



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 DEGREE**

(THREE YEARS) / HONORS (FOUR YEARS) FRAMED

AS PER NATIONAL EDUCATION POLICY (NEP 2020)

SYLLABUS

Applicable with effect from 2026-27

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Bharati Vidyapeeth (Deemed to be University), Pune

Faculty of Management Studies

Bachelor of Computer Application (Honors) FOUR YEARS

Revised Course Structure (To be effective from 2022-2023)

I. Preamble

The Bachelor of Computer Application (Honors) Programme is a full time 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. The expectations and requirements of the Software Industry, immediately and in the near future, are considered while designing the BCA programme. While designing the BCA Programme, the above facts 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 learning and evaluation.
- To further creativity and pursuit of excellence in computer applications.

V. Learning Outcome Based Curriculum Framework –

1. Programme Objectives

The Bachelor of Computer Application (Honors) Four Years degree programme has the following objectives.

- I. To prepare the youth to take up positions as system analysts, system engineers, software engineers and programmers.
- II. To aim at developing 'systems thinking' 'abstract thinking', 'skills to analyze and synthesize', and 'skills to apply knowledge', through 'extensive problem solving sessions', 'hands on practice under various hardware/software environments' and 'projects developed'.
- III. To prepare students with 'social interaction skills', 'communication skills', 'life skills', 'entrepreneurial skills', and 'research skills' which are necessary for career growth and for leading

quality life are also imparted.

2. Program Outcomes (POs)

On completion of BCA (Honors) Four Year Degree Programme the expected programme outcomes that a student should be able to demonstrate are the following:

PO1. Computational Knowledge: Understand and apply mathematical foundation, computing and domain knowledge for the conceptualization of computing models from defined problems.

PO2. Problem Analysis: Ability to identify, critically analyze and formulate complex computing problems using fundamentals of computer science and application domains.

PO3. Modern Tool Usage: Ability to select modern computing tools, skills and techniques necessary for innovative software solutions

PO4. Professional Ethics: Ability to apply and commit professional ethics and cyber regulations in a global economic environment.

PO5. Project Management: Ability to understand management and computing principles with computing knowledge to manage projects in multidisciplinary environments.

PO6. Communication Efficacy: Communicate effectively with the computing community as well as society by being able to comprehend effective documentations and presentations.

PO7. Societal & Environmental Concern: Ability to recognize economical, environmental, social, health, legal, ethical issues involved in the use of computer technology and other consequential responsibilities relevant to professional practice.

PO8. Innovation and Entrepreneurship: Identify opportunities, entrepreneurship vision and use of innovative ideas to create value and wealth for the betterment of the individual and society.

3. Programme Specific Outcomes (PSOs) :

After the completion of the course, a student is able to

PSO1 : Ability to learn the various programming languages with database concepts along with development environment

PSO2 : Ability to apply theoretical and practical knowledge to solve business problems through data communication technology concepts.

PSO3 : Flourish the innovation and research attitude to develop IT artifact.

PSO4 : Foster analytical and critical thinking abilities for efficient programming

PSO5 : Demonstrate and apply the programming knowledge to develop effective software solution.

PSO6 : Enrich the knowledge in the areas of Advanced technologies and business practices.

PSO7 : Maintain the personality with environmental and social concerns

4. Graduate Attributes:

After completing BCA (Honors) Four Year Degree programme the students will be able to acquire following attributes and skills to groom the overall personality.

GA01: Competence (strong foundational knowledge, skills and attitudes) in providing professional service

GA02: Ability to make decisions based upon critical thinking and reasoning

GA03: Readiness to identify, assess and respond to the needs of individuals, organizations and society

GA04: Service within the ethical, professional and legal framework

GA05: Readiness to lead and be led to provide service as a professional, as a researcher, as a manager, as an educator and as an advocate of best practices

GA06: Sensitivity and commitment to environmental conservation and sustainability in the professional and personal spheres

GA07: Valuing the diversity of Indian culture, ethos and knowledge system

GA08: Self-directed and lifelong learner for continuous professional and personal development

GA09: Effective communicator while providing professional service

GENERAL COURSE STRUCTURE & THEME

A. Definition of Credit:

1 Hr. Lecture (L) per week	1 Credit
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. Eligibility Criteria for admission:

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 with satisfying the conditions 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.

VIII. Grading System for Programmes under Management Studies

- **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 Adapted for Programmes under FMS

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
$5.5x \leq \text{Marks} \leq 8x$	Truncate $(M/x) + 2$
$4x \leq \text{Marks} \leq 5.5x$	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 **40** and **60** 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:

- Attendance*
- Class Tests*
- Presentations*
- Class Assignments*
- Case studies*
- Practical Assignments*
- Mini Projects*
- Oral*

IX. Standard of Passing:

For all courses, both UE and IA constitute separate heads of passing. 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 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 60% and 40% respectively.

GPA is calculated by adding the UE marks out of 60 and IA marks out of 40. 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:

% marks (CGPA)	10 * CGPA-10	If $5.00 \leq CGPA < 6.00$
	5 * CGPA+20	If $6.00 \leq CGPA < 8.00$
	10 * CGPA-20	If $8.00 \leq CGPA < 9.00$
	20 * CGPA-110	If $9.00 \leq CGPA < 9.50$
	40 * CGPA-300	If $9.50 \leq CGPA \leq 10.00$

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

XI. Rules of ATKT

- For admission to Semester V of BCA Third year, Students/Learners should pass all the courses under Sem I and II.
- For admission to Semester VII of BCA Fourth year, Students/Learners should pass all the courses under Sem I, II, III and IV.

XII. INTERNSHIP

At the end of Semester VI, 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. Course 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			UE	IA	Total Marks
				L	T	P			
101	Algorithms and Program Design using C	Core Course	3 +2	2	1	2	60	40+50	150
102	Mathematical Foundation	Core Course	3	2	1	0	60	40	100
103	Foundations of Computing	Core Course	3	2	1	0	60	40	100
104	Communication Skills	AEC	2	1	1	0	0	50	50
105	Client-Side Web Technologies (HTML, JavaScript and CSS)	Core Course	3+2	2	1	2	60	40+50	150
106	Any one course from bucket of open Courses	Open Course	2	1	1/0	0/1	0	50	50
		Total	20	10	5	5			600

Open courses Bucket : Ms-Office , Constitution of India, IKS- Yoga & Wellness

SEMESTER II

Course Number	Course Title	Course Type	Credits	Hours / Week			UE	IA	Total Marks
				L	T	P			
201	Database Management Systems	Core Course	3	2	1	0	60	40	100
202	Object oriented programming with Java	Core Course	3 + 2	2	1	2	60	40+50	150
203	Operating system	Core Course	3	2	1	0	60	40	100
204	Python Programming	Core Course	3 + 2	2	1	2	60	40+50	150
205	Cyber Security	VAC	2	1	1	0	0	50	50
206	Environmental Studies	VAC	4	2	1	1	0	50	50
Total			22	12	5	11	360	340	600

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.
2. **Work-Based Vocational Course:** A vocational course offered during the summer term that emphasizes hands-on training and workplace readiness.
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.

Social Responsibility & Community Engagement: Active engagement with an NGO or community organization for a minimum duration of 08 weeks, focusing on real-world and specifics of these additional credits will be determined by the respective **University/Admitting Body**, and students will be required to complete the 08-week program during the summer term following their second semester.

The exiting students will clear the subject / submit the Internship Report as per the University schedule.

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

The student who takes an exit after one year with an award of certificate 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			UE	IA	Total Marks
				L	T	P			
301	Software Engineering	Core Course	3	2	1	0	60	40	100
302	Data Structure using C	Core Course	5	2	1	2	60	90	150
303	Data Management with Oracle / MySQL	Core Course	5	2	1	2	60	90	150
304	SP1-E1	DSE	3	2	1	0	-	100	100
305	SP2-E1	DSE	3	2	1	0	-	100	100
306	Business Statistics using MS-Excel	VAC	2	1	0	1	0	50	50
			21	10		7	4	180	370

SEMESTER IV

Course Number	Course Title	Course Type	Credits	Hours / Week			UE	IA	Total Marks
				L	T	P			
401	Artificial Intelligence & Machine Learning	Core Course	3+2	2	1	2	60	40	100
402	Computer Network	Core Course	3	2	1	0	60	40	100
403	Dot Net Programming	Core Course	3+2	2	1	2	60	40	100
404	SP1-E2	DSE	3	2	1	0	60	40	100
405	SP2-E2	DSE	3	2	1	0	60	40	100
406	Any one course from bucket of open Courses)	VAC	2	0	2	0	0	50	50
407	Minor Project 1		2	0	0	2	60	40	100
		Total	23	10	7	6	360	290	650

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 Diploma 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			UE	IA	Total Marks
				L	T	P			
501	Software Project Management	Core Course	3	2	1	0	60	40	100
502	Cloud Computing	Core Course	3	2	1	0	60	40	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 Course	3	0	0	3		100	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	0	50	50
			20	8	6	6	120	530	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		UE		IA	Total Marks
				L	T	P			
601	Object Oriented Analysis and Design	Core Course	3	2	1	0	60	40	100
602	Business Intelligence and Data visualization	Core Course	5	2	1	2	60	90	150
603	SP1-E4	DSE	3	2	1	0	-	100	100
604	SP2-E4	DSE	3	2	1	0	-	100	100
605	Any one course from bucket of open Courses	Open Course	2	1	1	0	0	50	50
606	Minor Project 2	Project	4	0	0	4	60	40	100
		Total	20	9	5	6	180	420	600

OPEN COURSE -Gen AI Fundamentals / Entrepreneurship Development / Innovation and Start-up Management

SEMESTER VI

Course Number	Course Title	Course Type	Credits	Hours / Week			UE	IA	Total Marks
				L	T	P			
601	MOOC / Object Oriented Analysis and Design *	MDC	2	1	1	0			
602	MOOC / Business Intelligence and Data visualization *	MDC	2	1	1	0			
603	Capstone project or Internship project	Core Course	10	0	0	10	250	100	350
604	SP1-E4	DSE	3	2	1	0	-	100	100
605	SP2-E4	DSE	3	2	1	0	-	100	100
		Total	20	4	2	10	250	300	550

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

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

SEMESTER VII BCA Honours

Course Number	Course Title	Course Type	Credits	Hours / Week			UE	IA	Total Marks
				L	T	P			
701	SG-1-E5	Core Course	3	2		1	60	40	100
702	SG-1-E6	DSE	3	2		1	60	40	100
703	SG-2-E5	Core Course	3	2		1	60	40	100
704	SG-2- E6	DSE	3	2		1	60	40	100
705	Internship / Major Project (8)	DSE	8			8	120	80	200
		Total	20	8		12	120	480	600

SEMESTER VIII

Course Number	Course Title	Course Type	Credits	Hours / Week			UE	IA	Total Marks
				L	T	P			
801	SG-1-E7	Core Course	3	2		1	60	40	100
802	SG-1-E8	DSE	3	2		1	60	40	100
803	SG-2-E7	Core Course	3	2		1	60	40	100
804	SG-2- E8	DSE	3	2		1	60	40	100
805	Major Project (specialization domain)	DSE	8			8	120	80	200
		Total	20	8		12	120	480	600

SEMESTER VII (BCA - Honours with Research)

Course Number	Course Title	Course Type	Credits	Hours / Week			UE	IA	Total Marks
				L	T	P			
701	Research Methods in Computer Science	Core Course	3	2	1		60	40	100
702	Computational Research Methods	Core Course	3	2	1		60	40	100
703	Research Synthesis Methods (systematic LR & Bibliometric Analysis)	Core Course	3	2	1		60	40	100
704	Literature Review Seminar	Core Course	3		3			100	100
705	Internship/ Major Project (in research domain)	Core Course	8			8	120	80	200
		Total	20	6	6	8	300	300	600

SEMESTER VIII

Course Number	Course Title	Course Type	Credits	Hours / Week			UE	IA	Total Marks
				L	T	P			
801	Experimental Design & Statistical Analysis	Core Course	3	2	1		60	40	100
802	Applied Research in Computer Science	Core Course	3	2	1		60	40	100
803	Academic Writing, Research Ethics and Intellectual Property Right	Core Course	2	2			60	40	100
804	Dissertation (12) (on research study in computer domain)	Core Course	12			12	180	120	300
		Total	20	6	2	12	360	240	600

XIV. 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 CBCS– Revised Syllabus w.e.f.-Year 2026 –2027			
Semester	Course Code	Course Title	
I	101	Algorithms and Program Design Using C	
	Prepared by	Dr. D. V. Sahasrabuddhe	
Type of Course	Credits	Evaluation	Marks
CC	5	UE(60)+IE(90)	150
Course Objectives:			
- To analyze the problem and design steps to find solution for the problem. - To develop skills to write algorithms for the solution for the problem. - To learn writing, compiling and executing simple programs using C language. - Focus on semantics and problem solving.			
Course Outcomes:			
After completing the course the students shall be able to- CO1 - To understand and apply problem solving approach using procedural technique. CO2 - To understand and write C programs to solve various problems. CO3 - To understand and write structured programs using C. CO4 – to understand and apply concepts like arrays, pointers and use of User defined Datatypes for complex problems.			

Unit	Content	Sessions	COs Number	Teaching Methodology	Cognition Level	Evaluation Tools
1	Introduction to Algorithm Concept, of Problem, Problem Solving Steps. Procedure and Algorithm Flow – Charts, writing simple algorithms for accepting input, processing input with simple expressions like sum, difference, area of polynomials, swapping etc. , Tracing of Algorithms.	5	CO1	Lecture	Understand	Quiz Short Answers
2	Introduction to C Language History, Features of C Language, Structure of C Program, compilation process of a C program, Character set, C Tokens, Keywords, Data Types, Identifiers, Variables and Constants, Comments. Concept of header files, Preprocessor directives - #include Input and output functions (formatted and unformatted). Concept of Operators in C, Types of operators, Precedence and Associativity of operators, Expressions, Writing simple C programs for algorithms from unit 1.	10	CO1, CO2	Lectures with PPTs	Understand	Quiz Short Answers

3	Statements in C Types of statements in programming language. Decision making Statements in C – if, if – else, nested if-else, switch. Writing algorithms for if-else problems like finding minimum/maximum of 2 and 3 numbers etc. and converting algorithms to C program. Writing menu driven programs using switch. Introduction Looping statements and difference between top tested and bottom tested looping statements. Looping statements in C – while, for, do-while. Analyzing and Writing algorithms for looping problems and converting algorithms to C programs. break and continue statements, goto, exit function in C	10	CO1, CO2	Lectures with PPTs	Create	Quiz Short Answers
4	User Defined Functions and Pointers in C Storage classes and variables. Introduction to concept of structured Programming. Concept of UDFs in C, Function declaration and function definition. ‘return’ statement in function. Function ‘main()’. Writing simple functions without parameters and calling function in ‘main()’. Need and concept of Passing parameters to functions. Returning values to calling function. Concept and effect of ‘Call by value’. Concept of Recursion and simple problems on recursion. Concept of pointers and use of pointers in Program. Declaring and Initializing pointer variable. Operators used with pointers - Indirection operator and address of operator, Pointer arithmetic. Concept of ‘Call by Reference’ in UDFs. Simple problems on UDFs and pointers	10	CO3, CO4	Lectures with PPTs	Create	Quiz Short Answers
5	Arrays, Strings, Structures and unions in C Concept of Arrays, Types of Arrays. Defining and using arrays in C programs. Using one dimensional and two dimensional arrays in C. Role of pointers in allocation of an array. Simple programs for processing array elements. Concept of Strings. Header file ‘string.h’ and simple functions for processing strings. Concept of User defined Datatypes. ‘sizeof()’ function in C.	10	CO4	Lectures with PPTs	Create	Quiz Short Answers

	Concept of structure. Defining and using structures in C program. Simple programs to define, process structure data in C. Concept of union. Simple program to demonstrate difference between structure and union.					
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Reference Books:

Sr.No.	Name of the Author	Title of the Book	Year Edition	Publisher Company
1	Yashwant Kanetkar	Let us C	2018	BPB Publications
2	B.W.Kernighan, D.M.Ritchie	The 'C' programming language	1998	PHI
3	Balaguruswami	Programming in ANSI C	2019	TMH

Online Resources:

Online Resources No.	Website address
1	https://www.tutorialspoint.com/cprogramming
2	https://www.javatpoint.com/c-programming-language-tutorial
3	https://www.w3schools.in/c

MOOCs:

Resources No.	Website address
1	NPTEL / Swayam
2	www.edx.com
3	www.coursera.com

Programme : BCA CBCS –Revised Syllabus w.e.f. - Year 2026 – 2027			
Semester	Course Code	Course Title	
I	102	Mathematical Foundations	
	Prepared By	Dr. D.V.Sahasrabuddhe	
Type	Credits	Evaluation	Marks
CC	3	UE(60)+IE(40)	100
Course Objectives:			
• Get familiar with discrete structures of mathematics and its application in computational theory. • Model the given data in set structure also Set relation among data description. • Define the function and identify the types of function • Represent the facts in logic statements and resolve the given problem			
Course Outcomes :			
CO1: To understand discrete structures like sets, matrix, relations etc.(Understand) CO2 : To solve problems by carrying out various operations on structures (Apply) CO3 : To apply proper structure for representing given data (Apply) CO4 : To construct logic circuits for given Boolean expression (Create) CO5 : To test truthiness of the statement (Analyse)			

Unit	Content	Sessions (Hrs)	COs Number	Teaching Methodology	Cognition Level	Evaluation Tools
1	Set Theory Definition of a set, Representation of elements of sets, Methods of representing sets, types of sets, operations on sets(Union, intersection, complements, difference, symmetric difference), Laws of algebra of sets, partitions, power sets, cardinality of a set, Principle of Inclusion and Exclusion, , Venn Diagram, Proof by using Venn diagram	8	CO1, CO2, CO3	Lecture, problem solution, Quiz	Understand, Apply	Short Answers, Problem Solving Skills
2	Functions and Relations Definition of Function, Types of Functions, Invertible function, Composite Function, Relation definition, representation of relations, composition of relations, Types of Relations, Equivalence Relations	8	CO1, CO2, CO3	Lecture, problem solution, Quiz	Understand, Apply	Short Answers, Problem Solving Skills
3	Logic	9	CO1, CO2,	Lecture,	Understand,	Short

	Propositions, Logic Operations-Negation, Disjunction, Conjunction, Conditional and Biconditional, Truth Tables of compound propositions, Translating English sentences in to logical statements and vice versa, Logic gates and circuits		CO4, CO5	problem solution, Quiz	Apply, Analyze, Create	Answers, Problem Solving Skills
4	Matrices Matrix Definition, General Form, Representation of matrix in computers, Types of matrices, Operations on matrices: Addition, Subtraction and Multiplication, transpose, row / column transformations, Inverse of the matrix by Co-factor and Adjoint method, solutions to three variable problems by using matrices, applications of Matrices in Computer Applications	10	CO1, CO2, CO3	Lecture, problem solution, Quiz	Understand, Apply	Short Answers, Problem Solving Skills
5	Permutations, Combinations and Probability Concept- Permutation, Combination, Sum and Product rules, problems on Permutation and combination (with wording atleast, atmost, neither nor, any one etc.) Introduction to probability, conditional probability, Bayes Theorem	10	CO1, CO2, CO3	Lecture, problem solution, Quiz	Understand, Apply	Short Answers, Problem Solving Skills

Reference Books

Sr. No.	Name of the Author	Title of the Book	Year Edition	Publisher Company
1	Kenneth Rosen	Discrete Mathematics & its Applications, 6 th Edition	2007	Tata Mc Graw Hill
2	Semyour Lipschutz & Marc Lipson	Discrete Mathematics, 2 nd Edition	Reprint 2010	Tata Mc Graw Hill

MOOC:

Resources No.	Web site address
1	NPTEL Swayam
2	www.coursera.com
3	www.edx.com

Programme: BCA-CBCS–RevisedSyllabusw.e.f.- Year2022–2023			
Semester	Course Code	Course Title	
I	103	Foundation of Computing	
	Prepared by	Dr. D.V.Sahasrabuddhe	
Type	Credits	Evaluation	Marks
DSC	3	UE(60)+IE(40)	100
Course Objectives:			
The main objective is to introduce IT in a simple language to all undergraduate students, regardless of their specialization. It will help them to pursue specialized programs leading to technical and professional careers and certifications in the IT industry. The focus of the subject is on introducing skills relating to IT basics, computer applications, programming, interactive medias, Internet basics.			
Course Outcomes:			
After completing the course the students shall be able to CO1: Understand basic concepts and types of Computers, memory devices and software. CO2: Remember types of computers and its peripherals CO3: Demonstrating MS-office tools for data processing, mathematical operations in worksheets, presentations. CO4: Analyse the use of various components of computer			

Unit	Content	Sessions (Hrs)	COs Number	Teaching Methodology	Cognition Level	Evaluation Tools
1	Computer-Definition, Characteristics, Block Diagram of computer, Concept of Hardware, Software, Evolution of computer and Generations Types of Computers – Analog and Digital computers, Hybrid Computers, General Purpose and Special Purpose Computer Limitations of Computer, Applications of Computer in Various Fields. Number systems- Decimal, Binary, Octal, Hexadecimal, Number System Conversions, Binary Arithmetic, Addition and subtraction of BCD, Octal Arithmetic, Hexadecimal Arithmetic, Fundamental concepts of Error detecting and correcting codes, Concept of coding systems - ASCII, EBCDIC, Excess- 3 Code, The Gray Code.	9	CO1	As per individual faculty discretion	Remember	As per individual faculty discretion

2	Hardware Components - Input Device – Keyboard, Mouse, Scanner, MICR, OMR. Output Devices – VDU, Printers – Dot Matrix, Daisywheel, Inkjet, Laser, Line Printers and Plotters.	8	CO1, CO2	As per individual faculty discretion	Understand	As per individual faculty discretion
3	Memory Organization - Memory Cell, Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory, Virtual Memory, Memory Management Hardware. Semiconductor Memory – RAM, ROM, PROM, EPROM Secondary Storage Devices – Magnetic Tape, Magnetic Disk (Floppy Disk and Hard Disk), Compact Disk.	8	CO2	As per individual faculty discretion	Analyze	As per individual faculty discretion
4	Software Components - Software and its needs, Types of Softwares. System Software: Operating System, Utility Programs Application S/W and its types: Word Processing, Spread Sheets Presentation, Graphics, DBMSs. Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Concept of Network – Types of networks, Basic Elements of a Communication System, Data Transmission Media.	8	CO4	As per individual faculty discretion	Create	As per individual faculty discretion
5	• MS Office: Introduction to MS Office, Components and Features. • MS Word: Creating Letter, Table, Fonts, Page Layout Document, Formatting, Spell Check, Print Preview, Template, Color, Mail Merge, Auto Text, Inserting Picture, Word Art. • MS Excel: Introduction to Excel, Sorting, Queries,	12	CO3	As per individual faculty discretion	Create	As per individual faculty discretion

	Graphs, Scientific Functions. • PowerPoint: Introduction to PowerPoint, Creation of Slides, Inserting Pictures, Preparing Slide Show with Animation. MS Access: Creation and Manipulation of Files.					on
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Reference Books

Sr.No.	Name of the Author	Title of the Book	Year Edition	Publisher Company
1	Dromey	How to solve computer	2015, 3 rd edition	PHI Publication
2	P. K. Sinha	Computer Fundamentals	12 th edition	PBP Publication
3	V. Rajaraman	Computer Fundamentals	6TH EDN. 2014	PHI Publication

Online Resources

Online Resources No.	Website address
1	www.edx.com
2	www.coursera.com

MOOCs:

Resources No.	Website address
1	Alisons
2	Swayam

Programme: BCA-CBCS–RevisedSyllabusw.e.f.-Year2022–2023			
Semester	Course Code	Course Title	
I	104	Communication Skills	
	Prepared by	Dr. Amarja Nargunde	
Type	Credits	Evaluation	Marks
DSC	2	IE(50)	50
Course Objectives:			
- To acquaint students in managerial communication from every perspective that is globallydemanding. - To acquaint students with the required skills for effective communication in businessorganizations - To enable students to develop confidence and expertise in composing effective communication skills essential in Business Situations			
Course Outcomes:			
After completing the course the students shall be able to CO1: Explain the fundamentals and process of business communication CO2: Demonstrate effective verbal communication skills CO3: Apply non-verbal communication techniques effectively. CO4: Develop listening, reading and presentation skills. CO5: Draft effective business letters and professional written communication.			

Unit	Content	Sessi ons (Hrs)	COs Numbe r	Teaching Methodo logy	Cognitio n Level	Evaluatio n Tools
1	Concept and Nature of Communication Meaning and Introduction, Importance and Nature of Communication. Process and Objectives of Communication. Channels of Communication, Barriers to Communication, Overcoming barriers, Seven C's of effective communication	12				
2	Verbal Communication Verbal Communication (oral) – Meaning, Advantages, Disadvantages, Essentials of effective oral communication, Types. Speaking Skills – Meaning and importance –Guidelines for preparing a Speech – Strategies for good conversation Exercises on Verbal communication.	12				

3	Non – Verbal Communication Meaning , Importance, Uses of non verbal communication, Body Language, Gestures, Postures, Para Language, non verbal aspects of written communication.	12				
4	Listening, Reading Skills, Presentation Skills Listening Skills – Meaning and importance – Types – Listening Barriers – Overcoming barriers to improve Listening skills. Exercises on Listening Skills, Reading Skills – Meaning and importance – Steps for better reading. Exercises to improve Reading Skills , Introduction and importance, Planning the Presentation. Presentation Structure. Organizing the Presentation. Qualities of a skillful Presenter. Use of Visual aids in Presentation.	12				
5	Written Communication Writing Skills – Meaning and importance of written communication in business, Business Letters : Tactful use of language – Structure of a Business letter - Business letter formats – Types of letters: Letters of inquiry and Reply, Letters placing orders and reply, Letter of Complaint, Claims and Adjustments, Sales letters, Job application letters.	12				

Reference Books

Sr.No.	Name of the Author	Title of the Book	Year Edition	Publisher Company
1	Verma Shalini,	Business Communication		Vikas Publications
2	Urmila Rai and S. M Rai,	Effective Communication		Pearson Education, New Delhi
3	Shirley Taylor	Communication for Business		Himalaya Publishing House

4	Raymond Lesikar, Marie E Flatley,	Basic Business Communication		Tata McGraw – Hill
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Online Resources

OnlineResourcesNo.	Websiteaddress
1	http://www.notesdesk.com/notes/business-communications/business-communication-and-its-types/

MOOCs:

ResourcesNo.	Websiteaddress
1	https://eDx.com/: https://www.edx.org/course/business-communications-ubcx-bus2x
2	https://Coursera.com/: https://www.coursera.org/courses?languages=en&query=business%20communication

Programme: BCA CBCS– Revised Syllabus w.e.f.-Year 2022 –2023			
Semester	Course Code	CourseTitle	
I	105	Client-Side Web Technologies (HTML JavaScript and CSS)	
	Prepared by	Dr. Suvarna Patil	
Type of Course	Credits	Evaluation	Marks
CC	5	UE(60)+IE(40)	150
Course Objectives:			
Objectives :			
To learn Web Supporting Technologies and develop website			
Course Outcomes:			
CO1: To remember basic concepts of Web Supporting Technologies. CO2: To understand syntaxes of HTML, HTML5, CSS and JavaScript CO3: To design web pages by applying HTML, HTML5, CSS and JavaScript. CO4: To analyze and solve real life problem using web supporting technology given in the syllabus.			

Unit	Content	Sessions (Hrs)	COs Number	Teaching Methodology	Cognition Level	Evaluation Tools
1	Overview of HTML ,concept of Tag, types of HTML tags, structure ofHTML program, Text Formatting Through HTML EmphasizingMaterial in a Web Page, Using Image tag, attributes of Image tag, Block Element, Inline Elements. Lists: Unordered, Ordered, lists. Tables: Add Table, Define header rows & data rows, use of caption tag, changing height & width of table, BGcolor, cell padding, cell spacing, colspan, row span, imagesin table, Frames: Introduction To frames, using frames &	10	CO1, CO2	Explanation, Demo, PPT	Understand	Q-A in class, Quiz, theory assignment, Lab assignments,

	framesets, named frames. Hyperlink - Types of hyperlinks, linking to the beginning of document, linking to a particular location in a document, image as hyperlinks					
2	HTML5 Introduction to HTML5, Features of HTML5, Elements of HTML5, HTML Media and Graphics	7	CO1, CO2	Explanation Demo, PPT,	Remember	Q-A in class, Quiz, theory assignment, Lab assignments
	Cascading Style Sheets Introducing CSS, Types of style sheets: inline, embedded and external style sheets, working with CSS properties: text properties, color and background properties, border and shading, box and block properties, positioning with CSS, various types of CSS selectors, Using class and span tag, External style sheets,	7	CO1, CO2, CO3	Explanation, Demo, PPT	design	Q-A in class, Quiz, theory assignment, Lab assignments, Case based example solving
4	Introduction to JavaScript (Client-Side Scripting): Introduction to scripting, overview of Java Script, advantages, client-side java Script, capturing user input, writing JavaScript into HTML, Advantages and limitations of JavaScript, JavaScript Basics: Data types, literals, variables and operators, Java Script arrays, array methods, expressions. JavaScript Programming Constructs: Assignment, data declaration, if, switch, while, for, do while, label, break, continue, function call,	12	CO1, CO2, CO3, CO4,	Explanation, Demo, PPT	Analyze	Mini projects, team work,

	return, with, delete, method of invocation Dialog boxes -Alert dialog box, prompt dialog box, confirm dialog box, window objects JavaScript Functions- Types of functions in JavaScript- Built in functions, User defined functions, function declaration, passing parameters, variable scope, return values.					
	Forms: Interactive web pages concepts, difference between static & dynamic web pages, Concept of form, how form works, Different elements - text, password, button, submit, reset, checkbox, Radio, Text Area, select & option, properties of form elements, form object's Method, Other built-in Object: String object, math object, date object, Regular Expressions, Form validation JavaScript Events: What is an Event? Onclick Event Type, onsubmit Event Type, onmouseover and onmouseout, onchange, onload, onkeydown, working with DOM.	9	CO1, CO2, CO3, CO4	Explanation, Demo, PPT	Create	Case Presentation on Activity End Term: Theory Applied

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