and Inverse	Functions.			
Block III	Unit 1: Partial Order Sets, Repr	esenta <mark>tion of POSETS usir</mark>	ng Hasse diagram,		
	Unit <mark>2: Chains, Max</mark> imal and M	linimal Point, Glb, lub, Lat	tices & Algebric		
	Systems, Principle of Duality,				
	Unit 3: Basic Properties, Sublat	tices, Distributed & Compl	lemented Lattics.		
	Unit 1: Partial Differentiation, (Chain Rule,			
Block IV	Unit 2: Extrema of Functions of	f 2 Variables, Euler's Theor	rem.		
Block V	Unit 1: Double Integral in Carte	esian and Polar Coordinates	s to find Area		
	Unit 2: Change of Order of Inte	gration			
	Unit 3: Triple Integral to Find V	Volume of Simple Shapes in	1 Cartesian Coordinates		

- 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 Progra	mming				
Credit:3	CIA:25 ESE:75	Max. Marks:100				
This course	This course will introduce Python programming offers simplicity, versatility, and power. With its					
clear syntax	x and extensive libraries, Python is utilized in web devel	lopment, data analysis, AI, and				
more. Its d	nore. Its dynamic typing and memory management streamline coding, while its popularity and					
community	/ support make it a valuable skill in diverse industries.	n and tools negvined for muning				
	Unit 2: Pagio Types Variable types and operators : Assigning values to variables Multiple					
	Assignments Stondard Data Types Sat Man Single line com	g values to variables Multiple				
	Assignments standard Data Types Set Map Single line com	hents using Multi- line				
Block I	Unit 2. Data Tyma Conversion Operators, Tymas of Operator	Conditional statement				
	Unit 4: Looping statements with else-Pass-Break continue	, Conditional statement				
	Unit 1: Number and List: Accessing values in List-Delete.	update List element-Basic List				
	operations Indexing	1				
DL L I	Unit 2: Slicing and Matrices Built in methods and Function	ns for List-Accessing values in				
BIOCK II	Tuple Delete.					
	Unit 3: List element-Basic Tuple operations Indexing,					
	Unit 4: Slicing and Matrices Built in methods and Functions	for Tuple.				
	Unit 1: Accessing values in Dictionary	6				
	Unit 2: y-Updating Dictionary-Deleting Dictionary –elemen	ts Properties of Dictionary keys-				
	Built in Dictionary					
Block III	Unit 3: y Functions and Methods Defining Function-Calling	g function- Pass by reference vs				
	value,					
	Unit 4: Function Arguments-Required arguments-Keyword	arguments-Default arguments-				
	Variable length arguments Recursion.					
	Unit 1: The Time Module and its functions					
	Unit 2: -Calendar modules and its functions Other modules	and Functions Sum and				
Block IV	Difference					
	Unit 3: I time and date Import From import statement From	import statement				
	Executing modules					
	Unit 4: , Local functions-Reload function Packages in Python.					
	Unit 1: Exception handling and assertions-Standard Exception	ons-Assertions in Python				
Disals V	Unit 2: -Handling an exception.					
DIOCK V	Unit 3: n-Except clause with no exception-Except Claus	e with multiple exception-lry-				
	Finally Clause					
	Unit 4: Argument of an Exception Raising an Exception					

- 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	3 CIA:25 ESE:75 Max. Marks:100					
This cour	se will introduce C and C++, d	ata structures play a crucial role i	n organizing and manipulating data			
efficiently	y. Arrays, linked lists, stacks, a	and queues are commonly impler	nented using pointers and memory			
managem	ent techniques. Understanding	g data structures in these langua	ges is fundamental for optimizing			
algorithm	is and solving complex problem	as in software development.				
	Unit 1: Representation of sing	le and multidimensional arrays				
Block I	Unit 2: Sparse arrays – lower	and upper triangular matrices				
	Unit 3: Tri-diagonal matrices	with Vector Representation also.				
	Unit 1: Introduction and prim	itive operations on stack				
	Unit 2: Stack application; Infi	x, postfix, prefix expressions.				
Block II	Unit 3: Evaluation of postfix expression; Conversion between prefix.					
	Unit 4: Infix and postfix, intro	duction and primitive operation of	n queues, D- queues and			
	priority queues.					
	Unit 1: Introduction to linked	lists				
Block III	Unit 2: Sequential and linked	lists,				
DIOCK III	Unit 3: operations such as trav	rersal, insertion, deletion searchin	g			
	Unit 4: two way lists and Use	of headers				
	Unit 1: Introduction and termi	nology;				
	Unit 2: Traversal of binary tre	es;				
Block IV	Unit 3: Recursive algorithms	for tree operations such as travers	al, Cal			
	Unit4: insertion, deletion; Bin	ary Search Tree.				
	Unit 1: Graph terminology, Ro	epresentation of graphs,				
	Unit 2: path matrix, BFS (brea	adth first search),				
Block V	Unit 3: DFS (depth first searc	h), topological sorting,				
	Unit 4: Warshall's algorithm (shortest path algorithm.)				

- 1. E. Horowiz and S. Sahani, "Fundamentals of Data structures", Galgotia Book source Pvt. Ltd., 2003
- R.S. Salaria, "Data Structures & Algorithms", Khanna Book Publishing Co. (P)Ltd..,2002
 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 Operatin management and impleme on experienc	Ig System course covers foundational concepts like pro- , file systems, and device management. It delves into OS de entation techniques. Topics may include concurrency, virtual we with OS internals and system programming is often a key	cess management, memory esign principles, algorithms, ization, and security. Hands- component of the syllabus.			
Block I	Block IUnit 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	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 Manageme Unit 2: Dedicated Devices, Shared Devices, Unit 3: Virtual Devices; Input or Output Devices, Unit 4: Storage Devices, Buffering	ent			
Block V	 Unit 1: Information Management: Introduction, A Simple File s Model of a File System Unit 2: Symbolic File System, Basic File System, Unit 3: Access Control Verification, Logical File System, Phys. File – System Interface; File Concept, Unit 4: Access Methods, Directory Structure, Protection 	system, General ical File system			

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

BCA Semester 3 : Paper IV (04 credits)					
	Core Course: BCA 3004	Digital Electronics & Com	puter Organization		
Credit:4	CIA:25	ESE:75	Max. Marks:100		
A Digital Ele	A Digital Electronics & Computer Organization course explores the basics of digital systems, logic				
gates, and B	CDL angenization A growth	les such as combinational	and sequential circuits, memory		
systems, and	thmetic are also typically in	ory ranguage programming	force theoretical concents		
	Unit 1. Number System & F	Roolean Algebra Number Sys	stem: 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,				
Block I	Product, Product of Sum. Unit 4: Minimization of Boo OR, NOT, NAND, NOR, XO Unit 5: Implementations of I Multilevel gate Implementat	blean Expressions using K-M DR, XNOR; Logic Functions using Gates; ions.	Iap; Logic Gates: AND, NAND- NOR Implementations;		
Block II	Unit 1: Combinational Circuits Adders & Subtractors: Half Adder, Full Adder, Binary Adder, Half Subtractor, Full Subtractor, Adder Subtractor; Unit 2: 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 &				
Block III	Generator; Code Converter. 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; Des	sign of Sequential Circuits.			
Block IV	Block IV Unit 1: Registers; Bidirectional Shift 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 an Unit 2: Building large memory Unit 3: Cache memory organ	nd dynamic RAM; ories using chips; Associativ nization and Virtual memory	e memory; organization.		

- 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)				
Credit•4	Core Course: BCA 3005 Elements of Statistics				
The Elemen	ts of Statistics course introduces fundamental statistical concepts and methods. Topics				
include desc	criptive statistics, probability theory, hypothesis testing, and inferential statistics. Students				
learn techni	ques for data analysis, sampling methods, and estimation. Practical applications and				
interpretatio	nterpretation of statistical results are emphasized, often utilizing software like R or Python.				
	Unit 1: Population, Sample and Data Condensation Definition and scope of statistics				
	Unit 2: concept of population and simple with Illustration,				
Block I	Unit 3: Raw data, attributes and variables, classification,				
	Unit 4: frequency distribution, Cumulative frequency distribution.				
	Unit 1: Measures of Central Tendency Concept of central Tendency				
	Unit2: requirements of a good measures of central tendency:				
Block II	Unit 3: Arithmetic mean, Median, Mode, Harmonic Mean, Geometric mean for grouped				
	and ungrouped data.				
	Unit 1:Measures of Dispersion: Concept of dispersion,				
	Unit 2: Absolute and relative measure of dispersion, range variance,				
Block III	Unit 3: Standard deviation, Coefficient of variation.				
	Unit 1: Permutations and Combinations Permutations of 'n' dissimilar objects taken 'r' at				
	a time (with or without repetitions)				
Block IV	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.				
	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				
Block V	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.				
	Unit 1: Statistical Quality Control Introduction, control limits,				
	Unit 2: specification limits, tolerance limits, process and product control;				
Block VI	Unit 3: Control charts for number of defective in n charts control charts for number of				
	defects {c - chart}				
Suggest	ted 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 and Sons

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					
CIA:25	ESE:75	Max. Marks:100			
will introduce Computer gr	aphics and animation	encompass the creation, manipulation,			
ng of visual content using co	mputer technology. It	involves techniques such as modeling,			
ighting, and rendering to pro	oduce images or seque	ences of images that simulate motion.			
are utilized across various i	ndustries, including er	ntertainment, gaming, advertising, and			
Unit 1: Introduction: Interactiv	e Computer Graphics, A	dvantages of Interactive Graphics			
Unit 2: Representative Uses of	Computer Graphics				
Unit 3: Conceptual Framework	for Interactive Graphics	5			
Unit 4: Classification of Appl	ication Development of	Hardware and software for computer			
Graphics.					
Unit 1: Scan Conversion: Sca	n Converting Lines Sca	n Converting Circles Scan Converting			
Ellipses	n Converting Lines, Sea	in Converting Cricles, Sean Converting			
Unit 2: Clipping: point clipping	g. Cohen-Sutherland line	clipping Algorithm.			
Unit 3: Midpoint Subdivision A	Algorithm,				
Unit 4: polygon clipping (Suth	erland-Hodgeman)	22			
Unit 1:Geometrical Transfor	mation: 2D Transform	nation (translation, rotation, scaling,			
reflection and shearing)		S			
Unit 2: Homogeneous Coordin	ates and Matrix Represe	ntation of 2D Transformations			
Unit 3: Successive and compose	site 2D Transformations,	the Window-to-Viewport			
Iransformations		4			
Unit 4: Introduction to 3D Irat	hstormations Matrix.				
Unit 1: Introduction to Curves a	x Surfaces				
Unit 3: Quadratic and super ou	adrics surfaces				
Unit 4: Spline curve and representation					
Unit 1: Computer Animation:	ntroduction Application	of animation			
Unit?: Morphing Keyframe sy	stem Motion specificati	ons in Animation			
Unit 3: Types of animation	steni, nietich specificat				
Unit 4: Sequencing of Animati	on Design and Fundame	ntal principles of animation.			
	BCA Seme Course core - BCA- CIA:25 e will introduce Computer gr ng of visual content using co- ighting, and rendering to pro- are utilized across various i Unit 1: Introduction: Interactive Unit 2: Representative Uses of Unit 3: Conceptual Framework Unit 4: Classification of Appl Graphics. Unit 1: Scan Conversion: Scar Ellipses. Unit 2: Clipping: point clipping Unit 3: Midpoint Subdivision A Unit 4: polygon clipping (Suth Unit 1:Geometrical Transfor reflection and shearing) Unit 2: Homogeneous Coordin Unit 3: Successive and compos Transformations Unit 4: Introduction to 3D Tran Unit 1:Introduction to 3D Tran Unit 4: Introduction to 3D Tran Unit 1:Introduction to Curves a Unit 2: Polygon Surfaces and p Unit 3: Quadratic and super qu Unit 4: Spline curve and repres Unit 1: Computer Animation: i Unit2: Morphing, Keyframe sy Unit 3: Types of animation Unit 4: Sequencing of Animation	BCA Semester 4: Paper -1 ((Course core - BCA- 4001 Computer GraphCIA:25ESE:75ewill introduce Computer graphics and animation on g of visual content using computer technology. It ighting, and rendering to produce images or seque are utilized across various industries, including end unit 1: Introduction: Interactive Computer Graphics Unit 2: Representative Uses of Computer Graphics Unit 3: Conceptual Framework for Interactive Graphics Unit 4: Classification of Application Development of Graphics.Unit 1: Scan Conversion: Scan Converting Lines, Scan Ellipses.Unit 2: Clipping: point clipping, Cohen-Sutherland lines Unit 3: Midpoint Subdivision Algorithm, Unit 4: polygon clipping (Sutherland-Hodgeman)Unit 1:Geometrical Transformation: 2D Transform reflection and shearing)Unit 2: Homogeneous Coordinates and Matrix Represe Unit 3: Successive and composite 2D Transformations, TransformationsUnit 4: Introduction to 3D Transformations Matrix.Unit 1:Introduction to 3D Transformations Matrix.Unit 2: Polygon Surfaces and polygon meshes, Unit 3: Quadratic and super quadrics surfaces, Unit 4: Spline curve and representation.Unit 1: Computer Animation: introduction, Application Unit2: Morphing, Keyframe system, Motion specificati Unit 3: Types of animation			

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	3 CIA:25 ESE:75 Max. Marks:100						
This cou efficientl querying concurrent in diverse	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: Introduc Unit 2: data moo Unit 3: DBMS a	tion: Characteristi lels, urchitecture and da	ics of database approac ata independence.	ch,			
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 No Unit 2: Normal Unit 3: Data bas	rmalization: Func form up to 5th nor e design using EF	tional Dependencies rmal form ER to relational languag	ge.			
Unit 1: Relational Data Model: Relational model concepts Unit 2: relational constraints, Block IV Unit 3: relational algebra Unit 4: SQL queries, programming using SQL.							
Block V	Unit 1: Concurr Unit 2: locking 1 Unit 3: database Unit 4: Recover	ency Control: Trat techniques and as recovery, security y Techniques, Dat	nsaction processing sociated y and authorization. tabase Security				

- 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 Cour	se: BCA 4003 Software E	ngineering		
Credit:4	CIA:25	ESE:75	Max. Marks:100		
This course	will provide Software	engineering involves a	pplying systematic, disciplined, an		
quantifiable	approaches to the develo	opment, operation, and	maintenance of software systems.		
encompasses	s various methodologies,	tools, and practices to en	nsure software quality, reliability, an		
efficiency. S	oftware engineers analyze	requirements, design sol	utions, code, test, deploy, and maintai		
software to r	neet user needs effectively	7.			
	Unit 1: Software Engineerin	ig: Definition and paradigm	IS		
Block I	Unit 2: A generic view of sc	itware engineering.			
	Unit I: Requirements Analy	sis: Statement of system sc	ope		
	Unit 2: isolation of top level	processes and entitles and	their allocation to physical elements		
Block II	Unit 5: refinement and revie	zw.			
	Unit 1:Designing Software	Solutions: Refining the soft	ware Specification;		
	Unit 2: Application of funda	imental design concept for	data		
Block III	Unit 3: architectural and p	rocedural designs using so	offware blue print methodology and		
	Unit 4: Creating design door	Igili			
	Unit 4. Creating design doct	union: Pelotionshin betwee	n design and implementation		
	Unit 2: Implementation issu	es and programming suppo	rt environment		
Block IV	Unit 3: Coding the procedur	al design. Good coding sty	le.		
DIOCK IV	Unit 1: Software Maintena	nce: Maintenance as part	of software evaluation reasons for		
	maintenance	nee. Maintenance as part	of software evaluation, reasons for		
Block V	Unit 2: types of maintenance	e (Perceptive, adoptive, cor	rective)		
Unit 3: designing for maintainability, techniques for maintenance.					
	Unit 1: Comprehensive example a second s	nples using available softw	are platforms/case tools,		
Block VI	Unit 2: , Configuration Man	agement.			

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	edit:4 CIA:25 ESE:75 Max. Marks:10				
This course	will provide Operational Tech	hnology (OT) refers to	o hardware and software systems		
used to cor	trol industrial processes, such	as manufacturing, tra	insportation, and utilities. Unlike		
IT, OT focu	uses on real-time operations an	nd often involves spec	eialized protocols and equipment.		
It ensures t	ne reliable and efficient operati	on of critical infrastru	cture, including SCADA systems		
and industr	ial control systems.				
	Unit 1:Linear programming Cent	tral Problem of linear Pr	rogramming various		
	definitions included Statements of	of basic theorem and als	o their properties		
Block I	Unit 2: simplex methods, primal	and dual simplex method	od, transport problem		
	Unit 3: Assignment problem and	l its solution.			
	Unit 4: Graphical Method Formulation, Linear Programming Problem.				
	Unit 1: Game theory Introduction	n, Two-person zero-sum	n game, pure strategies		
	(Min-max and Max-min principle	es), Mixed strategies	with a difference of the second second second		
BIOCK II	unit 2: The rules principles of	Dominance, Algebraic	method to solve games without		
	Saddle point,	u du como			
Unit 3: Graphical method to solve the games.					
	Unit 1: Replacement Theory: Re	placement of item that of	deteriorates replacement of items		
Block III	that fail				
	Unit 2: Group replacement and in	ndividual replacement.			
	Unit 1: PERT and CPM: Project	t management origin an	d use of PERT, origin and use of		
	CPM				
Block IV 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 2: solution of sequencing pr	roblem Johnson s algori	thm for n jobs through 2		
	machines				

- 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, problemsolving, and understanding of the natural world.

Unit 1: Complex Number System, Algebra of Complex Numbers			
DIUCK I	Unit 3: Functions of Complex Variables, Elementary Functions.		
	Unit 1: Vector Calculus: Differentiation of Vectors, Scalar and Vector Fields		
Block II	Unit 2: Gradient, Directional Derivatives, Divergence and Curl and their Physical Meaning.		
	Unit 1: Fourier Series: Periodic Functions, Fourier series		
Block III	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 Eactor 		
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 Ma	nagement			
Credit:4	Credit:4 CIA:25 ESE:75 Max. Marks:100					
This course	will introduce Knowledge N	Aanagement is indispensal	ble for BCA students as it teaches			
efficient ha	ndling of information within	organizations. Understand	ling knowledge creation, storage,			
retrieval, ar	d dissemination optimizes w	vorkflow and decision-mak	ting in tech environments.			
Proficiency	in Knowledge Management	equips students to harness	data effectively, fostering			
innovation	and competitiveness in the ev	ver-evolving digital landsc	cape.			
	Unit 1: Business Intelligence a	nd Business Decisions: Mod	eling Decision Process			
Block I	Unit 2: Decision support system	ms;				
DIOCK I	Unit 3: Group decision support	t and Groupware Technologi	es.			
	Unit 1: Executive Information	and support Systems: Busine	ess Expert System and AI,			
Block II	OLTO & OLAP					
	Unit 2: Tools for data warehousing.					
	Unit 1: Multi- Dimensional analysis: Data mining and knowledge discovery					
Block III	Unit 2: Data mining and Techn	iques 978				
Unit 3: Data mining of Advance Databases.						
	Unit 1: Knowledge Manageme	nt Systems: Concept and Str	ucture KM systems			
Block IV	Unit 2: Techniques of knowled	lge management appreciation	1 & limitation.			
Block IIUnit 1: Executive Information and support Systems: Business Expert System and AI, OLTO & OLAP Unit 2: Tools for data warehousing.Block IIIUnit 1: Multi- Dimensional analysis: Data mining and knowledge discovery Unit 2: Data mining and Techniques Unit 3: Data mining of Advance Databases.Block IVUnit 1: Knowledge Management Systems: Concept and Structure KM systems Unit 2: Techniques of knowledge management appreciation & limitation.						

- 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 cour	se aims to provide Java Program	mming and Dynamic W	Vebpage Design are essential for BCA			
students a	s they provide hands-on exper	ience in developing rob	oust and interactive web applications			
Mastery i	n Java enables students to bu	ild scalable backend s	systems, while expertise in dynamic			
webpage	design equips them to create e	engaging user interface	s. These skills are vital for pursuing			
careers in	web development and softwar	e engineering.				
	Unit 1: Java Programming: Data	types, control structured				
	Unit 2: Arrays, strings					
Block I	Unit 3: Vector, classes (inheritan	ce, package, exception ha	ndling)			
	Unit 4: Multithreaded programm	ing.				
	Unit 1: Java applets, AWT controls (Button, Labels, Combo box, list and other Listeners, menu					
Block II	bar) layout manager					
	Unit 2: string handling (only main functions)					
	Unit 1: JDBC: JDBC Fundamer	itals, Establishing Conne	ctivity and Working with Connection			
Block III	Interface					
DIUCK III	Unit 2: Working with Statements	, Creating and Executing	SQL Statements			
	Unit 3: Working with ResultSet (Objects.				
	Unit 1: Java Servlets: Introduction	on, HTTP Servlet Basics	5			
Block IV	Unit 2: The Servlet Lifecycle, Re	etrieving Information, Sen	nding HTML Information			
	Unit 3: Session Tracking					
	Unit 1: Java Server Pages: Introc	lucing Java Server Pages,	, JSP Overview			
	Unit 2: Setting Up the JSP Envir	onment,				
Block V	Unit 3: Generating Dynamic Co	ontent, Using Custom Tag	g Libraries and the JSP Standard Tag			
DIUCK	Library					
	Unit 4: Processing Input and Out	put.				
l						

- 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 Netwo	ork				
Credit:4	CIA:25 ESE:75	Max. Marks:100				
This course a	aims to provide Java Computer Network is crucial for BC	A students as it combines Java				
programmin	g with network fundamentals. Understanding socket pro	gramming, network protocols,				
and distribut	ed systems empowers students to develop networked appli	cations. Mastery in this subject				
enables stud	ents to create efficient, scalable, and secure network solu	tions, preparing them for roles				
ın network a	dministration and software development.					
	Unit 1: Basic Concepts: Components of data communication	, distributed processing				
	Unit 2: standards and organizations. Line configuration, topo	ology				
	Unit 3: Transmission mode, and categories of networks.					
Disals I	Unit 4: OSI and TCP/IP Models: Layers and their functions,	comparison of models				
DIUCK I	Unit 5: Digital Transmission: Interfaces and Modems: DTE-	DCE Interface, Modems,				
	Cable modems.	ion distantion				
	Unit 1: Transmission Media: Guided and unguided, Attenuat	ength				
Block II	Unit 3: Shannon capacity, comparison of media.	engui				
DIOCK II	Unit 1: Telephony: Multiplexing error detection and correct	ion: Many to one. One to				
	many					
	Unit 2: WDM, TDM, FDM, Circuit switching, packet switch	ning and message switching.				
	Unit 3: Data link control protocols: Line discipline, flo	w control, error control,				
	synchronous and asynchronous protocols, character and bit oriented protocols, Link					
Block III	access procedures.					
DIOCK III	Unit 4: Point to point controls: Transmission states, PPP la NCP.	yers, LCP, Authentication,				
	Unit 5: ISDN: Services, Historical outline, subscriber's access, ISDN Layers and broadcast ISDN.					
	Unit 1: Devices: Repeaters, bridges, gateways, routers, The l	Network Layer;				
Block IV	Unit 2: Design issues, Internetworking, Network-Layer in th	e internet.				
DI	Unit 1: Transport and upper layers in OSI Model: Transport	layer functions, connection				
Block V	management,					
	Unit 2: functions of session layers, presentation layer and ap	plication layer;				
-	MAHAKAJ V					

- 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 introdu	ice Numerical Method	s is essential fo	or BCA stu	idents as it equips them with
techniques	to solve co	mplex mathematical	problems using	g computer	rs. Understanding numerical
analysis alg	orithms like	e interpolation, integr	ation, and diff	erential ec	quations enables students to
develop effi	cient compu	utational solutions. Ma	astery in this su	ubject enha	nces problem-solving skills,
crucial for v	arious appli	cations in software dev	elopment and o	lata analysi	is.
Dlook I	Unit 1: Root	ts of Equations: Bisectio	ns Method, False	e Position M	ethod
DIUCK I	Unit 2: New	ton's Raphson Method,	Rate of converge	ence of New	ton's method
	Unit 1: Inter	polation and Extrapolati	on : Finite Differ	rences, The	operator E,
Block II	Newton's Forward and Backward Differences				
DIOCK II	Unit 2: New	ton's dividend differenc	es formulae,		
	Unit 3: Lagr	ange's Interpolation for	nula for unequal	Intervals.	
	Unit 1: Num	nerical Differentiation N	umerical Integrat	ion : Introdu	uction, direct
Block III	methods, maxima and minima of a tabulated function				
Unit 2:, General Quadratic formula					
	Unit 1: Sol	ution of Linear Equation	on: Gauss's Elin	nination me	thod and Gauss's Siedel
Block IV iterative method					
	Unit 1: Solu	tion of Differential Fau	ations: Euler's m	ethod Pica	rd's method Fourth-order
Block V	Ranga – Kut	ta method.		iethou, i leal	a s method, i ourth order
Diver					

- 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 Ir	formation & Cyber Security	in BCA equips students	s with skills to mitigate digital risks,			
protect data	integrity, ensure confidenti	ality, maintain availabili	ty, comply with legal requirements,			
implement	best practices, understand er	nerging technologies, ex	xplore career opportunities, navigate			
ethical cons	iderations, and contribute to	societal security in an ir	creasingly interconnected world.			
	Unit 1: Concept of Cyberspace	: Netizens Technology, Lav	w and Society Object, Scope of the			
	Information Technology Act, 20	000, Electronic Records an	d Electronic Commerce.			
Block I	Unit 2: Intrusion Detection Sys	stem, Intrusion Prevention	System, Public Key Infrastructure.			
	Unit 1 Internet Security: Con	mputer Security and Thr	eats, Hacking, Cracking, sneaking,			
Block II	Viruses, Irojan Horses, malicio	former Most Common Attac	Bombs.			
	Defense					
	Unit 1: Wireless Network Se	ourity: Wireless Network	Components Security issues in			
Block III	Wireless Networks Securing a	Wireless Network Mobile	Security The Smartphone Pentest			
DIOCK III	Framework	whereas recevers, moone	becanty, the smarphone fentest			
	Unit 1 Cyber Laws and Standar	ds: ISO 27001 Cyber Law	(Information Technology Act. 2000)			
Block IV	Unit 2: International Standards	maintained for Cyber Secu	rity. Security Audit. Investigation on			
DIOCKIV	by Investing Agency. Cyber Security Solutions.					
	Unit 1: Security Managemen	nt: Disaster Recovery, D	igital Signature, Ethical Hacking,			
Block V	Pen <mark>etration Test</mark> ing, Computer	Forensics.				
Block IV Block V	Unit 1 Cyber Laws and Standar Unit 2: International Standards by Investing Agency, Cyber Ser Unit 1: Security Managemen Penetration Testing, Computer	ds: ISO 27001, Cyber Law maintained for Cyber Secu curity Solutions. nt: Disaster Recovery, E Forensics.	(Information Technology Act, 2000 urity, Security Audit, Investigation of vigital Signature, Ethical Hacking			

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 Cours	se: BCA-6002 Internet Of	Things		
Credit:04	Credit:04 CIA:25 ESE:75 Max. Marks:100					
C program	nming is crucial	in BCA curricu	lum, teaching foundatio	nal coding principle	es. It enhances	
problem-s	olving skills, pro	epares for softw	ware development career	s, and lays a strong	programming	
foundation	n for advanced s	studies and real	-world applications.			
Block I	Unit 1: Internet o	of Things (IoT):	Vision, Definition, Concep	tual Framework, Arc	hitectural view	
DIOCK I	Unit 2: Technolo	gy behind IoT, S	Sources of the IoT, M2M C	ommunication, IoT E	Examples.	
	Unit 1: M2M vs	s IoT An Archite	ectural Overview:Building	architecture, Main d	lesign principles	
Block II	and needed capab	and needed capabilities,				
Dioth II	Unit 2: An IoT	Γ architecture o	outline, standards consider	rations. Reference A	architecture and	
	Reference Model	of IoT.				
	U nit 1 Hardware f	for IoT: Sensors,	Digital sensors, actuators,	radio frequency ident	ification (RFID)	
	technology					
Block III	Unit 2: Wireless	sensor networks	, participatory sensing tech	nology		
DIOURIN	Unit 3: Embedde	ed Platforms for	IoT: Embedded computing	g basics, Overview of	f IOT supported	
	Hardware platforms.					
	Unit 1 Network	& Communicati	on aspects in IoT: Wireless	Medium access issue	es	
Block IV Unit 2: MAC protocol survey, Survey routing protocols, Sensor deployment & Node					Node	
	discovery			5		
Block V	Unit 1: Domain s	specific application	ions of IoT: Home automat	ion		
DIUCK V	Unit 2: Industry a	applications, Sur	rveillance applications, Oth	er IoT application.		

- 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)							
Credit:04	Credit:04 CIA:25 ESE:75 Max. Marks:100						
Principles o leadership, d in IT industr	f Management in BCA curriculu ecision-making, and organization ies and entrepreneurship endeavor	m develop essential man al behavior, preparing stuc rs.	agerial skills, including lents for leadership roles				
Block I	Unit 1: Introduction to E-Commerce Unit 2:Definition of Electronic Con Unit 3: E-commerce and the Trade Interchange Unit 4: Internet Commerce, E-Com Unit 1: Business-to-Business Elect	e: The Scope of Electronic mmerce, Electronic Cycle, Electronic Markets e mmerce in Perspective. ronic Commerce: Character	Commerce electronic Data stics of B2B EC, Models				
Block II	of B2B Ec Unit 2:Procurement Management U Deliver Unit 3: Other B2B Models, Auction EDI. Integration with Back-end Inf	Using the Buyer's Internal M ons and Services from Trad ormation System.	Marketplace, Just in Time				
	Unit 4: The Role of Software Agent of B2B EC, Managerial Issues	s for B2B EC, Electronic ma	rketing in B2B, Solutions				
Block III	Unit 1: Internet and Extranet : Auto Extranet, Architecture of the Internet Unit 2, Applications of Intranets, Ir Intranet Deployment Unit 3: The Extranets, The stru- services, Applications of Extra Applications, Managerial Issues. Unit 4: Electronic Payment Systems Security Schemes in Electronic pay Internet, Electronic Fund transfer a and E- Cash, Electronic Check S Managerial Issues.	ctures of Extranets, Extran nets, Business Models of s : Is SET a failure, Electroni orment systems, Electronic C nd Debit cards on the Intern ystems, Prospect of Electron	The Largest ranet software, dies, Considerations in net products of Extranet c Payments & Protocols, redit card system on the et, Stored – value Cards onic Payment Systems,				
Block IV	Unit 1: Public Policy: From Legal Incidents, Legal Incidents, Ethical of Unit 2: Protecting Intellectual P Censorship, Taxation & Encrypti Gambling & More Consumer & Se	Issues to Privacy : EC- Rela & Other Public Policy Issues roperty, Free speech, Inte ion Policies, Other Legal	ted Legal s, Protecting Privacy, ernet Indecency & Issues: Contracts,				
Block V	Unit 1: Infrastructure For EC : It ta Internet Protocols. Unit 2: WebBased client/ Server, Ir Web, Multimedia delivery, Analyzin	kes more than Technology, Anternet Security, selling on the ng Web Visits, Managerial Is	A Network Of Networks, ne web, Chatting on the ssues.				

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 cur	riculum fosters effectiv	e communication skills vital	for
professiona	l success. It prepares students	for collaboration, client in	nteractions, and presenting techr	nical
information	clearly, enhancing employabi	lity in diverse IT roles.		
	Unit 1: Introduction to Data Sc	cience: Evolution of Data So	cience, Data Science Roles,	
Block I	Stages in a Data Science Projec	t		
	Unit 2: Applications of Data Sc	ience in various fields, Data	a Security Issues.	
Unit 1: Data Collection and Data Pre-Processing: Data Collection Strategies, Data				
Block II	Block II Pre-Processing Overview			
	Unit 2: Data Cleaning, Data In	tegration and Transformation	on, Data Reduction.	
	Unit 1: Exploratory Data Analy	tics: Descriptive Statistics -	Mean Standard Deviation,	
Block III	Unit 2: Skewness and Kurtosis	– Box Plots – Pivot Table –	Correlation Statistics –	
	ANOVA.			
	Unit 1: Introduction: Idea of M	achines learning from data		
Block IV	Unit 2: Classification of pr	oblem – Regression and	Classification, Supervised and	
	Unsupervised learning.			
	Unit 1: Neural Networks: H	istory, Artificial and biolo	gical neural networks, Artificial	
	intelligence and neural network	S		
Block V	Unit 2: Biological neurons, Mo	dels of single neurons, Diff	erent neural network models.	

- 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
- Mathematical 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, Geography), B.Sc. (Physics, Mathematics, Computer Applications), B.Sc. (Physics, Mathematics, Geography), B.Sc. (Physics, Mathematics, Computer Applications), B.Sc. (Physics, Mathematics, Geography), 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, B. Tech. in Chemical Engineering, B. Tech. in Mechanical Engineering, B. Tech. in Mechanical Engineering, B. Tech. in Chemical Engineering, B. Tech. in Chemical Engineering, B. Tech. in Chemical Engineering, B. Tech. in Mechanical Engineering, B. Tech. in Chemical Engineering, B. Tech. in Chemical Engineering, B. Tech. in Mechanical Engineering, B. Tech. in Chemical Engineering, B. Tech. in Mechanical Engineering, B. Tech. in Chemical Engineering, Diploma in Chemical Engineering, Diploma in Electrical Engineering, Diploma in Mechanical Engineering, Diploma in Mechanical Engineering, Diploma in Mechanical Engineering, Diploma in Mechanical Engineering, 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)

































