



BHARATI VIDYAPEETH

(Deemed to be University), Pune

'A++' Accreditation (Third Cycle) by 'NAAC' in 2024

Category-I Deemed to be University Graded by UGC

'A' Grade University Status by MHRD Govt. of India.

FACULTY OF MANAGEMENT STUDIES

BACHELOR OF COMPUTER APPLICATION

(THREE YEARS) / HONORS (FOUR YEARS) FRAMED AS

PER NATIONAL EDUCATION POLICY (NEP 2020)

SYLLABUS

Applicable with effect from Academic Year 2026-27

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Bharati Vidyapeeth (Deemed to be University), Pune

Faculty of Management Studies

Bachelor of Computer Application (Three Years)

/ Bachelor of Computer Application (Honors) Four Years

(effective from Academic Year 2026-2027)

I. Preamble

The Bachelor of Computer Application (Honors) Programme is a full time three / four year programme offered by Bharati Vidyapeeth (Deemed to be University), Pune and conducted in Regular mode at its management institutes located in New Delhi, Pune, Navi Mumbai, Kolhapur, Sangli, Karad and Solapur. All the seven institutes have excellent faculty members, computer laboratories, Libraries, and other facilities to provide proper learning environment to the students. The University is accredited by NAAC with 'A++' grade. While designing the BCA Programme, the expectations and requirements of the Software Industry, immediately and in the near future are considered and the requirements for higher studies and immediate employment are visualized. This effort is reflected in the Vision and Mission statements of the BCA programme, the statements also embody the spirit of the vision of Dr. Patangraoji Kadam, the Founder of Bharati Vidyapeeth —“Social Transformation Through Dynamic Education”

II. Vision

Preparing the Students to cope with the rigor of Post Graduate Programmes in global and creating high caliber solution architects for software development, who will also be sensitive to societal concerns.

III. Mission

- We aim to drive transformation, technology and innovation through problem solving approach and research development.
- We aim to provide students with the IT tools to become productive and lifelong learner.

IV. Aims

- To impart quality computer education to enhance logical computing and programming skills.
- To implement innovative techniques and process in leading-learning and evaluation.
- To further creativity and pursuit of excellence in computer applications.

V. Learning Outcome Based Curriculum Framework –

1. Programme Education Objectives

The **Programme Educational Objectives (PEOs)** describe the expected professional achievements of graduates within three to five years of completing the BCA programme. These objectives reflect the programme's vision and mission and define the knowledge, skills, professional growth, and values that graduates are expected to demonstrate in their careers, higher education, entrepreneurship, and lifelong learning.

PEO1: Professional Competence

Apply knowledge of computer science and modern computing technologies to build effective software solutions and succeed in professional careers or higher education.

PEO2: Problem Solving and Innovation

Analyze real-world problems, develop innovative solutions, and adapt to new technologies through continuous learning.

PEO3: Professional Growth

Work effectively as individuals and team members, demonstrate leadership, communicate clearly, and contribute positively in multidisciplinary and multicultural environments.

PEO4: Ethics and Social Responsibility

Practice professional ethics, social responsibility, and environmental awareness while contributing to the sustainable development of society.

PEO5: Entrepreneurship and Lifelong Learning

Pursue entrepreneurship, research, professional certifications, or higher studies, and continuously upgrade knowledge and skills to meet changing industry needs.

2. Program Outcomes (POs)

Programme Outcomes (POs) describe the knowledge, skills, and professional competencies that students are expected to achieve by the time they graduate. Upon successful completion of the BCA programme, graduates will be able to demonstrate the following outcomes:

PO1: Computing Knowledge

Apply knowledge of computer science, mathematics, and modern computing technologies to solve computing problems.

PO2: Problem Analysis

Identify, analyze, and solve computing problems using logical thinking, appropriate methods, and modern tools.

PO3: Software Development

Design, develop, test, and maintain software applications that meet user requirements using suitable programming languages, tools, and technologies.

PO4: Modern Tool Usage

Select and use appropriate software, platforms, frameworks, and emerging technologies to develop effective computing solutions.

PO5: Professional Skills

Communicate effectively, work individually and in teams, and demonstrate leadership and project management skills in professional environments.

PO6: Ethics and Social Responsibility

Apply professional ethics, legal principles, environmental awareness, and social responsibility in computing practices.

PO7: Lifelong Learning

Recognize the need for continuous learning and adapt to changing technologies, industry practices, and professional requirements.

PO8: Innovation and Entrepreneurship

Apply creativity, innovation, and entrepreneurial thinking to develop technology-based solutions and create value for society and industry.

3. Programme Specific Outcomes (PSOs) :

Programme Specific Outcomes (PSOs) define the discipline-specific knowledge, technical skills, and professional competencies that students are expected to acquire by the time they graduate. These outcomes reflect the unique strengths of the BCA programme and complement the broader Programme Outcomes by focusing on software development, emerging technologies, and professional practice.

PSO1: Software Development

To develop the ability to design, develop, test, and maintain software applications using appropriate programming languages, databases, software engineering principles, and modern development tools.

PSO2: Emerging Computing Technologies

To develop the ability to apply Artificial Intelligence, Machine Learning, Cloud Computing, Cyber Security, Business Intelligence, and other emerging technologies to solve practical computing problems.

PSO3: Professional Practice

To develop professional skills in the use of computing tools, project management, communication, teamwork, and entrepreneurship for successful careers, higher education, and professional growth

4. Graduate Attributes:

The **Graduate Attributes (GAs)** describe the knowledge, skills, values, and professional qualities that every BCA graduate is expected to possess upon successful completion of the programme. These attributes reflect the programme's commitment to Outcome-Based Education (OBE), the principles of NEP 2020, and the evolving needs of the computing profession. They provide the foundation for the Programme Outcomes (POs) and guide the overall design and delivery of the curriculum.

GA1: Computing Knowledge

Apply knowledge of computer science, mathematics, and modern computing technologies to solve real-world problems.

GA2: Problem Solving

Identify, analyze, and develop effective solutions for computing and business problems using appropriate methods and tools.

GA3: Technical Skills

Design, develop, test, and maintain software applications using modern programming languages, tools, and technologies.

GA4: Innovation and Lifelong Learning

Learn new technologies, think creatively, and continuously upgrade knowledge and skills to meet changing industry needs.

GA5: Communication and Teamwork

Communicate effectively and work productively as an individual and as a member of multidisciplinary teams.

GA6: Professional Ethics and Responsibility

Demonstrate ethical behaviour, professional responsibility, and respect for legal, social, and environmental values.

GA7: Entrepreneurship and Leadership

Show initiative, leadership, and entrepreneurial thinking to create innovative solutions and contribute to organizational growth.

GA8: Social and Global Responsibility

Use computing knowledge responsibly to improve society while considering sustainability, diversity, and global perspectives.

5. Eligibility Criteria

- A candidate applying for BCA(Honors) Four years programme should have passed higher secondary (10 + 2) or equivalent examination (10+3) of any recognized Board.
- Every eligible student/learner have to pass a common All India Entrance test (BU-MAT) conducted by Bharati Vidyapeeth (Deemed to be University), Pune. The final admission is based solely on the merit at the BU-MAT test.

Higher education qualifications at different levels on the NHEQF

NHEQF Level	Examples of higher education qualifications located within each level
Level 4.5	Undergraduate Certificate. Programme duration: First year (first two semesters) of the undergraduate programme, followed by an exit 4-credit skills-enhancement course(s).
Level 5	Undergraduate Diploma. Programme duration: First two years (first four Semesters) of the undergraduate programme, followed by an exit 4-credit skills enhancement course(s) lasting two months.
Level 5.5	Bachelor's Degree. Programme duration: First three years (Six semesters) of the four-year undergraduate programme.

**The equivalence will be given on the basis of above guidelines.

GENERAL COURSE STRUCTURE & THEME**A. Definition of Credit:**

1 Hr. Lecture (L) per week	1 Credit
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1 Hr. Tutorial (T) per week	1 Credit
1 Hr. Practical (P) per week	0.5 Credit
2 Hours Practical (P) per week	1 Credit

B. Course code and definition:

Course code	Definitions
L	Lecture
T	Tutorial
P	Practical
CC	Core Courses
AEC	Ability Enhancement Course
MDC	Multi-Disciplinary course
VAC	Value added Course
SEC	Skill Enhancement Course
DSE	Discipline Specific Elective
OE	Open Elective

Course Name:

Bachelor in Computer Application

OR

Bachelor in Computer Application (Honours)

OR

Bachelor in Computer Application (Honours with Research)

Course Level/Duration/System:

Undergraduate / Three or Four years/6 or 8 Semesters with multiple entry and exit.
The following option will be made available to the students joining BCA Program:

- a. **One year:** Under Graduate Certificate in Computer Application
- b. **Two years:** Under Graduate Diploma in Computer Application
- c. **Three years:** Bachelor in Computer Application (BCA)
- d. **Four years:** Bachelor in Computer Application with Honours: BCA (Honours)
or Bachelor in Computer Application Honours with Research: BCA (Honours with Research)

Minimum Eligibility Criteria

Minimum eligibility criteria for opting the course in the fourth year will be as follows:

1. **BCA (Honours with Research):** Minimum 75% marks or equivalent CGPA in BCA Degree up to Sixth Semester
2. **BCA (Honours):** BCA Degree

VI. Academic Bank of Credits (ABC)

As per the National Educational Policy (NEP) 2020, the Academic Bank of Credit offer the flexibility of curriculum framework and interdisciplinary /multidisciplinary academic mobility of students across Higher Educational Institutes (HEIs) with appropriate credit transfer mechanism. In furtherance to these guidelines the Faculty of Management Studies, Bharati Vidyapeeth (Deemed to be University) Pune has designed a four years undergraduate program offered at its constituent units.

As a pre-requisite a student should register in the Bharati Vidyapeeth (Deemed to be University) Academic Bank of Credit. The credits earned by the student/learner will be stored in it. A Student/learner would be required to complete the course as per the ABC (Academic Bank Credit) policy of UGC. The validity of the credits earned for a course is seven years only.

VII. Grading System

- **Grade Points** : The Faculty of Management Studies, Bharati Vidyapeeth (Deemed to be University) has suggested 10-point grading system for all programmes designed by its various Board of Studies. A grading system is a 10-point system if the maximum grade point is 10. The system is given in Table I below.

Table I: The 10-point Grading System

Range of Percent Marks	[80,100]	[70,79]	[60,69]	[55,59]	[50,54]	[40,49]	[00,39]
Grade Point	10.0	9.0	8.0	7.0	6.0	5.0	0.0
Grade	O	A+	A	B+	B	C	D

Formula to calculate GP is as under:

Set $x = \text{Max}/10$ where Max is the maximum marks assigned for the examination (i.e. 100)

Formula to calculate the individual evaluation

Range of Marks	Formula for the Grade Point
$8x \leq \text{Marks} \leq 10x$	10
$5.5x \leq \text{Marks} \leq 8x$	$\text{Truncate } (M/x) + 2$
$4x \leq \text{Marks} \leq 5.5x$	$\text{Truncate } (M/x) + 1$

➤ Scheme of Examination

Courses having Internal Assessment (IA) and University Examinations (UE) shall be evaluated by the respective constituent units and the University at the term end for 50 and 50 Marks respectively. The total marks of IA and UE shall be 100 Marks and it will be converted into grade points and grades.

For Internal Assessment (IA) the subject teacher may use the following assessment tools:

1. Attendance
2. Class Tests
3. Presentations
4. Class Assignments
5. Case studies
6. Practical Assignments
7. Mini Projects
8. Oral

VII. Standard of Passing:

- For all courses, both UE and IA constitute separate heads of passing (HoP). In order to pass in such courses and to earn the assigned credits, the student/learner must obtain a minimum grade point of 5.0 (40% marks) at UE and also a minimum grade point of 5.0 (40% marks) at IA.
- If Student fails in IA, the learner passes in the course provided, he/she obtains a minimum 25% marks in IA and GPA for the course is at least 6.0 (50% in aggregate). The GPA for a course will be calculated only if the learner passes at UE.
- A student who fails at UE in a course has to reappear only at UE as backlog candidate and clear the Head of Passing. Similarly, a student who fails in a course at IA he has to reappear only at IA as backlog candidate and clear the Head of Passing to secure the GPA required for passing.
- The 10-point Grades and Grade Points assign according to the following table
- The performance at UE and IA will be combined to obtain GPA (Grade Point Average) for the course. The weights for performance at UE and IA shall be 50% and 50% respectively.
- GPA is calculated by adding the UE marks out of 50 and IA marks out of 50. The total marks out of 100 are converted to grade point, which will be the GPA.

The 10 point Grades and Grade Points according to the following table

Range of Marks (%)	Grade	Grade Point
$80 \leq \text{Marks} \leq 100$	O	10
$70 \leq \text{Marks} < 80$	A+	9
$60 \leq \text{Marks} < 70$	A	8
$55 \leq \text{Marks} < 60$	B+	7
$50 \leq \text{Marks} < 55$	B	6
$40 \leq \text{Marks} < 50$	C	5
Marks < 40	D	0

The performance at UE and IA will be combined to obtain GPA (Grade Point Average) for the course.

The weights for performance at UE and IA shall be 50% and 50% respectively.

GPA is calculated by adding the UE marks out of 50 and IA marks out of 50. The total marks out of 100 are converted to grade point, which will be the GPA.

Formula to calculate Grade Points (GP)

Suppose that “Max” is the maximum marks assigned for an examination or evaluation, based on which GP will be computed. In order to determine the GP, Set $x = \text{Max}/10$ (since we have adopted 10 point system). Then GP is calculated by the following formulas

Range of Marks	Formula for the Grade Point
$8x \leq \text{Marks} \leq 10x$	10
$5.5x \leq \text{Marks} < 8x$	Truncate (M/x) +2
$4x \leq \text{Marks} < 5.5x$	Truncate (M/x) +1

Two kinds of performance indicators, namely the Semester Grade Point Average (SGPA) and the Cumulative Grade Point Average (CGPA) shall be computed at the end of each term. The SGPA measures the cumulative performance of a learner in all the courses in a particular semester, while the CGPA measures the cumulative performance in all the courses since his/her enrolment. The CGPA of learner when he /she completes the programme is the final result of the learner.

The SGPA is calculated by the formula

$$SGPA = \frac{\sum Ck * GPk}{\sum Ck}$$

where, Ck is the Credit value assigned to a course and GPk is the GPA obtained by the learner in the course. In the above, the sum is taken over all the courses that the learner has undertaken for the study during the Semester, including those in which he/she might have failed or those for which he/she remained absent. The SGPA shall be calculated up to two decimal place accuracy.

The CGPA is calculated by the following formula

$$CGPA = \frac{\sum C_k * GP_k}{\sum C_k}$$

where, Ck is the Credit value assigned to a course and GPk is the GPA obtained by the learner in the course. In the above, the sum is taken over all the courses that the learner has undertaken for the study from the time of his/her enrolment and also during the semester for which CGPA is calculated.

The CGPA shall be calculated up to two decimal place accuracy.

The formula to compute equivalent percentage marks for specified CGPA:

	10 * CGPA-10	If $5.00 \leq \text{CGPA} < 6.00$
	5 * CGPA+20	If $6.00 \leq \text{CGPA} < 8.00$
	10 * CGPA-20	If $8.00 \leq \text{CGPA} < 9.00$

% marks (CGPA)	20 * CGPA-110	If $9.00 \leq \text{CGPA} < 9.50$
	40 * CGPA-300	If $9.50 \leq \text{CGPA} \leq 10.00$

IX. Award of Grades

A student who has completed the minimum credits specified for the programme shall be declared to have passed in the programme. The final result will be in terms of letter grade only and is based on the CGPA of all courses studied and passed. The criteria for the award of honours are given below.

Range of CGPA	Final Grade	Performance Descriptor	Equivalent Range of Marks (%)
$9.5 \leq \text{CGPA} \leq 10$	O	Outstanding	$80 \leq \text{Marks} \leq 100$
$9.0 \leq \text{CGPA} \leq 9.49$	A+	Excellent	$70 \leq \text{Marks} < 80$
$8.0 \leq \text{CGPA} \leq 8.99$	A	Very Good	$60 \leq \text{Marks} < 70$
$7.0 \leq \text{CGPA} \leq 7.99$	B+	Good	$55 \leq \text{Marks} < 60$
$6.0 \leq \text{CGPA} \leq 6.99$	B	Average	$50 \leq \text{Marks} < 55$
$5.0 \leq \text{CGPA} \leq 5.99$	C	Satisfactory	$40 \leq \text{Marks} < 50$
CGPA below 5.0	F	Fail	Marks below 40

X. Rules of ATKT

Students admitted can be permitted to take admission in the subsequent years / semesters irrespective of the number of subjects they have passed / cleared. However, the University reserves its right to admit the students in any of the semester / year depending on the fulfillment of level of knowledge required.

XI. Skill Development Pathways for Exit options

Stage	Exit/ Qualification	Professional Skill Level	What the student should be able to do
After Year 1	UG Certificate in Computer Applications	Computing & Programming Associate	Develop basic programs, design simple webpages, use databases at a basic level, apply algorithms and solve computational problems
After Year 2	UG Diploma in Computer Applications	Application Development Associate	Develop small database-driven applications, use OOP, data structures, web technologies, OS/network concepts and basic security practices

After Year 3	BCA Degree	Application / Technology Professional	Analyse requirements, design and develop applications, work with databases, cloud/DevOps tools, AI/data/security technologies and complete an industry-oriented project
After Year 4 (if offered)	BCA Honours / Honours with Research	Advanced Computing Professional / Research Associate	Design complex solutions, undertake specialization-based projects, conduct applied research and demonstrate advanced professional skills

XII. INTERNSHIP

At the end of Semester IV, each student shall undertake Internship in an Industry for 50 (Fifty) Days. It is mandatory for the students to seek written approval from the Faculty Guide about the Topic & the Organisation before commencing the Internship.

During the Internship students are expected to take necessary guidance from the faculty guide allotted by the Institute. To do it effectively they should be in touch with their guide through e-mail or telecom. Internship Project should be a Computer Application to Real life business activity.

The learning outcomes and the utility to the organization must be highlighted in Internship Project Report.

XIII. Internal Assessment scheme

Internal Assessment (IA) shall be conducted throughout the semester using appropriate assessment methods aligned with the Course Outcomes (COs). The assessment methods are indicative and may be adapted by the course instructor based on the nature of the course and learning objectives. The following guidelines shall be followed for the conduct and implementation of the Internal Assessment (IA) Scheme.

a. Internal Assessment Scheme (50 Marks)

Assessment Component	Indicative Assessment Methods	Marks
Assessment I: Individual Assessment	Attendance, Written Test, Practical/Coding Test, Problem Solving, Design Exercise, Technical Report, Case Analysis, Open Book Test, Reflection Report	15
Assessment II: Collaborative Assessment	Project, Case Study, Group Presentation, Seminar, Prototype Demonstration, Group Discussion	15
Assessment III: Continuous Assessment	Quiz, Tutorial, Practical/Laboratory Exercise, Viva Voce, Short Test, Learning Portfolio	10

Assessment IV: Professional Engagement & Lifelong Learning	Technical Portfolio, Workshop/Seminar Report, MOOC/Certification Completion, Reflective Learning Report, Professional Conduct Evaluation	10
	Total	50

b. Internal Assessment Scheme (100 Marks)

Assessment Component	Indicative Assessment Methods	Marks
Assessment I: Individual Assessment	Attendance, Written Test, Practical/Coding Test, Problem Solving, Design Exercise, Technical Report, Case Analysis	25
Assessment II: Collaborative Assessment	Project, Industry Case Study, Group Presentation, Prototype Demonstration, Research Project	25
Assessment III: Continuous Assessment	Quiz, Tutorial, Practical/Laboratory Exercise, Viva Voce, Short Test, Learning Portfolio	20
Assessment IV: Professional Engagement & Lifelong Learning	Technical Portfolio, Workshop/Seminar Report, MOOC/Certification Completion, Reflective Learning Report, Professional Conduct Evaluation	15
Assessment V: Comprehensive Assessment (where applicable)	Project Demonstration, Portfolio Evaluation, Practical Demonstration, Capstone Presentation, Comprehensive Viva Voce	15
	Total	100

Indicative Internal Assessment Activities for Different Categories of Courses

The assessment methods presented under the Internal Assessment components are general indicative methods applicable across the programme. As the nature and learning outcomes of courses vary, the actual assessment activities should be selected from the relevant course category-wise assessment activities provided in the following tables. The course instructor may adopt one or more appropriate assessment methods aligned with the Course Outcomes (COs), subject requirements, and Outcome-Based Education (OBE) principles. The activities listed are indicative and not exhaustive, and the Institute may revise or prescribe additional assessment methods, evaluation rubrics, digital platforms, software tools, and learning resources from time to time

Programming, Computing & Laboratory Courses

Assessment Component	Indicative Assessment Methods
Assessment I: Individual Assessment	Attendance, Coding Test, Debugging Exercise, Algorithm Design, SQL Query Writing, Code Optimization, Program Development, Technical Report, Technology Review
Assessment II: Collaborative Assessment	Software Development Project, Web/Mobile Application Development, Database Design Project, API Integration Project, GitHub Collaborative Project, Software Prototype Development, Hackathon Challenge
Assessment III: Continuous Assessment	Laboratory Exercises, Weekly Coding Exercises, Practical Quiz, Code Review, Programming Viva, Unit Test
Assessment IV: Professional Engagement & Lifelong Learning	Technical Portfolio, MOOC/Certification Completion, Coding Competition Performance, Workshop/Seminar Report, Reflective Learning Report

Mathematics, Statistics & Analytical Courses

Assessment Component	Indicative Assessment Methods
Assessment I: Individual Assessment	Attendance, Written Test, Numerical Problem Solving, Mathematical Modelling, Data Interpretation, Proof Writing, Analytical Report
Assessment II: Collaborative Assessment	Mathematical Modelling Project, Group Problem Solving, Data Analysis Project, Case-based Numerical Analysis, Seminar Presentation
Assessment III: Continuous Assessment	Tutorial Sheets, Class Tests, Problem-solving Exercises, Practical Quiz
Assessment IV: Professional Engagement & Lifelong Learning	Mathematical Portfolio, MOOC/Certification Completion, Seminar Report, Reflective Learning Report

Database, Networking, Software Engineering & Information Systems Courses

Assessment Component	Indicative Assessment Methods
Assessment I: Individual Assessment	Attendance, Requirement Analysis, UML Design, SQL Tasks, Network Configuration Exercise, System Design Report, Technical Documentation
Assessment II: Collaborative Assessment	Software Engineering Project, System Design Project, Network Simulation Project, Industry Case Study, Group Technical Presentation
Assessment III: Continuous Assessment	Laboratory Exercises, Configuration Tasks, Design Review, Practical Quiz, Viva Voce
Assessment IV: Professional Engagement & Lifelong Learning	Technical Portfolio, Workshop/Seminar Report, MOOC/Certification Completion, Reflective Learning Report

Artificial Intelligence, Data Science & Emerging Technologies

Assessment Component	Indicative Assessment Methods
Assessment I: Individual Assessment	Attendance, Data Analysis using Python/R, AI/ML Model Development, Prompt Engineering Task, Data Visualization, Research Review, Technology Review
Assessment II: Collaborative Assessment	AI/ML Project, Data Analytics Project, Cloud-based Application, Research Project, Prototype Development, Group Technical Presentation
Assessment III: Continuous Assessment	Coding Exercises, Laboratory Exercises, Practical Quiz, Model Evaluation Exercise, Viva Voce
Assessment IV: Professional Engagement & Lifelong Learning	Technical Portfolio, Hackathon Performance, Workshop/Seminar Report, MOOC/Certification Completion, Reflective Learning Report

Soft Skills, Communication, Management & Value-Added Courses

Assessment Component	Indicative Assessment Methods
Assessment I: Individual Assessment	Attendance, Mock Interview, Resume/CV Evaluation, Technical Writing Exercise, Reflection Report, Essay Writing, Elevator Pitch, Individual Presentation, Case Analysis
Assessment II: Collaborative Assessment	Group Discussion, Debate, Role Play, Panel Discussion, Team Presentation, Business Simulation, Community Engagement Project, Case Study Presentation
Assessment III: Continuous Assessment	Short Quiz, Communication Exercise, Scenario-based Problem Solving, Reflective Journal, Learning Portfolio, Peer Assessment
Assessment IV: Professional Engagement & Lifelong Learning	Professional Conduct Evaluation, Leadership & Teamwork Evaluation, Workshop/Seminar Report, E-Portfolio Evaluation, MOOC/Certification Completion

Project, Internship, Seminar & Capstone Courses

Assessment Component	Indicative Assessment Methods
Assessment I: Individual Assessment	Attendance, Project Proposal, Literature Review, Progress Report, Technical Documentation, Project Diary, Individual Presentation
Assessment II: Collaborative Assessment	Software/System Development Project, Industry Project, Prototype Development, Poster Presentation, Group Demonstration
Assessment III: Continuous Assessment	Milestone Review, Progress Seminar, Supervisor Evaluation, Logbook Evaluation, Project Viva
Assessment IV: Professional Engagement & Lifelong Learning	Technical Portfolio, Reflective Portfolio, Industry Mentor Evaluation, Project Management Report, Workshop/Seminar Report

General Guidelines for Internal Assessment

1. Internal Assessment shall be based on multiple assessment methods to evaluate knowledge, skills, application, communication, collaboration, and professional attributes.
2. The assessment methods listed above are **indicative and not exhaustive**. The course instructor may select one or more appropriate assessment methods depending on the nature of the course and the Course Outcomes (COs).
3. Assessment I should primarily evaluate individual learning and application of course concepts.
4. **Assessment II** should assess **collaborative learning, teamwork, and application of knowledge**.

5. **Assessment III** should support **continuous learning and formative assessment** throughout the semester.
6. **Professional Engagement & Continuous Learning** shall be evaluated using documented evidence such as class participation, laboratory engagement, teamwork, professional conduct, communication, timely submission of assignments, self-learning initiatives, MOOCs, workshops, technical events, coding competitions, GitHub/e-portfolio, or other relevant activities.

XIV. Question Paper Patterns for University Examination:

Title of the Course

Day:

Total Marks: 50

Date:

Time: 03 Hours

Instructions:

- 1. Section I –Attempt any two questions. Each question carries 05 Marks.**
- 2. Section II –Attempt any two questions. Each question carries 10 Marks.**
- 3. Section III –Question 7 is compulsory and attempt any one question from the remaining two. Each question carries 10 Marks.**
- 4. All three sections should be attempted in same answer sheet.**

SECTION – I			
Question	Marks	CO	BL
Q.1 Write Short Notes on ANY Two a) b) c)	(5 marks)		Remember
Q.2	(5 marks)		Understand
Q.3	(5 marks)		Understand
SECTION – II			
Q.4	(10 marks)		Apply
Q.5	(10 marks)		Apply
Q.6	(10 marks)		Apply
SECTION – III			
Q.7.....	(10 marks)		Analyze
Q.8.....	(10 marks)		Evaluate
Q.9.....	(10 marks)		Evaluate/Create

XV. Programme Structure

<i>Programme</i>	<i>Duration</i>	<i>Total Credits Required AICTE – NEP 2020</i>	<i>Current curriculum</i>
BCA (Basic Degree)	3 Years (6 Semesters)	120 Credits	126 Credits
BCA (Honours)	4 Years (8 Semesters)	160 Credits	166 Credits
BCA (Honours with Research)	4 Years (8 Semesters)	160 Credits	166 Credits

SEMESTER I

Course Number	Course Title	Course Type	Credits	Hours / Week			IA	UE	Total Marks
				L	T	P			
101	Algorithms and Program Design using C	Core Course	3	2	1	-	50	50	100
102	Mathematical Foundation	Core Course	3	2	1	-	50	50	100
103	Foundations of Computing	Core Course	3	2	1	-	50	50	100
104	Client-Side Web Technologies	Core Course	3	2	1	-	50	50	100
105	Communication Skills	AEC	2	1	1	-	50	-	50
106	Lab on Algorithms and Program Design using C	Core Practical	2	-	-	4	50	50	100
107	Lab on Client-Side Web Technologies	Core Practical	2	-	-	4	50	50	100
108	Open Course-I: Any one course from bucket of open Courses	Open Course	2	1	1	-	50	-	50
Total			20	10	6	8	400	300	700

Open courses Bucket : Ms-Office

Constitution of India & Human Rights

IKS- Yoga & Wellness

SEMESTER II

Course Number	Course Title	Course Type	Credits	Hours / Week			IA	UE	Total Marks
				L	T	P			
201	Database Management Systems	Core Course	3	2	1	0	50	50	100
202	Object oriented programming with Java	Core Course	3	2	1	0	50	50	100
203	Operating system	Core Course	3	2	1	0	50	50	100
204	Python Programming	Core Course	3	2	1	0	50	50	100
205	Cyber Security	VAC	2	1	1	0	50	-	50
206	Lab on Object oriented programming with Java	Core Practical	2	0	0	4	50	50	100
207	Lab on Python Programming	Core Practical	2	0	0	4	50	50	100
208	Environmental Studies	VAC	4	3	1	0	50	50	100
Total			22	12	6	8	400	350	750

Exit Criteria after First Year of BCA Programme

Students will have the option to exit the Bachelor of Computer Application (BCA)

The mode program after successfully completing the first year. Upon exit, they will be awarded a **UG Certificate in Computer Application**. To be eligible for this certificate, students must complete an additional 04 credits in one of the following areas:

- 1. Skill-Based Subject:** A course designed to enhance practical and technical skills in the field of computer applications (4 credits).
- 2. Work-Based Vocational Course:** A vocational course offered during the summer term that emphasizes hands-on training and workplace readiness (4 credits).
- 3. Internship/Apprenticeship:** A professional internship or apprenticeship program in a relevant field, with a minimum duration of 08 weeks, which will take place after the second semester (4 credits).
- 4. Social Responsibility & Community Engagement:** An approved engagement with an NGO or community organization for a minimum duration of **8 weeks**, preferably involving the application of computer application skills to real-world problems.

The specific activity, learning outcomes, duration, assessment, and mode of awarding credits shall be determined by the University/Institute. Students shall complete the approved activity during the **summer term following Semester II** and submit the required evidence, such as a course completion record, internship report, or other prescribed document.

5. Re-entry Criteria Second Year (Third Semester) into

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The student who takes an exit after one year with an award of certificate in computer application may be allowed to re-enter in to Third Semester for completion of the BCA Program as per the respective University /Admitting Body schedule after earning requisite credits in the First year.

SEMESTER III

Course Number	Course Title	Course Type	Credits	Hours / Week			IA	UE	Total Marks
				L	T	P			
301	Software Engineering	Core Course	3	2	1	0	50	50	100
302	Data Structure using C	Core Course	3	2	1	0	50	50	100
303	Database Application Development	Core Course	3	2	1	0	50	50	100
304	SP1-E1	DSE	3	2	1	0	100	-	100
305	SP2-E1	DSE	3	2	1	0	100	-	100
306	Lab on Data Structure using C	Core Practical	2	0	0	4	50	50	100
307	Lab on Database Application Development	Core Practical	2	0	0	4	50	50	100
308	Business Statistics using MS-Excel	VAC	2	1	0	1	50	-	50
			21	11	5	9	500	250	750

SEMESTER IV

Course Number	Course Title	Course Type	Credits	Hours / Week			IA	UE	Total Marks
				L	T	P			
401	Artificial Intelligence & Machine Learning	Core Course	3	2	1	0	50	50	100
402	Computer Network	Core Course	3	2	1	0	50	50	100
403	Dot Net Programming	Core Course	3	2	1	0	50	50	100
404	SP1-E2	DSE	3	2	1	0	100	-	100
405	SP2-E2	DSE	3	2	1	0	100	-	100
406	Lab on Artificial Intelligence & Machine Learning	Core Practical	2	0	0	4	50	50	100
407	Lab on Dot Net Programming	Core Practical	2	0	0	4	50	50	100
408	Any one course from bucket of open Courses)	VAC	2	0	2	0	50	-	50
409	Minor Project 1		2	0	0	2	50	50	100
		Total	23	10	7	10	550	300	850

Open course Bucket : Financial Management,
Quantitative Aptitude & Logical Reasoning,
Linux Operating System,
Entrepreneurship Development & Start-up,
IKS - Indian cultural systems,

Exit Criteria after Second Year of BCA Programme

Students will have the option to exit the Bachelor of Computer Application (BCA) program after successfully completing the second year. Upon exit, they will be awarded a **UG Diploma in Computer Application**. To be eligible for this diploma, students must complete an additional 04 credits in one of the following areas:

1. **Skill-Based Subject:** A specialized course aimed at enhancing technical and practical expertise in computer applications.
2. **Work-Based Vocational Course:** A vocational course offered during the summer term, focused on building practical, industry-relevant skills.
3. **Internship/Apprenticeship:** A professional internship or apprenticeship with a minimum duration of 08 weeks, conducted after the fourth semester, offering hands-on experience in a relevant field.
4. **Social Responsibility & Community Engagement:** Involvement with an NGO or community-based organization for a minimum of 08 weeks, contributing to social initiatives and applying computer application knowledge to solve real-world challenges.
5. **Capstone Project:** Completion of a capstone project integrating the skills and knowledge gained during the first two years of the program, which can be an independent or group project.

The specific mode of completing the additional credits will be decided by the respective **University/Admitting Body**, and students will be required to complete the 08-week program or project during the summer term following their fourth semester.

Students opting for this exit will also be required to **submit an Internship/Apprenticeship Report** or complete the Capstone Project as per the schedule outlined by the University/Admitting Body before they are awarded the UG Diploma.

Re-entry Criteria in to Third Year (Fifth Semester)

The student who takes an exit after second year with an award of UG Diploma in computer application may be allowed to re-enter into fifth Semester for completion of the BCA Program as per the respective University / Admitting Body schedule after earning requisite credits in the Second year.

SEMESTER V

Course Number	Course Title	Course Type	Credits	Hours / Week			IA	UE	Total Marks
				L	T	P			
501	Software Project Management	Core Course	3	2	1	0	50	50	100
502	Cloud Computing	Core Course	3	2	1	0	50	50	100
503	SP1-E3	DSE	3	2	1	0	100	-	100
504	SP2-E3	DSE	3	2	1	0	100	-	100
505	Lab on Server-Side Web Technology (Java/Python/Dot Net)	Core Practical	3	0	0	3	50	50	100
506	Summer Internship / Major Project	Project	3	0	0	3	50	50	100
507	Any one course from bucket of open Courses	VAC	2	0	2	0	50	-	50
			20	8	6	6	450	200	650

Open Courses - Foreign Languages: (not limited to)

Spanish/German/French/Korean/Mandarin ,
Disaster Management,
Basics of R Programming

SEMESTER VI

Course Number	Course Title	Course Type	Credits	Hours / Week			IA	UE	Total Marks
				L	T	P			
601	Object Oriented Analysis and Design	Core Course	3	2	1	0	50	50	100
602	Business Intelligence and Data visualization	Core Course	3	2	1	0	50	50	100
603	SP1-E4	DSE	3	2	1	0	100	-	100
604	SP2-E4	DSE	3	2	1	0	100	-	100
605	Lab on Business Intelligence and Data visualization	Core Practical	2	0	0	4	50	50	100
606	Any one course from bucket of open Courses	Open Course	2	1	1	0	50	-	50
607	Minor Project 2	Project	4	0	0	4	50	50	100
		Total	20	9	5	8	450	200	650

OPEN COURSE -Gen AI Fundamentals

Entrepreneurship Development

Innovation and Start-up Management

Minimum eligibility criteria for opting the course in the fourth year will be as follows:

BCA (Honours with Research) : BCA Degree with CGPA >7.5

- **BCA (Honours):** Students who have successfully completed the BCA Degree programme shall be eligible for admission to the fourth year leading to the award of **BCA (Honours)**.
- **BCA (Honours with Research):** As per the framework of **NEP 2020** for the four-year undergraduate degree programme, students who have successfully completed the BCA Degree programme with a **minimum CGPA of 7.5** shall be eligible for admission to the fourth year leading to the award of **BCA (Honours with Research)**, subject to the applicable University regulations

SEMESTER VII BCA Honours

Course Number	Course Title	Course Type	Credits	Hours / Week			IA	UE	Total Marks
				L	T	P			
701	SG-1-E5	Core Course	3	2		1	50	50	100
702	SG-1-E6	DSE	3	2		1	50	50	100
703	SG-2-E5	Core Course	3	2		1	50	50	100
704	SG-2- E6	DSE	3	2		1	50	50	100
705	Internship / Major Project (8)	DSE	8			8	100	100	200
		Total	20	8		12	300	300	600

SEMESTER VIII

Course Number	Course Title	Course Type	Credits	Hours / Week			IA	UE	Total Marks
				L	T	P			
801	SG-1-E7	Core Course	3	2		1	50	50	100
802	SG-1-E8	DSE	3	2		1	50	50	100
803	SG-2-E7	Core Course	3	2		1	50	50	100
804	SG-2- E8	DSE	3	2		1	50	50	100
805	Major Project (specialization domain)	DSE	8			8	100	100	200
		Total	20	8		12	300	300	600

SEMESTER VII (BCA - Honours with Research)

Course Number	Course Title	Course Type	Credits	Hours / Week			IA	UE	Total Marks
				L	T	P			
701	Research Methods in Computer Science	Core Course	3	2	1		50	50	100
702	Computational Research Methods	Core Course	3	2	1		50	50	100
703	Research Synthesis Methods (systematic LR & Bibliometric Analysis)	Core Course	3	2	1		50	50	100
704	Literature Review Seminar	Core Course	3		3		50	50	100
705	Internship/ Major Project (in research domain)	Core Course	8			8	100	100	200
		Total	20	6	6	8	300	300	600

SEMESTER VIII

Course Number	Course Title	Course Type	Credits	Hours / Week			IA	UE	Total Marks
				L	T	P			
801	Experimental Design & Statistical Analysis	Core Course	3	2	1		50	50	100
802	Applied Research in Computer Science	Core Course	3	2	1		50	50	100
803	Academic Writing, Research Ethics and Intellectual Property Right	Core Course	2	2			50	50	100
804	Dissertation (12) (on research study in computer domain)	Core Course	12				12	150	150
		Total	20	6	2	12	300	300	600

XVI. Specialization Groups

- 1. Artificial Intelligence and Machine learning**
- 2. Data Science**
- 3. Full Stack Development**
- 4. Mobile Computing**
- 5. Cloud Computing**
- 6. Digital Commerce**
- 7. Cyber Security**
- 8. Big Data**
- 9. Blockchain Technology**

INDUCTION PROGRAM

The Essence and Details of Induction program can also be institute specific which will include following activities.

Induction program (mandatory)	Three-week duration
Induction program for students to be offered right at the start of the first year.	• Physical activity • Creative Arts • Universal Human Values • Literary • Proficiency Modules • Lectures by Eminent People • Visits to local Areas / Industries • Familiarization to Department/Branch & Innovations

Programme BCA			
Semester	Course Code	Course Title	
I	101	Algorithms and Program Design Using C	
Type of Course	Credits	Evaluation	Marks
CC	3	UE:IA	50:50
Course Objectives:			
1. To introduce students to computational thinking, problem-solving techniques, algorithms, flowcharts, pseudocode, the program development cycle, and the fundamentals of C programming for systematic program development. 2. To familiarize students with the fundamental elements of C programming, including character sets, tokens, data types, variables, operators, expressions, type conversion, and formatted input/output operations. 3. To enable students to apply decision-making and iterative programming constructs for developing structured solutions to computational problems. 4. To introduce modular programming concepts through functions and develop problem-solving skills using arrays and string manipulation techniques in C. 5. To introduce user-defined data types, pointers, and dynamic memory allocation for developing efficient and modular C programs.			
Course Outcomes:			
After successful completion of this course, the students shall be able to: CO1: Explain computational thinking, problem-solving concepts, algorithms, flowcharts, pseudocode, the program development cycle, and the basic structure and execution of C programs. CO2: Develop C programs using variables, constants, data types, operators, expressions, type conversion, and formatted input/output functions to solve basic computational problems. CO3: Design and implement C programs using conditional statements, looping constructs, nested loops, and control transfer statements to solve logical and repetitive computational problems. CO4: Develop modular C programs using user-defined functions, recursion, arrays, and string handling functions to solve computational problems efficiently. CO5: Design and implement C programs using structures, unions, pointers, and dynamic memory allocation techniques for solving real-world programming problems.			

Unit No.	Contents
Unit I	Introduction to Problem Solving, Algorithms and C Programming Introduction to Computers and Programming, Problem Solving Concepts, Computational Thinking, Characteristics of Algorithms, Algorithm Development, Flowcharts, Pseudocode, Program Development Cycle, Compiler and Interpreter, Introduction to C Programming, Features and Applications of C, Structure of a C Program, Compiling and Executing a C Program.
Unit 2	Fundamentals of C Programming Introduction to the C Character Set, Tokens, Keywords, Identifiers, Constants, Variables, Data Types, Operators (Arithmetic, Relational, Logical, Assignment, Increment/Decrement, and Conditional), Expressions, Operator Precedence and Associativity, Type Conversion, Formatted Input and Output using printf() and scanf().
Unit 3	Decision Making and Iterative Programming Decision-Making Statements including if, if-else, Nested if, else-if Ladder, switch Statement, and Conditional Operator; Iterative Programming using while, do-while, and for Loops; Nested Loops, break and continue Statements.
Unit 4	Functions, Arrays and Strings Concept of Modular Programming, Library Functions, User-Defined Functions, Function Declaration, Function Definition, Function Call, Actual and Formal Parameters, Call by Value, Scope and Lifetime of Variables, Storage Classes, Introduction to Recursive Functions, Development of Simple Applications using Functions. Introduction to One-Dimensional and Two-Dimensional Arrays, Declaration and Initialization, Accessing and Traversing Array Elements, Basic Array Operations (Reading, Displaying, Searching, Finding Sum, Average, Maximum and Minimum Elements). Introduction to Strings, Declaration and Initialization of Strings, String Input and Output, String Handling Functions.
Unit 5	Structures, Unions and Introduction to Pointers Introduction to User-Defined Data Types, Structure Declaration, Definition and Initialization, Accessing Structure Members, Arrays of Structures. Introduction to Unions, Declaration and Initialization of Unions, Comparison of Structures and Unions. Introduction to Pointers, Pointer Declaration and Initialization, Pointer Arithmetic, Dynamic Memory Allocation, Dynamic Memory Allocation Functions (malloc(),

	calloc(), realloc(), and free()).
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CO Mapping, Pedagogy and Bloom's Cognitive Levels

Unit No.	CO Mapping	Pedagogy	Bloom's Cognitive Levels
1	CO1	Interactive Lectures, Demonstration, Algorithm & Flowchart Design, Problem-Based Learning, Hands-on Programming	L1-Remember, L2-Understand, L3-Apply
2	CO2	Interactive Lectures, Live Coding Demonstration, Guided Laboratory Practice, Hands-on Programming	L1-Remember, L2-Understand, L3-Apply
3	CO3	Interactive Lectures, Problem-Based Learning, Live Coding, Laboratory Practice	L2-Understand, L3-Apply, L4-Analyze
4	CO4	Interactive Lectures, Live Coding, Laboratory Programming, Programming Assignments	L2-Understand, L3-Apply, L4-Analyze, L5-Evaluate
5	CO5	Interactive Lectures, Hands-on Laboratory Sessions, Case-Based Programming, Mini Projects	L2-Understand, L3-Apply, L4-Analyze, L5-Evaluate

Reference Books

Sr. No.	Name of the Author	Title of the Book	Year and Edition	Publisher
1.	E. Balagurusamy	Programming in ANSI C	8th Edition, 2019	McGraw Hill Education
2.	Yashavant Kanetkar	Let Us C	18th Edition, 2020	BPB Publications
3.	Brian W. Kernighan and Dennis M. Ritchie	The C Programming Language	2nd Edition	Pearson Education
4.	Reema Thareja	Programming in C	2nd Edition	Oxford University Press

Online Resources:

Sr. No.	Resources	Website URL
1.	GeeksforGeeks – C Programming Tutorials	https://www.geeksforgeeks.org/c-programming-language/
2.	TutorialsPoint – C Programming	https://www.tutorialspoint.com/cprogramming/g/
3.	Programiz – Learn C Programming	https://www.programiz.com/c-programming

Programme: BCA			
Semester	Course Code	Course Title	
I	102	Mathematical Foundations	
Type of Course	Credits	Evaluation	Marks
Core Course	3	UE: IA	50:50
Course Objectives:			
After completing this course, the teacher will be able to: To develop logical reasoning, analytical thinking, and problem-solving skills required for computing and decision making. To introduce fundamental mathematical structures such as sets, relations, and functions used in computer science and information systems. - To develop the ability to organize, interpret, and analyze data for informed decision making. To familiarize students with matrices and their applications in data representation, organization, and analysis. To introduce graph-based models and discrete mathematical concepts used for representing networks and relationships in computing.			
Course Outcomes:			
After successful completion of the course, students will be able to: CO1. Apply logical reasoning and problem-solving techniques to analyze and solve computational and real-world problems. CO2. Use sets, relations, and functions to model and represent mathematical and computing-related situations. CO3. Organize, analyze, and interpret data presented in tabular and graphical forms for decision making. CO4. Perform matrix operations and use matrices for data organization, representation, and analysis. CO5. Explain graph concepts and apply graph-based models to represent and analyze networks and relationships in computing applications.			

Unit No.	Contents
Unit I	Logical Reasoning and Problem Solving (9 Hours) Introduction to Mathematical Thinking, Logical Reasoning and Analytical Thinking, Statements and Propositions, Logical Connectives (AND, OR, NOT), Truth Tables, Tautology and Contradiction, Logical Equivalence, Deductive and Inductive Reasoning, Methods of Reasoning, Pattern Recognition, Problem-Solving

	Techniques, Mathematical Puzzles, Applications of Logical Reasoning in Everyday Life and Computing.
Unit 2	Sets, Relations and Functions (9 Hours) Introduction to Sets, Representation and Types of Sets, Set Operations, Venn Diagrams and Applications of Sets, Cartesian Product of Sets, Introduction to Relations and Types of Relations, Introduction to Functions, Types of Functions, One-to-One and Onto Functions, Composite Functions, Applications of Sets, Relations and Functions in Information Systems, Databases and Data Organization.
Unit 3	Unit III: Data Analysis and Interpretation (9 Hours) Data and Information, Types of Data, Sources of Data, Data Collection Methods, Organization of Data, Tabular Representation of Data, Frequency Distribution, Graphical Representation of Data using Bar Charts, Pie Charts and Line Graphs, Measures of Central Tendency (Mean, Median and Mode), Introduction to Data Interpretation, Analysis of Tables, Charts and Graphs, Problem Solving Using Data, Data-Based Decision Making, Applications of Data Analysis in Computing, Business and Everyday Life.
Unit 4	Unit IV: Matrices and Data Representation (9 Hours) Introduction to Matrices, Representation of Data Using Matrices, Types of Matrices (Row Matrix, Column Matrix, Square Matrix, Diagonal Matrix and Identity Matrix), Matrix Operations (Addition, Subtraction, Multiplication and Transpose), Organization and Representation of Data Using Matrices, Applications of Matrices in Spreadsheets, Information Systems, and Simple Decision-Making Problems.
Unit 5	Introduction to Graphs and Their Applications (9 Hours) Definition, Graph Models, Sub Graph, Decomposition and special Graphs, Connection in Graphs, Types of Graphs, Representing Graph in computer memory, Walk, paths, trail, circuits, Connected Graph, Bridge, Isomorphism, Eulerian Circuits, Euler's path, Euler graph, Hamiltonian Graph and Graph Algorithm, Konigsberge Bridge problem, shortest path problems, city route puzzle problem, Seating arrangement problem, Travelling salesman problem,

CO Mapping, Pedagogy and Bloom's Cognitive Levels

Unit	CO Mapping	Pedagogy	Bloom's Level
Unit I	CO1	Interactive Lectures, Logical Reasoning Exercises, Puzzle-Based Learning, Tutorials	L2 Understand, L3 Apply
Unit II	CO2	Worked Examples, Venn Diagram Activities, Tutorial Practice, Problem	L2 Understand, L3 Apply

		Solving Sessions	
Unit III	CO3	Data Interpretation Activities, Numerical Exercises, Spreadsheet-Based Activities, Problem Solving Sessions	L2 Understand, L3 Apply, L4 Analyze
Unit IV	CO4	Matrix Computation Exercises, Demonstrations, Practice Sessions, Spreadsheet-Based Activities	L2 Understand, L3 Apply, L4 Analyze
Unit V	CO5	Graph-Based Activities, Network Modelling Exercises, Group Discussions, Problem Solving Sessions	L2 Understand, L3 Apply, L4 Analyze

Reference Books				
Sr. No.	Author	Title	Latest Edition	Publisher
1	Kenneth H. Rosen	Discrete Mathematics and Its Applications	8th Edition, 2018	McGraw-Hill
2	Richard Johnsonbaugh	Discrete Mathematics	8th Edition, 2017	Pearson
3	Susanna S. Epp	Discrete Mathematics with Applications	5th Edition, 2019	Cengage Learning
4	Seymour Lipschutz & Marc Lipson	Discrete Mathematics (Schaum's Outline Series)	3rd Edition, 2017	McGraw-Hill
5	Narsingh Deo	Graph Theory with Applications to Engineering and Computer Science	1st Edition, 2017 (Reprint)	Prentice Hall of India

Online Resources:		
Sr. No.	Resource	Website
1	NPTEL Mathematics and Computing Courses	https://nptel.ac.in
2	SWAYAM	https://swayam.gov.in
3	Khan Academy Mathematics	https://www.khanacademy.org
4	MIT OpenCourseWare	https://ocw.mit.edu
5	GeeksforGeeks - Discrete Mathematics	https://www.geeksforgeeks.org/discrete-mathematics-tutorial/

Programme: BCA			
Semester	Course Code	Course Title	
I	103	Foundation of Computing	
Type of Course	Credits	Evaluation	Marks
Core Course	3	UE: IA	50:50
Course Objectives:			
1. To introduce the fundamental concepts of computers, computing systems, and digital technologies. 2. To develop an understanding of data representation, number systems, and digital information processing. 3. To familiarize students with computer hardware, software, program execution concepts, 4. To introduce networking, Internet technologies, 5. To learn programming language paradigms			
Course Outcomes:			
After successful completion of the course, students will be able to: CO1. Explain the evolution, characteristics, components, and applications of computer systems. CO2. Apply concepts of data representation, number systems, number representation, and binary arithmetic in digital computing. CO3. Describe computer hardware, software, program execution concepts, CO4. Explain networking concepts, Internet technologies, CO5. Explain programming language generations with examples.			

Unit No.	Contents
Unit I	Unit I: Introduction to Computing (9 Hours) Evolution and Generations of Computers, Characteristics and Applications of Computers, Types of Computers (Microcomputers, Workstations, Servers, Mainframes, and Supercomputers), Components of Computer Systems, Block Diagram of a Computer, Input and Output Devices, Primary and Secondary Storage Devices, Hardware and Software, System Software and Application Software,
Unit 2	Data Representation and Digital Foundations (9 Hours) Data and Information, Analog and Digital Data, Data Storage Units (Bit, Nibble, Byte, KB, MB, GB, and TB), Number Systems (Decimal, Binary, Octal, and Hexadecimal), Number System Conversions, Number Representation in Computers, Signed and Unsigned Numbers, Integer and Floating-Point Representation (Introduction), Binary Arithmetic (Addition, Subtraction, Multiplication, and Division), Character Encoding Standards (ASCII and Unicode), Digital Representation of Text, Images, Audio, and Video.
Unit 3	Computer Hardware, Software (9 Hours) CPU and Its Functions, Main Memory and Secondary Storage, Memory Hierarchy, Input and Output Devices, Program Execution Concepts, Instruction Cycle (Fetch, Decode and Execute), Introduction to Addressing Modes (Immediate, Direct and Indirect), System Software and Application Software, Utility Software,
Unit 4	Computer Networks, Internet (9 Hours) Fundamentals of Computer Networks, Types of Networks (LAN, MAN, and WAN), Network Devices, Internet Fundamentals, Internet Services, World Wide Web, Web Browsers and Search Engines, Electronic Mail, Transmission Media
Unit 5	Unit V: Programming Languages (9 Hours) Machine Language, Assembly Language, High Level Language their advantages & disadvantages along with examples

CO Mapping, Pedagogy and Bloom's Cognitive Levels

Unit	CO Mapping	Pedagogy	Bloom's Level
Unit I	CO1	Interactive Lectures, Demonstrations, Logical Reasoning Exercises, Problem-Solving Activities, Group Discussions	L1 Remember, L2 Understand, L3 Apply
Unit II	CO2	Numerical Exercises, Worked Examples, Tutorial Sessions, Guided Practice on Number System	L2 Understand, L3 Apply

		Conversions and Binary Arithmetic	
Unit III	CO3	Interactive Lectures, Hardware Demonstrations, Educational Videos, Case-Based Discussions	L2 Understand, L3 Apply
Unit IV	CO4	Multimedia Demonstrations, Internet-Based Activities, Guided Exploration of Online Services	L2 Understand, L3 Apply
Unit V	CO5	Interactive lectures, Comparative study of different generation Languages	L2 Understand

Reference Books				
Sr. No.	Author	Title	Latest Edition	Publisher
1	Peter Norton	Introduction to Computers	7th Edition, 2018	McGraw-Hill Education
2	P. K. Sinha & Priti Sinha	Computer Fundamentals	8th Edition, 2020	BPB Publications
3	Anita Goel	Computer Fundamentals	1st Edition, 2010	Pearson Education
4	Alexis Leon & Mathews Leon	Fundamentals of Information Technology	2nd Edition, 2014	Vikas Publishing House
5	V. Rajaraman	Fundamentals of Computers	6th Edition, 2014	PHI Learning

Online Resources:		
Sr. No.	Resource	Website
1	NPTEL	https://nptel.ac.in
2	SWAYAM	https://swayam.gov.in
3	Microsoft Learn	https://learn.microsoft.com
4	Cisco Networking Academy	https://www.netacad.com
5	IBM SkillsBuild	https://skillsbuild.org

Programme: BCA			
Semester	Course Code	Course Title	
I	104	Client-Side Web Technologies	
Type of Course	Credits	Evaluation	Marks
Core Course	3	UE : IA	50:50
Course Objectives: 1. Introduce the fundamental concepts of the Internet, World Wide Web, client-side web technologies, and the architecture of web-based applications. 2. Explain the principles of website planning, user interface (UI) design, user experience (UX), responsive web design, and website development lifecycle. 3. Teach the structure and semantics of web pages using HTML5 and the techniques for designing attractive and responsive web pages using CSS3. 4. Demonstrate client-side scripting using JavaScript to develop interactive, event-driven, and dynamic web pages. 5. Familiarize students with modern web development practices, browser developer tools, website deployment methods, and AI-assisted website development tools for rapid prototyping and no-code/low-code development.			
Course Outcomes: CO1: Explain the fundamentals of the Internet, World Wide Web, web architecture, and client-side web technologies. CO2: Develop structured and semantically appropriate web pages using HTML5. CO3: Apply CSS techniques to design visually effective and responsive web pages. CO4: Implement interactive and dynamic web pages using JavaScript and DOM manipulation. CO5: Design and develop a responsive client-side website integrating HTML5, CSS3, and JavaScript.			

Unit No.	Contents
Unit I	Introduction to Web Technologies: Evolution of the Internet and World Wide Web, Internet, Intranet and Extranet, Static and Dynamic Websites, Types of Web Applications, Client-Server Architecture, Web Browsers and Web Servers, URL, Domain Name and IP Address, Internet Service Providers (ISP). Website Development Fundamentals: Website Development Lifecycle, Web Hosting and Types of Hosting, Website Security, User Experience (UX), Responsive Design, and Website Content Strategy.

Unit II	HTML5: Introduction to HTML5 and its role in web development, Structure of an HTML document, Basic HTML elements and tags, HTML attributes, Block-level and Inline elements. Creating Web Page Content: Headings, Paragraphs, Text Formatting, Hyperlinks, Images and Multimedia, Lists, Tables, and Basic Forms and Form Elements. Semantic Web Page Structure: Semantic HTML elements (Header, Navigation, Section, Article, Aside, Footer), Importance of Semantic Markup, and Introduction to SEO-friendly and accessible HTML structure.
Unit III	Cascading Style Sheets (CSS): Introduction to CSS, Types of Style Sheets (Inline, Internal and External), CSS Syntax, CSS Selectors, Text and Font Properties, Colors and Backgrounds, Borders, Box Model, Display and Positioning, Class and ID Selectors, Span Element. Responsive Web Design: Media Queries, Flexbox, CSS Grid, Responsive Layouts, and External Style Sheets.
Unit IV	JavaScript (Client-Side Scripting): Introduction to Scripting, Overview, Advantages and Limitations of JavaScript, Client-side Scripting, Embedding JavaScript in HTML, and Capturing User Input. JavaScript Basics: Variables, Data Types, Literals, Operators, Arrays, Array Methods, and Expressions. Programming Constructs: Assignment, Decision Making, Loops, Functions, Scope, Return Values, Built-in and User-defined Functions. Dialog Boxes: Alert, Prompt, Confirm, Window Object. JavaScript Events: onclick, onsubmit, onchange, onmouseover, onmouseout, onload, onkeydown, and DOM Manipulation.
Unit V	Forms and Client-side Validation: Interactive Web Pages, HTML Forms, Form Elements (Text, Password, Button, Submit, Reset, Checkbox, Radio Button, Text Area, Select and Option), Form Properties and Methods. JavaScript Objects: String, Math and Date Objects. Regular Expressions: Introduction and Pattern Matching. Form Validation: Client-side Validation, Input Validation, Error Handling, and Validation Feedback. Integration: Develop an interactive webpage integrating HTML, CSS, JavaScript, DOM manipulation, and client-side form validation.

CO Mapping, Pedagogy and Bloom's Cognitive Levels

Unit No.	CO Mapping	Pedagogy	Bloom's Cognitive Levels
Unit I	CO1	Interactive Lectures, Website Demonstration, Case Studies, Group Discussion, Website Analysis Activity	L2 – Understand, L3 – Apply
Unit II	CO2	Live Coding Demonstration, Hands-on Laboratory Practice, Guided Exercises, Think–Pair–Share, Flipped Learning	L2 – Understand, L3 – Apply
Unit III	CO3	Demonstration, Hands-on Coding,	L3 – Apply, L4 –

		Problem-Based Learning, Design Exercises, Peer Learning	Analyze
Unit IV	CO4	Live Coding, Laboratory Sessions, Pair Programming, Problem-Solving Tasks, Debugging Exercises	L3 – Apply, L4 – Analyze
Unit V	CO5	Hands-on Programming, Case-Based Learning, Integrated Website Development, Laboratory Demonstration, Debugging and Testing	L4 – Analyze, L5 – Evaluate, L6 – Create

Reference Books				
Sr. No.	Name of the Author	Title of the Book	Year and Edition	Publisher
1	Paul McFedries	HTML, CSS, & JavaScript All-in-One For Dummies	2023, 1st Edition	Wiley
2	David Sawyer McFarland	JavaScript & jQuery: The Missing Manual	2014, 3rd Edition	O'Reilly Media
3	Jon Duckett	HTML and CSS: Design and Build Websites	2011, 1st Edition	Wiley
4	Ivan Bayross	HTML, JavaScript, DHTML and PHP	4 th Edition	BPB publication

Online Resources:		
Sr. No.	Resources	Website URL
1	NPTEL	https://nptel.ac.in
2	Infosys Springboard	https://infyspringboard.onwingspan.com
3	W3Schools	https://www.w3schools.com

Programme: BCA			
Semester	Course Code	Course Title	
I	105	Communication Skills	
Type	Credits	Evaluation	Marks
AEC	2	IA	50
Course Objectives:			
1. To develop an understanding of the fundamentals, process, channels, principles, and barriers of effective communication. 2. To develop effective verbal and non-verbal communication skills for academic and professional situations. 3. To develop effective listening, reading, and presentation skills for academic and professional situations. 4. To develop professional written communication skills for effective workplace correspondence.			
Course Outcomes:			
After successful completion of this course, the students shall be able to: CO1: Explain the fundamentals, process, channels, barriers, and principles of effective communication. CO2: Demonstrate effective verbal and non-verbal communication skills in interpersonal and professional situations. CO3: Apply effective listening, reading, and presentation strategies in academic and professional situations. CO4: Draft appropriate professional written communication for workplace situations.			

Unit	Content
1	Fundamentals of Communication (7 Hours) Meaning, nature and importance of communication; communication process; objectives of communication; channels of communication; barriers to communication and ways of overcoming them; Seven Cs of effective communication. Suggested Learning Activities • Analyze communication situations and identify barriers. • Identify appropriate communication channels for given situations. • Examine examples of effective and ineffective communication. • Improve communication messages using the Seven Cs.

	Analyze common communication problems in academic and professional situations.
2	Verbal and Non-Verbal Communication (8 Hours) Verbal Communication Meaning and importance of verbal communication; advantages and limitations of oral communication; essentials of effective oral communication; types of oral communication; speaking skills; guidelines for preparing a speech; strategies for effective conversation. Non-Verbal Communication Meaning, importance and uses of non-verbal communication; body language; gestures; postures; facial expressions; eye contact; paralanguage; non-verbal aspects of written communication. Suggested Learning Activities - Self-introduction and introduction of others. - Pair-based conversation. - Situational conversation. - Role play. - Short speech preparation and delivery. - Group discussion. - Observation and interpretation of body language. - Video-based analysis of gestures, posture and facial expressions. - Practice of eye contact, posture and paralanguage. - Peer feedback on verbal and non-verbal communication.
3	Listening, Reading and Presentation Skills (8 Hours) Listening Skills Meaning and importance of listening; types of listening; barriers to listening; strategies for improving listening skills. Reading Skills Meaning and importance of reading; strategies and steps for effective reading; identifying main ideas and supporting information; reading comprehension. Presentation Skills

	Meaning and importance of presentation skills; planning a presentation; presentation structure; organizing content; qualities of an effective presenter; use of visual aids. Suggested Learning Activities • Listening and comprehension exercises. • Identify key information from audio/video content. • Activities based on different listening purposes. • Reading and comprehension exercises. • Identify main ideas and supporting points from passages. • Prepare and organize a short presentation. • Individual or group presentation. • Use of appropriate visual aids. • Peer feedback on presentation performance.
4	Professional Written Communication (7 Hours) Meaning and importance of written communication in business; principles of effective business writing; tactful use of language; structure and formats of business letters. Business Correspondence • Letters of inquiry and replies • Letters placing orders and replies • Letters of complaint, claims and adjustments • Sales letters • Job application letters Suggested Learning Activities • Analyze model business letters. • Identify appropriate formats for different situations. • Select appropriate language for professional correspondence. • Draft responses to workplace situations. • Improve ineffective business communication. • Prepare job application letters for specified positions. • Peer review and correction of written communication.

CO Mapping, Pedagogy and Bloom's Cognitive Levels

Unit No.	CO Mapping	Pedagogy	Bloom's Cognitive Levels
Unit I	CO1	Interactive Discussion, Case Examples, Brainstorming, Situational Activities, Problem-Based Learning	L2 – Understand, L3 – Apply
Unit II	CO2	Demonstration, Role Play, Pair Activities, Speaking Exercises, Group Discussion, Video Analysis, Peer Feedback	L2 – Understand, L3 – Apply, L4 – Analyze
Unit III	CO3	Listening Exercises, Reading Activities, Demonstration, Presentation Practice, Individual/Group Activities, Peer Feedback	L2 – Understand, L3 – Apply, L4 – Analyze
Unit IV	CO4	Model Analysis, Writing Practice, Situational Tasks, Drafting Exercises, Peer Review	L3 – Apply, L4 – Analyze, L6 – Create

Reference Books				
Sr.No.	Name of the Author	Title of the Book	Year Edition	Publisher Company
1	Verma Shalini,	Business Communication	2014, 2 nd edition	Vikas Publications
2	Urmila Rai and S. M Rai,	Effective Communication	2018, 2 nd edition	Pearson Education, New Delhi
3	Shirley Taylor	Communication for Business	2005, 4 th edition	Himalaya Publishing House
4	Raymond Lesikar, Marie E Flatley,	Basic Business Communication	2005, 11 th edition	Tata McGraw – Hill

Online Resources		
Sr. No.	Resources	Website URL
1	NotesDesk – Business Communication	http://www.notesdesk.com/notes/business-communications/business-communication-and-its-types/
2	Purdue Online Writing Lab (OWL)	https://owl.purdue.edu/owl/
3	e-PG Pathshala – Business Communication Module	https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000023MA/P001399/M022616/ET/1504697696module29niti.pdf
4	edX – Business Communications	https://www.edx.org/course/business-communications-ubcx-bus2x
5	Coursera – Business	https://www.coursera.org/courses?languages=en&que

	Communication Courses	<u>ry=business%20communication</u>
6	NPTEL – Business English Communication	<u>https://nptel.ac.in/courses/109106129</u>
7	NPTEL – Enhancing Soft Skills and Personality	<u>https://nptel.ac.in/courses/109104115</u>

Programme: BCA			
Semester	Course Code	Course Title	
I	106	Lab on Algorithms and Program Design Using C	
Type of Course	Credits	Evaluation	Marks
Core Course Practical	2	UE: IA	50:50
Course Objectives:			
6. To develop practical skills in problem solving by designing algorithms, flowcharts, and pseudocode and implementing basic solutions using C programming. 7. To develop practical skills in writing C programs using character sets, tokens, data types, variables, constants, operators, expressions, type conversion, and formatted input/output. 8. To enable students to implement C programs using decision-making and iterative programming constructs for solving computational problems. 9. To enable students to develop modular C programs using functions, recursion, arrays, and string handling techniques. 10. To enable students to implement C programs using structures, unions, pointers, and dynamic memory allocation for solving application-oriented problems.			
Course Outcomes:			
After successful completion of this course, the students shall be able to: CO1: Develop algorithms, flowcharts, and pseudocode and implement basic computational problems using C. CO2: Implement C programs using variables, data types, operators, expressions, type conversion, and formatted input/output. CO3: Develop C programs using decision-making, looping, nested loops, and control transfer statements to solve computational problems. CO4: Implement modular C programs using functions, recursion, arrays, and strings for solving computational problems. CO5: Develop C programs using structures, unions, pointers, and dynamic memory allocation for application-oriented problems.			
Unit No.	Contents		
Unit I	Introduction to Problem Solving, Algorithms and C Programming (12 Practical Hours) Problem Statements Required to be Solved (but not limited to) Design an algorithm, flowchart, and pseudocode for finding the area and perimeter of different geometric shapes and implement the solution in C.		

	2. Formulate a computational solution for calculating total marks, percentage, and average of a student. 3. Translate a given problem into an algorithm and C solution for calculating simple and compound interest. 4. Solve unit-conversion problems involving temperature, distance, time, and weight. 5. Analyze a given problem to identify inputs, outputs, processing requirements, and the sequence of computational steps. 6. Convert a given pseudocode or algorithm into a C program and verify the correctness of the solution. 7. Trace and test basic C programs using suitable input values and verify the expected output. 8. Identify, diagnose, and correct syntax, compilation, and logical errors in basic C programs. 9. Apply the program development cycle to solve a simple real-world computational problem. Focus: Problem analysis, computational thinking, algorithm development, flowcharts, pseudocode, and basic program implementation.
Unit 2	Fundamentals of C Programming (12 Practical Hours) Problem Statements Required to be Solved (but not limited to) 1. Solve numerical problems involving arithmetic operations on two or more input values. 2. Determine the gross salary and net salary of an employee based on specified salary components and deductions. 3. Calculate the final payable amount for a purchase involving quantity, price, discount, and applicable charges. 4. Determine profit or loss and the corresponding percentage for a given business transaction. 5. Apply appropriate data types and type conversion to solve problems involving integer, floating-point, and character data. 6. Evaluate mathematical expressions involving multiple operators while applying appropriate precedence and associativity rules. 7. Process formatted input and output for a specified computational problem. 8. Trace given C expressions and programs for different input values and determine their outputs. 9. Analyze and correct errors related to variables, constants, data types, operators, expressions, type conversion, and input/output operations. Focus: Selection and application of fundamental C programming elements for translating computational requirements into executable solutions.
Unit 3	Decision Making and Iterative Programming (12 Practical Hours) Problem Statements Required to be Solved (but not limited to)

	1. Problem Statements Required to be Solved (but not limited to) 2. Classify numbers according to specified conditions such as positive/negative, zero, even/odd, and other required categories. 3. Determine the largest and smallest values among a given set of numbers. 4. Process student performance data and assign grades based on specified marks and grading criteria. 5. Calculate an electricity bill using specified consumption slabs and applicable billing rules. 6. Determine whether a given year satisfies leap-year conditions. 7. Analyze a given number to determine whether it is prime, palindrome, Armstrong, or satisfies another specified numerical property. 8. Generate and process numerical sequences such as factorial and Fibonacci series. 9. Process a specified range of numbers to determine required counts, sums, averages, maximum, minimum, or other properties. 10. Generate numerical and character patterns according to specified input conditions. 11. Design a menu-driven solution for performing a set of related computational operations. 12. Process repeated input values until a specified termination condition is satisfied. 13. Analyze and debug solutions containing inappropriate or incorrectly applied decision-making and iterative constructs. Focus: Selection and application of appropriate decision-making and iterative logic for solving computational problems.
Unit 4	Functions, Arrays and Strings (12 Practical Hours) Problem Statements Required to be Solved (but not limited to) 1. Decompose a computational problem into suitable functions and implement the resulting modular solution. 2. Apply user-defined functions to solve mathematical and computational problems such as factorial, GCD, and other specified operations. 3. Process a collection of numerical values using a one-dimensional array to determine sum, average, maximum, and minimum. 4. Search for specified values within an array and report their location or occurrence. 5. Determine the frequency of elements in a given collection of values. 6. Rearrange, reverse, and process array elements according to specified requirements. 7. Represent and process tabular data using two-dimensional arrays. 8. Perform matrix operations such as addition, subtraction, multiplication, and transpose. 9. Apply recursion to solve suitable computational problems.

	10. Analyze textual data to determine string length and the occurrence of selected characters. 11. Perform required string operations such as comparison, copying, concatenation, and other string processing tasks. 12. Determine whether a given string is a palindrome and report the result. 13. Classify characters in a string as vowels, consonants, digits, spaces, or special characters. 14. Integrate functions, arrays, and strings to solve a specified application-oriented problem. Focus: Problem decomposition, modular programming, recursion, collection processing, and string manipulation.
Unit 5	Structures, Unions and Introduction to Pointers (12 Practical Hours) Problem Statements Required to be Solved (but not limited to) 1. Represent and process student information using structures. 2. Maintain employee records using an array of structures. 3. Search and retrieve a record based on a specified identifier. 4. Modify and display selected information from a collection of records. 5. Process student marks and generate result information using structures. 6. Represent alternative forms of data using a union and examine its behavior. 7. Compare structures and unions with respect to their storage requirements and usage. 8. Exchange or modify data values using pointers. 9. Traverse and process array elements using pointers. 10. Process character strings using pointer-based operations. 11. Allocate memory dynamically for a collection of values and perform specified processing. 12. Apply malloc() and calloc() to manage dynamically allocated data. 13. Resize dynamically allocated memory using realloc() when the data requirement changes. 14. Release dynamically allocated memory appropriately using free() and verify correct memory management. 15. Integrate structures, pointers, and dynamic memory allocation to solve a small application-oriented problem. Focus: Selection of appropriate data representation, pointer-based processing, and dynamic memory management for application-oriented problem solving.

CO Mapping, Pedagogy and Bloom's Cognitive Levels

Unit No.	CO Mapping	Pedagogy	Bloom's Cognitive Levels
1	CO1	Problem-Based Learning, Algorithm and Flowchart Design, Demonstration, Hands-on Programming	L1-Remember, L2-Understand, L3-Apply

2	CO2	Live Coding, Guided Laboratory Practice, Problem Solving, Debugging	L2-Understand, L3-Apply
3	CO3	Problem-Based Learning, Live Coding, Hands-on Programming, Debugging	L2-Understand, L3-Apply, L4-Analyze
4	CO4	Problem-Based Learning, Modular Programming, Hands-on Programming, Code Analysis	L3-Apply, L4-Analyze, L5-Evaluate
5	CO5	Case-Based Programming, Hands-on Laboratory Practice, Application Development	L3-Apply, L4-Analyze, L5-Evaluate

Programme: BCA			
Semester	Course Code	Course Title	
I	107	Lab on Client-Side Web Technologies	
Type of Course	Credits	Evaluation	Marks
Core Course Practical	2	UE : IA	50:50
Course Objectives:			
6. To develop practical skills in creating structured web pages using HTML5. 7. To apply CSS3 techniques for styling and responsive web design. 8. To implement JavaScript for webpage interactivity and dynamic behaviour. 9. To integrate HTML5, CSS3 and JavaScript to develop functional client-side webpages			
Course Outcomes:			
CO1: Develop structured and semantically appropriate web pages using HTML5. CO2: Apply CSS3 techniques to design visually effective and responsive web pages. CO3: Implement JavaScript programs to add interactivity and dynamic behaviour to web pages CO4: Implement JavaScript events and DOM manipulation to create dynamic web interfaces. CO5: Design and develop a responsive client-side website integrating HTML5, CSS3, JavaScript, DOM manipulation, and client-side validation.			

Unit No.	Contents
Unit I	HTML5 Web Page Development (12 Practical Hours) Problem Statements Personal Profile Webpage Design and develop a personal/student profile webpage using headings, paragraphs, text formatting, hyperlinks, images and lists. College/Event Webpage Design and develop a webpage for a college, department or event using appropriate HTML5 elements, hyperlinks, images, tables and multimedia. Registration Webpage Design and develop a registration webpage using HTML5 forms, appropriate form controls and semantic HTML5 elements. Suggested Practical Activities - Create and organize an HTML5 document. - Use appropriate HTML5 elements and attributes. - Structure content using lists, tables, links and multimedia. - Create forms using suitable form controls.

	• Apply semantic HTML5 elements. CO1 Focus: HTML5 structure, semantic markup and webpage creation.
Unit II	CSS3 and Responsive Web Design (12 Practical Hours) Problem Statements 4. Styled Webpage Apply CSS3 to an existing HTML webpage using selectors, colors, fonts, backgrounds, borders, box model, classes and IDs. 5. Responsive Webpage Design and develop a responsive webpage that adapts to desktop, tablet and mobile screen sizes using media queries. 6. Responsive Layout Design a webpage layout using Flexbox and/or CSS Grid for organizing content responsively. Suggested Practical Activities • Apply inline, internal and external CSS. • Use selectors and CSS properties. • Apply the box model. • Create page layouts using positioning. • Implement responsive design using media queries. • Create layouts using Flexbox and CSS Grid. CO2 Focus: CSS styling, layout and responsive design.
Unit III	JavaScript Programming (12 Practical Hours) Problem Statements 7. Interactive Calculator Develop a JavaScript-based calculator or utility application to perform user-specified operations. 8. Student Result Application Develop a webpage that accepts student marks and dynamically calculates total, percentage, grade and result. 9. Data Processing Application Develop a JavaScript application using arrays, functions, conditional statements and loops to solve a real-world data-processing problem. Suggested Practical Activities • Use variables and data types. • Apply operators and expressions. • Implement conditional statements. • Implement loops. • Work with arrays and array methods. • Create user-defined functions. • Capture and process user input.

	• Use appropriate JavaScript built-in functions and objects. CO3 Focus: JavaScript programming and problem solving.
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Unit IV	JavaScript Events and DOM Manipulation (12 Practical Hours) Problem Statements 10. Event-Driven Webpage Develop an interactive webpage using appropriate mouse, keyboard, form or window events. 11. Dynamic Content Webpage Develop a webpage that dynamically changes its content, attributes or styles in response to user actions. 12. Interactive Web Component Develop an interactive component such as a calculator, counter, image gallery, tabs, FAQ section, accordion or to-do list using JavaScript and DOM manipulation. Suggested Practical Activities • Handle mouse and keyboard events. • Handle form events. • Access HTML elements using DOM methods. • Modify webpage content dynamically. • Modify HTML attributes using JavaScript. • Modify CSS properties dynamically. • Create interactive webpage components. • Test and debug event-driven webpages. CO4 Focus: JavaScript events and DOM-based dynamic interaction.
Unit V	Integrated Client-Side Website Development 12 Practical Hours CO5 Problem Statements 13. Client-Side Form Validation Develop a registration or feedback form with client-side validation for appropriate input fields using JavaScript. 14. Responsive Multi-page Website Design and develop a responsive multi-page website for a specified real-world application using HTML5 and CSS3. 15. Integrated Client-Side Website Design and develop a responsive client-side website integrating HTML5, CSS3, JavaScript, events, DOM manipulation and client-side form validation. Suggested Application Areas • College/Department Website

	• Student Event Website • Restaurant Website • Travel Website • Personal Portfolio • Online Course Website • Fitness Centre Website • Small Business Website Problem statements are required to be completed(not limited to the above applications). CO5 Focus: Integration of client-side technologies to develop a functional responsive website.
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CO Mapping, Pedagogy and Bloom's Cognitive Levels

Unit No.	CO Mapping	Pedagogy	Bloom's Cognitive Levels
Unit I	CO1	Demonstration, Guided Practice, Problem-Based Learning, Hands-on Practice	L3 – Apply
Unit II	CO2	Live Coding, Demonstration, Design Exercises, Hands-on Practice	L3 – Apply
Unit III	CO3	Live Coding, Problem Solving, Guided Practice, Debugging Exercises	L3 – Apply
Unit IV	CO4	Demonstration, Hands-on Practice, Problem-Based Learning, Debugging	L3 – Apply
Unit V	CO5	Project-Based Learning, Integrated Problem Solving, Demonstration, Testing	L6 – Create

Programme: BCA			
Semester	Course Code	Course Title	
I	108	MS-Office	
	Prepared by		
Type	Credits	Evaluation	Marks
OC	2	IA	50
Course Objectives:			
To develop practical proficiency in MS Word for creating and managing professional documents. • To develop practical skills in MS Excel for data management, analysis and reporting. • To develop professional MS PowerPoint presentation design and delivery skills. • To enable students to integrate Word, Excel and PowerPoint to solve real-world workplace problems through hands-on projects..			
Course Outcomes:			
After completing the course, the students shall be able to- 1. CO1: Apply MS Word features to create and manage professionally formatted documents for academic and workplace requirements. 2. CO2: Apply MS Excel functions and data-analysis techniques to process, analyse and interpret real-world datasets and generate meaningful business reports. 3. CO3: Design and deliver professional presentations using MS PowerPoint by effectively applying presentation, multimedia and collaboration features. 4. CO4: Integrate MS Word, MS Excel and MS PowerPoint to develop and present workplace-oriented solutions for real-world problems.			

Unit	Content
1	Professional Document Creation using MS Word (8 Hours): Students shall perform practical exercises covering: • Creating and managing professional documents • Formatting using styles, themes and templates • Page layout, sections, headers, footers and page numbering • Tables, images, SmartArt and shapes • References, captions, citations and automatic Table of Contents • Mail Merge for letters, certificates and labels • Forms and document protection • Track Changes, comments and collaborative editing • Resume, cover letter, business report and meeting minutes preparation • Exporting documents in different formats
2	Data Analysis and Reporting using MS Excel (12 Hours): Students shall perform practical exercises covering: Workbook Management • Workbook organisation

	• Cell formatting • Relative, absolute and mixed references Functions • Mathematical functions • Logical functions (IF, Nested IF) • Text functions • Date and Time functions • Lookup functions (XLOOKUP/VLOOKUP, INDEX-MATCH) • Statistical functions • Financial functions Data Management • Sorting • Filtering • Advanced Filter • Data Validation • Conditional Formatting Data Analysis • Charts • Pivot Tables • Pivot Charts • Slicers • Dashboard creation • What-if Analysis o Goal Seek o Scenario Manager Business Applications Students shall analyse real-world datasets involving: • Sales analysis • Payroll processing • Inventory management • Student performance • Budget preparation • Financial reporting
3	Professional Presentations using MS PowerPoint (6 Hours) Students shall perform practical exercises covering: • Presentation planning • Themes and templates • Slide Master • SmartArt • Charts • Icons • Images • Audio and video integration • Hyperlinks and action buttons • Animations and transitions • Presenter View

	• Recording presentations • Collaborative editing • Designing business presentations, start-up pitches, technical seminars and project presentations •
4	Integrated Office Productivity Project (4 Hours) Students shall complete one integrated project requiring the use of Word, Excel and PowerPoint. Illustrative projects include: • Sales Performance Dashboard • HR Analytics Report • Student Performance Analysis • Inventory Management Report • Start-ups Business Plan • Financial Budget Analysis • Placement Analysis The project shall include: • Data analysis using Excel • Professional report using Word • Business presentation using PowerPoint
	Suggested Pedagogy • 100% hands-on laboratory sessions • Demonstration–practice approach • Task-based learning using workplace scenarios • Weekly laboratory assignments • Case-based learning • Collaborative activities • Mini-projects • Faculty demonstrations followed by individual practice
	Minimum Competencies to be Demonstrated At the successful completion of the course, every student shall be able to: MS Word • Prepare professionally formatted business reports • Create resumes and cover letters • Use styles, templates and automatic Table of Contents • Perform Mail Merge • Use document review and collaboration features MS Excel • Apply mathematical, logical, lookup and financial functions • Analyse datasets using sorting, filtering and conditional formatting • Create Pivot Tables and Pivot Charts

	• Design interactive dashboards • Perform What-if Analysis • Generate business reports from real-world datasets MS PowerPoint • Develop professional presentations using Slide Master • Integrate multimedia, charts and SmartArt • Prepare business and technical presentations Integrated Skills • Integrate outputs from Word, Excel and PowerPoint to prepare professional reports and presentations • Apply Office tools to solve workplace problems
5	Laboratory Exercises Students shall complete at least 15 laboratory exercises, including: MS Word • Professional Resume • Business Letter • Business Report with Automatic Table of Contents • Mail Merge • Meeting Minutes • Fillable Form MS Excel • Student Marksheet • Payroll System • Sales Dashboard • Inventory Management • Budget Planner • Loan EMI Calculator • Attendance Tracker • Pivot Table Analysis • Interactive Dashboard MS PowerPoint • Company Profile • Start-ups Pitch Deck • Technical Presentation • Product Presentation Integrated Project One comprehensive project integrating Word, Excel and PowerPoint. Guidelines for End-Semester Practical Examination The practical examination should assess the student's ability to apply Office productivity tools in an integrated manner rather than testing isolated features. The examination may include tasks such as:

	• Preparing and analysing a business dataset in Excel. • Creating a professional report in Word using outputs generated from Excel. • Developing a presentation summarising key findings using PowerPoint. • Viva-voce based on the practical work performed.
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Reference Books				
Sr. No.	Name of the Author	Title of the Book	Year and Edition	Publisher
1	Lambert, J. & Frye, C	<i>Microsoft Office 365 and Office 2019: Step by Step</i>		Microsoft Press.
2	Shelly, G. B. & Vermaat, M. E	<i>Microsoft Office 365: Introductory</i>		Cengage Learning
3	Be Skeen, D. W., et al.,	<i>Microsoft Office 365: Illustrated</i>		Cengage Learning

Online Resources:	
Sr. No.	Resources
1	• Microsoft Learn – Official training for Microsoft 365, Word, Excel and PowerPoint; best primary resource for current features and skills. Microsoft Learn • Microsoft Support – Office – Official documentation, tutorials and feature-specific guidance for Word, Excel and PowerPoint. Microsoft Support – Office • GCFGlobal – Microsoft Office – Beginner-friendly tutorials and practical learning materials for Office applications. GCFGlobal – Office Tutorials • ExcelJet – Excellent supplementary resource for Excel functions, formulas, Pivot Tables, charts and advanced Excel techniques. • Coursera – Microsoft 365 Foundations – Structured learning covering Word, Excel and PowerPoint, with hands-on activities and workplace-oriented applications.

Programme: BCA			
Semester	Course Code	Course Title	
I	108	Yoga and Meditation	
Type	Credits	Evaluation	Marks
OC	2	IA	50
Course Objectives:			
• To provide the basic knowledge of the theory and practice of yoga so that the students learn to practice asana • To build awareness of yoga among student • To promote positive health and holistic wellness			
Course Outcomes:			
CO1: Study Yogasana, Kriya, Bandhas, Mudra, Meditation and Pranayama CO2: Demonstrate and practice Yoga exercise for wellness.			

Unit No	Content
1	Introduction (7 hr) What is Yoga? Brief history and development of Yoga. The Fundamentals of Yoga Traditional Schools of Yoga Yogic practices for health and wellness General Guidelines for Yoga Practice Prayer
2	Preparatory Exercises (8 hr) I. Neck Bending II. Trunk Movement III. Knee Movement IV. Other movements Surya Namaskara and Benefits
3	Definition, Benefits (7 hr) A. Standing Asana Tadasana, Vrikshasana, Ardha Chakrasana, Trikonasana, Virasana B. Sitting Asana Ardha Ushtrasana, Sanskarsana, Vakrasana, Vajrasana C. Pron Asana Bhujangasana, Shalabhasana, Dhanurasana, Makarasana D. Spine Asana Setubandhasana, Pawanmuktasana Sarvangasana, Savasana, Eye Exercises
4	Pranayama Meditative Postures (8 hr) : Sukhasana, Swastikasana; Vajrasana; Ardha Padmasana, Padmasana, Siddhasana Preparatory Breathing Practices Sectional Breathing (Abdominal, Thoracic and Clavicular Breathing) Yogic Deep Breathing Concept of Puraka, Rechaka and Kumbhaka OM Meditation Shuddhi Kriya Definition, Benefits, Kapalabhati Trataka Pranayama Definition, Benefits, Nadi Sodhana / Anuloma Viloma Bhramari Pranayama

Reference Books:

Sr.No.	Name of the Author	Title of the Book	Year Edition	Publisher Company
1	Goyandka, Harikrishandass	Yoga Darshan	2010	Geeta Press, Gorakhpur
2	Dhirendra Brahmachari	Yogic Suksma Vyayama	1986	Dhirendra Yoga Publications, New Delhi,
3	Joshi, K.S.	Yoga in daily life	1985	Orient paper backs Delhi
4	Vishwas Mandlik	Yoga Parichay		
5	Saraswati, Swami Satyananda	Asana, Pranayama, Mudra, Bandha	2006	Yoga Publications Trust Bihar School of Yoga, Munger,

Online Resources:

Sr.No	URL
1	https://yoga.ayush.gov.in/public/assets/front/pdf/CYPEnglishLeaflet.pdf

Programme: BCA			
Semester	Course Code	Course Title	
I	108	Constitution of India & Human Rights	
Type	Credits	Evaluation	Marks
OC	2	IA	50
Course Objectives:			
i) To impart knowledge about Constitution of India . ii) To develop decision making capabilities of the students /learners iii) To impart knowledge of human rights. iv) To sensitize the students about environmental issues and sustainable consumption			
Course Outcomes:			
At the successful completion of the course the learner will be able to CO1: Demonstrate an understanding of Constitution of India. CO2: Communicate effectively with various stakeholders of business CO3: Make sound business decisions. CO4: Collaborate with others in the organizational context, manage resources and lead them in the pursuit of organizational goals CO5: Identify the need for and engage in lifelong learning in the field of business management CO6: Create sustainable and ethical business policies			
Unit	Contents		
1	Constitution of India- Introduction		
2	Constitution of India- Fundamental rights & duties		
3	Human Rights – UDHR		
4	National Human Rights Commission		
5	International Human Rights Treaties		

Reference Books

Sr.No.	Name of the Author	Title of the Book	Year Edition	Publisher Company
01	Government of India	The Constitution of India	2012	Government of India
02	Jack Donnelly	Universal Human Rights	2013	Cornell University Press, 3rd Edition.

03	Asrti Singh, Shivani Singh	National Human Rights Commission :Prevention of Human Rights Violation,	2014	LAP Lambert Academic Publishing
04	Philip Alston	The Future of UN Human Rights Treaty Monitoring	2000	Cambridge University Press

Online Resources

Online Resources No.	Website address
1	https://cdn1.sph.harvard.edu/wp-content/uploads/sites/134/2016/07/Human-Rights- A-brief-intro-2016.pdf

MOOCs:

Resources No.	Website address
1	https://www.mooc.org
2	Swayam