SCHEME OF EXAMINATION

SYLLABI

for

Bachelor of Computer Applications (BCA)
Scheme and Syllabus (w.e.f. Academic Session 2024-25)
As per UGC Curriculum & Credit Framework for Undergraduate Programme (CCFUP) (Dec 2022)

Offered by

**University School of Information, Communication & Technology GGSIPU
at Affiliated Institutions of the University**

GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY

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Vision of the School

Create High-Quality Engineering and Computer Application Professionals

Mission of the School

To serve humanity by creating professionally competent, socially sensitive engineers with high ethical values who can work as individuals or in groups in multicultural global environments.

Approval History:

  1. Scheme of study of BCA programme, its first year detailed syllabus and implementation rules approved by Board of Study of University School of Information, Communication and Technology on 15.12.2023.

  2. Scheme of study of BCA programme, its first year detailed syllabus and implementation rules approved by Academic Council on 20.12.2023.

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Bachelor of Computer Applications Curriculum Framework as per CCFUP

Aim: In accordance with the revised UGC Curriculum and Credit Framework for Undergraduate Programmes, the Bachelor of Computer Applications (BCA) programme w.e.f academic session 2024-25 curriculum framework shall be as follows:

The BCA programme covers basic to advanced level concepts in Computer Science, Computer Applications and Information Technology. The theoretical concepts in class room teaching and hands on machine experience in digital laboratories using computer program using computers and standard tools widen the horizon of the students. With the acquired knowledge, students can solve the problems in various domains using computers.

Eligibility Criteria: The students are required to refer the eligibility criteria provided in the admission brochure for BCA programme for the specific academic session. As per the Admission Brochure for the Academic Session (AS) 2023-24, the eligibility criteria for BCA programme is as follows:
"Pass in 12th Class of 10+2 of CBSE or equivalent with a minimum of 50% marks in aggregate* with pass in English (core or elective or functional). Mathematics or Computer Science / or other subject related to Computer Science".
<center>OR</center>
"Three-year Diploma in a branch of Engineering from a polytechnic duly approved by All India Council for Technical Education and affiliated to a recognized examining body with a minimum of 50% marks in aggregate".

Duration of the BCA Programme, Provision of Multiple Exit and Awarding Certificate, Diploma, and Degrees

The maximum duration of programme will be as per regulations and recommendations of the statutory bodies governing the BCA programme. As per existing UGC CCFUP, the total duration for completing the BCA programme from the date of admission in first year to completion of Certificate / Diploma / 3 years' degree/ 4 years Hons. degree (including Breaks) shall not exceed 7 years. The detailed qualification award (Certificate / Diploma/ Degree), exit options and other requirement is given in Table1. Grading System shall be as per Ordinance 11 of the University.

Table1: Duration and qualification Award Details:

No of years of completion	Qualification Awarded	Exit Options	Credit Requirement	Entry Option	Remarks
One Year (I & II Semester)	BCA Certificate	Students have an option of exiting the programme after completion of first year (Semester I and semester II)	Students are required to complete Minimum 52 credits including vocational course which is mandatory.	Students who exit with a BCA certificate are permitted to re-enter within three years from the date	Students are required to secure minimum 48 credits during first year and 4 credits in work based vocational courses during summer break after first year. ii. Students may be permitted to take a break from the study during the period of BCA programme but the total duration for completing the BCA

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				when student took break and may complete the BCA programme.	programme from the date of admission in first year shall not exceed 7 years.
Two Years (I to IV Semesters)	BCA Diploma	Students have an option of exiting the programme after completion of second year (Semester III & IV)	Students are required to complete Minimum 96 credits and also secure 4 credits in skill based vocational course either offered after first year or after second year during the summer break time.	Students who exit with a BCA diploma are permitted to re-enter within three years from the date when student took break and may complete BCA programme.	i. Students exiting the programme after securing 96 credits in initial two years of admission will be awarded BCA Diploma provided they secure additional 4 credit in skill based vocational courses offered after first year or after second year during the summer break time. ii. Students may be permitted to take a break from the study during the period of BCA programme but the total duration for completing the BCA programme from the date of admission to first year shall not exceed 7 years.
Three Years (I to VI Semesters)	BCA	Students will be allowed to exit after completion of the 3rd year (V & VI semesters)	Students are required to complete Minimum 146 credits and also secure 4 credits in Summer Internship during the summer break time after 2nd year.	Students who exit with a BCA are permitted to re-enter within two years and complete the four year BCA, but the student is not entitled to re-enter for BCA (Honours).	Students who want to undertake 3-year BCA programme will be awarded BCA Degree upon securing 146 credits Students may be permitted to take a break from the study during the period of BCA programme but the total duration for completing the BCA programme from the date of admission year shall not exceed 7 years.
Four Years (I to VIII Semesters)	BCA Honours (Hons.)		Hons. shall only be awarded if the student acquires full credits in every semester with a total CGPA of above or equal to 7.5, and the degree is	--	Students will be awarded BCA (Hons.) Degree

			awarded after the immediate completion of the 4th year from the year of admission. No Hons. shall be conferred if the degree requirements are not completed in the minimum duration.		

It is envisioned that the graduates passing out BCA programme, will achieve the following BCA programme specific Learning Outcomes (PLO) and Generic Learning Outcomes (PO) as detailed in Table 2.

Table 2: Programme specific Learning Outcomes (PLO) and Generic Learning Outcomes (GLO)

Programme Specific Learning Outcomes (PLOs)	Description
PSO 1	Comprehensive knowledge and coherent understanding of the Computer Applications in various domains and emerging developments associated with the Computer Science and Information Technology
PSO 2	Practical, professional, and procedural knowledge required for carrying out professional or highly skilled work/tasks in the field of computer science and Information Technology, including knowledge required for undertaking self-employment initiatives, and knowledge and mindset required for entrepreneurship involving enterprise creation, improved product development, or a new mode of organization.
PSO 3	Skills in areas related to specialization in the chosen disciplinary/interdisciplinary area(s) of learning including wide-ranging practical skills, involving variable routine and non-routine contexts relating to the Computer Applications
PSO 4	Capacity to extrapolate from what has been learned, translate concepts to real-life situations and apply acquired competencies in new/unfamiliar contexts, rather than merely replicate curriculum content knowledge, to generate solutions to specific problems.
Programme Outcomes (PO)	The student should be able to demonstrate the capability to:
PO1	*Disciplinary Knowledge:* Apply the knowledge of computer application concepts and domain knowledge to solve the problems in IT domain/IT industry
PO2	*Problem Analysis:* Identify, formulate, review research literature, and analyse complex computer application problem at their workplace and for the society.
PO3	*Design /Development of Solutions:*

	Design and evaluate solutions for computer applications problems, and design the processes that meet specified needs with appropriate consideration for the public health, safety, cultural, societal, and environmental considerations.	
PO4	*Modern Tool Usage:* Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computer application activities, with an understanding of the limitations.	
PO 5	*Professional Ethics:* Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices.	
PO 6	*Life-long Learning:* Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.	
PO 7	*Project management and finance:* Demonstrate knowledge and understanding of the computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	
PO 8	*Communication Efficacy with Cooperation/teamwork* Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions. Function effectively as an individual and as a member or a leader.	
PO 9	*Societal and Environmental Concern:* Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practices.	
PO 10	*Innovation and Entrepreneurship* Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.	

Curricular components of the BCA programme

The BCA programme curriculum consists of core courses and interdisciplinary / multidisciplinary courses from other disciplines, ability enhancement courses (language courses), skill enhancement courses, and a set of value added courses. Vocational courses are also added which will help the students to equip with job- oriented skills. The minimum credit requirements for each component for 3-year BCA and 4-year BCA (Hons.) are given in Table 3. The distribution of credits across semesters for BCA programme is given in Table 4.

Table 3: Category Wise Minimum Credit Requirements

S.No.	Broad Category of Course	Minimum Credit Requirement	
		3-year BCA	**4-Year BCA (Hons.)**
1	Core Courses (CCT/ CCP/PCE)	114	124
2	Multidisciplinary Courses	09	09
3	Ability Enhancement Courses (AEC)	08	08
4	Skill Enhancement Courses (SEC)	08	10
5	Value Added Courses (VA)	08	08
6	Summer Internship (SI)	04	04

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7	Major/ Minor Project (PRJ)	06	22
	Total	**157**	**185**

The student is required to complete one Minor Project in the sixth semester, Major Project-1 in seventh semester and Major Project-2 in eight semesters, all from any emerging technologies.

Table 4: Distribution of Credits across Semesters for BCA Programme

S.No.	Broad Category of Course	Semester (Credits)							
		I	II	III	IV	V	VI	VII	VIII
1	CCT/ CCP/PCE	20	21	20	16	17	20	10	-
2	Multidisciplinary Courses	-	-	3	3	3	-	-	-
3	Ability Enhancement Courses (AEC)	3	3	-	2	-	-	-	-
4	Skill Enhancement Courses (SEC)	1	-	4	2	-	1	2	-
5	Value Added Courses (VA)	2	2	2	-	-	2	-	-
6	Summer Internship (SI)	-	-	-	-	4	-	-	-
7	Major/ Minor Project (PRJ)	-	-	-	-	-	6	6	10
	Total	**26**	**26**	**29**	**23**	**24**	**29**	**18**	**10**

*Multidisciplinary Generic Elective (GE) for BCA Students
GE-1 (choose any One)
(i) Principles of Management & Organizational Behaviour
(ii) Any One Paper Offered as open elective by other School /Department / Programme
GE-2 (choose any One)
(i) Digital Marketing
(ii) Principles of Accounting
(iii)Any One Paper Offered as open elective by other School / Department / Programme
GE-3
  (i) Introduction to Management & Entrepreneurship Development
  (ii)   MOOC Course

Vocational Courses Recommendations:
The objective of encouraging the students to undertake a vocational course during summer break after First Year (Second semester) and, also after third year (Sixth semester) for four years programme are

• To ensure the development of capabilities across a range of disciplines including sciences, social

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sciences, arts, humanities, languages, as well as vocational subjects, a student can undertake programmes /courses of study relating to Languages, Literature, Music, Philosophy, Art, Dance, Theatre, Statistics, Pure and Applied Sciences, Sports, etc., and other such subjects needed for a multidisciplinary and stimulating learning environment

- To prepare professionals in cutting-edge areas that are fast gaining prominence, such as Artificial Intelligence (AI), 3-D machining, big data analysis, and machine learning, Block chain Technology, Full stack web development, Robotic Process Automation or any other emerging technology with important applications to health, environment, and sustainable living the students are also encouraged to undergo training in the emerging technologies which are not part of their curriculum.
- To find a job for those students who exit before completing the programme.

Summer Internship Recommendations

Students can undertake internships with local industry, businesses etc., or with faculty and researchers at their own or other Higher Educational Institutes (HEIs).

Summer Training (Conducted at the end of the 4th Semester and evaluation to be carried in 5th Semester) Report and Viva – Voce: Students will undergo summer training/industry visit/In-house training/In-house project during the summer break after the completion of 4th semester. This will help the students to engage with all aspects of their learning and facilitate their improvement in the employability. A report of the Summer Internship is required to be submitted to the College/ Institution. Viva-voce examination will be conducted based on the report submitted by the student. A panel of examiner will be appointed by the HOD/ Director of the Institution for internal evaluation out of 40 marks. External evaluation of 60 marks will be conduct by the examination division of the university.

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Generic (Open) Electives for other undergraduate programmes

The following Core courses (as mentioned in Table 5) of BCA programme may be offered as Generic Elective for other undergraduate programmes. Maximum number of students from other School / Department / Programme should not exceed 20% of total intake for the programme.

Table 5: Generic (Open) Electives offered by BCA programmes for other undergraduate programmes

S.No.	Semester	Subject Code	Subject Name
1	I	BCA 105T BCA 105P	Web Technologies Web Technologies Lab
2	II	BCA 102T BCA 102P	Database Management System Database Management System Lab
3	III	BCA 201T BCA 201P	Python Programming Python Programming Lab

Major/ Minor Project Recommendations

The student shall undertake Minor Project in 6th Semester, Major Project -1 in 7th Semester and Major Project-2 in 8th Semester, all in any of the emerging areas. Four year students not undertaking Major Project-2 will do an industry internship throughout the eighth semester in lieu of a Major project-2 and will be awarded BCA (Hons.). The students who secure 185 credits, including 22 credits from Minor Project, Major Project-1 and Major Project-2 / internship, shall be awarded BCA (Hons.).

The semester wise evaluation scheme of BCA Programme are mentioned from Table 6 to Table 13.

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Table 6: FIRST SEMESTER

Code No.	Paper	Course Category	L	T/P	Credits	Marks Internal	Marks External	Max Marks
Core Course Theory (CCT)								
BCA 101T	Programming for Problem Solving using C	**CCT**	4	-	4	40	60	100
BCA 103T	Fundamental of Information Technology	**CCT**	4	-	4	40	60	100
BCA 105**T#**	Web Technologies#	**CCT**	4	-	4	40	60	100
BCA 107T	Mathematical Foundation for Computer Science	**CCT**	4	-	4	40	60	100
Core Course Practical (CCP)								
BCA 101P	Programming for Problem Solving using C Lab	**CCP**	-	4	2	40	60	100
BCA 103P	Fundamental of Information Technology Lab	**CCP**	-	4	2	40	60	100
Ability Enhancement Course (AEC)								
BCA 141T	Writing Skills	AEC	3	-	3	100	-	100
Skill Enhancement Course (SEC)								
BCA 105**P#**	Web Technologies Lab	**SEC**	-	2	1	40	60	100
Value Added Course (VA)								
BCA 191T*	Understanding India*(NUES)	VA	2	-	2	100	-	100
Bridge Course (Mandatory for Students from Non Mathematics background)								
BCA 181T+	Bridge Course in Mathematics+(NUES)	Mandatory for Students from Non Mathematics background	2	-	-	Pass Grade	-	-
	Total				**26**			**900**

*NUES (Non – University Examination Subject) – Only Internal Assessment by the Institute)
+ NUES Non Credit subject mandatory for the students who do not have mathematics in 12th std.

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Passing is mandatory for the student by obtaining at least pass marks (40%). The examination of this paper shall be conducted by the concerned teacher teaching the course / paper as Teacher's Continuous Evaluation for a total 100 marks. Only the Pass / Fail status is to be specified on the marksheet of the examination and the result of the student.

Generic Elective (GE) for other undergraduate programmes (Refer Table 5 for details)

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SEMESTER WISE EVALUATION SCHEME

Table 7: SECOND SEMESTER

Code No.	Paper	Course Category	L	T/P	Credits	Marks Internal	Marks External	Max Marks
Core Course Theory (CCT)								
BCA 102T#	Database Management System (DBMS)	CCT	4	-	4	40	60	100
BCA 104T	Object Oriented Programming using Java	**CCT**	4	--	4	40	60	100
BCA 106T	Data Structures and algorithms	CCT	4	-	4	40	60	100
BCA 108T	Software Engineering	CCT	4	-	4	40	60	100
Core Course Practical (CCP)								
BCA 102P#	DBMS Lab	CCP	-	2	1	40	60	100
BCA 104P	Object Oriented Programming using Java Lab	**CCP**	-	4	2	40	60	100
BCA 106P	Data Structures and algorithms Lab	CCP	-	2	1	40	60	100
BCA 108P	Software Engineering Lab	CCP	-	2	1	40	60	100
Ability Enhancement Course (AEC)								
BCA 142T	Soft Skills	AEC	3	-	3	100	-	100
Value Added Course (VA)								
BCA 192T	Environment Studies	VA	2	-	2	25	75	100
	Total				**26**			**1000**

Generic Elective (GE) for other undergraduate programmes (Refer Table 5 for details)

** Students must complete one work based vocational course of 4 credits after the second semester during the summer vacation of the first year for which evaluation will be conducted in the third semester. (As mentioned in the scheme of the Third Semester). Vocational course will be held for 4 weeks after the end of the second semester and its evaluation will be conducted in the third semester.

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Table 8: THIRD SEMESTER

Code No.	Paper	Course Type	L	T/P	Credits	Marks Internal	Marks External	Max Marks
Core Course Theory(CCT)								
BCA 201T	Python Programming	**CCT**	4	--	4	40	60	100
BCA 203T#	Dynamic Web Designing	**CCT**	4	--	4	40	60	100
BCA 205T	Computer Organization and Architecture	**CCT**	4	--	4	40	60	100
BCA 207T	Discrete Mathematics	**CCT**	4	-	4	40	60	100
Core Course Practical (CCP)								
BCA 201P	Python Programming Lab	**CCP**	-	4	2	40	60	100
BCA 203P#	Dynamic Web Designing Lab	**CCP**	-	2	1	40	60	100
BCA 205P	Computer Organization and Architecture Lab	**CCP**	-	2	1	40	60	100
Skills Enhancement Course (SEC)*								
BCA 261*	Vocational Course*	SEC	4	-	4	100	-	100
Multidisciplinary (Generic Elective) (Choose any One)**								
BCA 221T	Principles of Management & Organizational Behavior	GE-1	3	-	3	40	60	100
BCA 223T	Open Elective offered by other Department/School /Programme	GE-1	3	-	3	40	60	100
Value Added Course (VA)								
BCA 291T***	Human Values and Ethics***(NUES)	VA	2	-	2	40	60	100
Total					**29**			**1100**

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* Students must complete one work based vocational course of 4 credits after second semester during the summer vacation of the first year for which evaluation will be conducted in third semester.
** Choose one subject from list of GE-1
# Generic Elective (GE) for other undergraduate programmes (Refer Table 5 for details)

Table 9: FOURTH SEMESTER

Code No.	Paper		Course Type	L	T/P	Credits	Marks Internal	Marks External Th	Max Marks
Core Course Theory (CCT)									
BCA 202T	Operating Systems		CCT	4	--	4	40	60	100
BCA 204T	Software Testing		CCT	4	--	4	40	60	100
Core Course Practical (CCP)									
BCA 202P	Operating Systems Lab		CCP	-	2	1	40	60	100
BCA 204P	Software Testing Lab		CCP	-	2	1	40	60	100
Ability Enhancement Course (AEC)									
BCA 232	Introduction to Logic & Critical Thinking		AEC	-	4	2	100	-	100
Skill Enhancement Course (SEC)*									
BCA 234*	Health & Wellness, Yoga Education and Sports & Fitness*		SEC	-	4	2	100	-	100
(Choose Any One Theory and Respective Practical) **Programme Core Elective (PCE)**									
BCA 212	BCA 212T	Introduction to Data Science and	PCE	4	-	4	40	60	100
	BCA 212P	Data Science Lab	PCE	-	4	2	40	60	100
BCA 216	BCA 216T	Introduction to Security, Acts and Cyber Laws and	PCE	4	-	4	40	60	100

		Cyber Security						
	BCA 216P	Introduction to Security, Acts and Cyber Laws and Cyber Security Lab	PCE	-	4	2	40	60	100
BCA 218	BCA 218T	Web Development Using Python	PCE	4	-	4	40	60	100
	BCA 218P	Web Development Using Python Lab	PCE	-	4	2	40	60	100
BCA 220	BCA 220T	Information Security	PCE	4	-	4	40	60	100
	BCA 220P	Information Security Lab	PCE	-	4	2	40	60	100
Multidisciplinary (Generic Elective) **(Choose any One)**									
BCA 222T	Digital Marketing		GE-2	3	-	3	40	60	100
BCA 224T	Principles of Accounting		GE-2	3	-	3	40	60	100
BCA 226T	Open Elective offered by other Department/ School /programme***		GE-2	3	-	3	40	60	100
	Total					**23**			**900**

* NUES (Non – University Examination Subject) – Only Internal Assessment by the Institute) i.e. the assessment shall be conducted by the institution for all 100 marks as Teacher's Continuous Assessment
*** Choose one subject from list of GE-2

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Summer Training (Conducted at the end of the 4th Semester and evaluation to be carried in 5th Semester) Report and Viva – Voce: Students will undergo summer training/industry visit/In-house training/In-house project during the summer break after the completion of 4th semester. Report of the same is required to be submitted to the College/ Institution. Viva-voce examination will be conducted based on the report submitted by the student. A panel of examiner will be appointed by the HOD/ Director of the Institution for internal evaluation out of 40 marks. External evaluation of 60 marks will be conduct by the examination division of the university.

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Table 10: FIFTH SEMESTER

Code No.	Paper		Course Type	L	T/P	Credits	Marks Internal	Marks External	Max Marks
Core Course Theory (CCT)									
BCA 301T	Computer Networks		CCT	4	--	4	40	60	100
BCA 303T	Artificial Intelligence		CCT	4	--	4	40	60	100
Core Course Practical (CCP)									
BCA 301P	Computer Networks Lab		CCP	-	2	1	40	60	100
BCA 303P	Artificial Intelligence Lab		CCP	-	4	2	40	60	100
Choose Any One Theory and Respective Practical (Programme Core Electives (PCE))									
BCA 305	BCA 305T	Natural Language Processing	PCE	4	-	4	40	60	100
	BCA 305P	Natural Language Processing Lab	PCE	-	4	2	40	60	100
BCA 307	BCA 307T	Network Security	PCE	4	-	4	40	60	100
	BCA 307P	Network Security Lab	PCE	-	4	2	40	60	100
BCA 309	BCA 309T	Full Stack Development using Java	PCE	4	-	4	40	60	100
	BCA 309P	Full Stack Development using Java Lab	PCE	-	4	2	40	60	100
Summer Internship (SI)*									
BCA 311*	Summer Training*		SI	0	0	4	40	60	100
Multidisciplinary (Generic Compulsory) (Choose Any One)									
BCA 313T	Introduction to Management & Entrepreneurship Development		GE-3	3	0	3	40	60	100
BCA 315T**	MOOC Course**		GE-3	3	0	3	40	60	100
	Total					**24**			**800**

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* Summer Training (Conducted at the end of the 4ᵗʰ Semester and evaluation to be carried in 5ᵗʰ Semester) Report and Viva – Voce: Students will undergo summer training/industry visit/In-house training/In-house project during the summer break after the completion of 4ᵗʰ semester. Report of the same is required to be submitted to the College/ Institution. Viva-voce examination will be conducted based on the report submitted by the student. A panel of examiner will be appointed by the HOD/ Director of the Institution for internal evaluation out of 40 marks. External evaluation of 60 marks will be conduct by the examination division of the university.

**The students can learn these courses / technologies through self-paced MOOC courses or through regular courses offered by the institute during the summer break on a fast-track mode. The broad guidelines for undertaking MOOC courses are as follows:

1. MOOC Course should be done from SWAYAM/NPTEL as per the guidelines of UGC.
2. For securing the credits, the student is required to complete the assessment of the course and to provide the certificate of the course done from SWAYAM/NPTEL.
3. The fees (if any) for the registration and/or assessment of the MOOC course must be borne by the student only.
4. If the student secures more than 4 credits for the MOOC Course even then 3 credits shall be considered for this subject and the grade/marks provided by assessing authority shall be transferred to the university by the institution where the student is studying. The University's Examination Division shall take the result of the MOOC course on record and the final result must accommodate the results received from such MOOC courses. The student must submit the result of such papers to their respective institution. All the results for the MOOC courses may be submitted before the completion of other requirements including credits requirement.

Table 11: SIXTH SEMESTER

Code No.	Paper		Course Type	L	T/P	Credits	Marks Internal	Marks External	Max Marks
Core Course Theory (CCT)									
BCA 302T	Distributed systems and Cloud Computing		CCT	4	-	4	40	60	100
BCA 304T	Machine Learning		CCT	4	-	4	40	60	100
BCA 306T	Software Project Management		CCT	4	-	4	40	60	100
Core Course Practical (CCP)									
BCA 302P	Distributed systems and Cloud Computing Lab		CCP	0	2	1	40	60	100
BCA 306P	Software Project Management Lab		CCP	0	2	1	40	60	100
Choose Any One Theory and Respective Practical (Programme Core Electives (PCE))									
BCA 312	BCA 312T	Data Visualization & Analytics	PCE	4	-	4	40	60	100
	BCA 312P	Data Visualization & Analytics Lab	PCE	-	4	2	40	60	100
BCA314	BCA 314T	Deep Learning with Python	PCE	4	-	4	40	60	100
	BCA 314P	Deep Learning with Python Lab	PCE	-	4	2	40	60	100
BCA 316	BCA 316T	Web Security	PCE	4	-	4	40	60	100
	BCA 316P	Web Security Lab	PCE	-	4	2	40	60	100
BCA 318	BCA 318T	Mobile Application Development and	PCE	4	-	4	40	60	100
	BCA 318P	Mobile Application Development Lab	PCE	-	4	2	40	60	100

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colspan=9	**Minor Project* (PRJ)
BCA 320	Minor Project	PRJ	0	14	6	40	60	100
Skill Enhancement Course (SEC)
BCA 304P	Machine Learning Lab	**SEC**	0	2	1	40	60	100
Value Added Course (VA)**
BCA 374**	NSS / NCC / Cultural Clubs / Technical Society / Technical Clubs	**VA** (Mandatory)	0	0	2	100	0	100
	Total				**29**			**1000**

*Minor Project: The student shall do the Minor project in any emerging technology.

**NUES (Non – University Examination Subject) Comprehensive evaluation of the students by the concerned coordinator of NCC / NSS / Cultural Clubs / Technical Society / Technical Clubs out of 100 marks as per evaluation schemes worked out by these societies / organizations at the institution / University level. The coordinators shall be responsible for the evaluation of the same. These activities shall start from the 1st semester and evaluation shall be conducted at the end of 6th semester for the students admitted in the first semester.

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Table 12: SEVENTH SEMESTER

Code No.	Paper	Course Type	L	T/P	Credits	Marks Internal	Marks External	Max Marks
Core Course Theory (CCT) **Choose Any Two Theory and Respective Practical Electives**								
BCA 401T	E-Commerce	CCT	4	-	4	40	60	100
BCA 403T	Internet Of Things (IOT)	CCT	4	-	4	40	60	100
Core Course Practical (CCP)								
BCA 401P	E-Commerce Lab	CCP	-	2	1	40	60	100
BCA 403P	Internet Of Things (IOT) lab	CCP	-	2	1	40	60	100
Major Project*(PRJ)								
BCA 405	Major Project-1	PRJ	0	12	6	40	60	100
Skills Enhancement Course (SEC) **								
BCA 461**	Vocational Course	SEC	0		2	100	-	100
	Total				**18**			**600**

*Major Project :The student shall do the Major project in any emerging technology.

**NUES (Non – University Examination Subject) – Only Internal Assessment by the Institute) i.e. the assessment shall be conducted by the institution for all 100 marks as Teacher's Continuous Assessment. Evaluation will be based on Summer Training held after fourth semester.

Table 13: EIGTH SEMESTER

Code No.	Paper	Course Type	L	T/P	Credits	Marks Internal	Marks External	Max Marks
Major Project (PRJ) / Industry Internship (II) **(Choose Any One Group) ***								
BCA 402	Major Project-2	PRJ	20	0	10	40	60	100
BCA 404	Industry Internship Report	IIR	20	0	10	40	60	100
	Total				**10**			**100**

By default, every student shall do the project work Minor Project (BCA 320) during sixth semester. Those students who wants to peruse BCA (Hons.) shall do Major Project-1 (BCA-405) during seventh semester and Major Project–2 (BCA-402) during eighth semester. A student shall either be allowed to do Major project-2 (BCA-402) or an internship (BCA-404). The student must apply for approval to do internship before the commencement of the 8th semester to the college, and only after approval of HOD / Director of the college through Training and Placement Officer of the college, shall proceed for internship.

** The student offered minor project work / major project shall be allocated a supervisor / guide for project work at the end of 5th semester by the college and the project shall continue into the 8th semester.

Students may be allowed to do internship in 8th semester in lieu of Major project-2. The students allowed to proceed for internship shall be required to maintain a log-book of activities performed during internship. The same has to be countersigned by the mentor at the organization where internship is completed.

Evaluation shall be conducted of 40 marks (Teachers' continuous evaluation / internal assessment) by the training and placement officer of the college on the basis of the report submitted by the student. And, 60 marks by a bench of the Training and Placement Officer of the college and the external examiner deputed by examinations division (COE), for a total of 100 marks.

In the absence of the supervisor or the Training and placement officer (as the case may be), the HOD/ Director of the college can assign the responsibility of the supervisor or the Training and Placement officer (for purpose of examinations) to any faculty of the college.

Applicable from Batch Admitted in Academic Session 2024-25 Onwards

Syllabus First Year

FIRST SEMESTER EXAMINATION

Course Code: BCA 101T　　　　　　　　　　　　　　　　　　　　　**L T C**
Course Name: Programming for Problem Solving using C　　　**4　0 4**

LEARNING OBJECTIVES:
This course will provide the learners the following:-
1.　　　Understanding of the syntax and the semantics of C programming language
2.　　　Building of their logics for solving a given problem.

PRE-REQUISITES: None

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO
CO1	Develop programming skills by learning the fundamentals of structured programming using C Language.
CO2	Design and develop programs using arrays, storage classes, functions and to understand memory management through pointers
CO3	Critically analyze real world problems using structures, unions and develop applications for handling text and binary files.
CO4	Explore the use of command line arguments, string manipulation and standard libraries.

Course Outcomes	Program Outcomes (Scale – 1:very low,2: low,3:medium,4:high)									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	4	4	4	_2	-	2	1	_-	-	2
CO2	4	4	4	_2	-	2	1	_-	-	2
CO3	4	4	4	_2	-	2	1	_-	-	2
CO4	4	4	4	_2	-	2	1	_-	-	2

Applicable from Batch Admitted in Academic Session 2024-25 onwards

UNIT – I

No. of Hours: 12 Chapter/Book Reference: TB1 [1,2,3,4,5,6,7]; TB2 [1,2,3,4,5,6,7]; TB3 [1,2,3,4,5,6]

C basics: C character set, Identifiers and keywords, Data types, constants, symbolic constants, variable declarations, structure of basic C program, writing and executing the first C program, #include Preprocessor directive, expression statements, compound statements, operators: Arithmetic, Unary, Relational, logical, assignment, shorthand assignment, conditional and bitwise, comma operator.

C control structures: if statement, if….else statement, else if ladder, while, do….while, for, and switch statement, nested control structure, Jump Statements: break, continue, goto statement and exit statement.

UNIT II

No. of Hours: 13 Chapter/Book Reference: TB1 [8,9,10,13,14]; TB2 [8,9,10,12]; TB3 [7,8, 9,10,11,12]

C Functions: Functions: declaration, definition & scope, recursion, call by value, call by reference. Preprocessor directive: #define, macros with arguments, nested macros, # and ## operators.

Storage Classes: automatic, external (global), static & registers. Arrays: Arrays (1D, 2D), strings, Pointers:Pointers Basics, pointer arithmetic, Pointer to Pointer, array & pointer relationship, array of pointers, pointers to functions and returning pointers, Dynamic memory allocation.

UNIT – III

No. of Hours: 11 Chapter/Book Reference: TB1 [17,19,20,21]; TB2 [11,13,14]; TB3 [13,14,16]

Structures: Structures, unions, Enumeration, passing structure to functions, arrays and structures, typedef, difference between structure and union, self-referential structure(Introduction).

File handling [text (ASCII), binary]: file input output operations, file access modes, file pointers, file Positioning functions (fseek, ftell, rewind etc.)

UNIT – IV

No. of Hours: 08 Chapter/Book Reference: TB1 [15,22]; TB2 [9]; TB3 [8]

Standard library functions from stdio.h, stdlib.h, conio.h, ctype.h, math.h, string.h, process.h., Usage of command line arguments.

TEXT BOOKS:
TB1. Yashwant Kanetkar, "Let us C" 17th edition, 2020.
TB2. E. BalaGuruswamy, "Programming in ANSI C", 8th edition, 2019.
TB3. Ashok N. Kamthane, "Programming in C", Pearson Education, 3rd Edition, 2015

REFERENCE BOOKS:
RB1. K R Venugopal, Sudeep R Prasad, "Mastering C", McGraw Hill Education; 2nd edition, 2017
RB2. V Rajaraman , "Computer Programming in C", 2nd Edition, 2019
RB3. Kernighan and d. Ritchie, "The ANSI C Programming Language", 2015
RB4. Stephen Prata, "C Primer Plus" 6th Edition, 2014
RB5. Schaum's Outline Series, "Programming with C", 4th Edition, 2018

RB6. Reema Thareja, Programming In C" , Oxford University Press, September 2018

CourseCode: BCA 103T   **L T C**

Course Name: Fundamental of Information Technology   **4 0 4**

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

The objectives of this course is to provide the learners:

1. Awareness of evolution of Computers, various types of computers its characteristics, usage, and limitations.
2. Identification of different categories of computers, their peripherals and memory.
3. Knowledge about operating system, their types, MS-Office various software.
4. Understanding of computer network fundamentals and various communication networks.
5. Overview of emerging technologies in IT i.e. AI and Machine Learning, IOT, Data Analytics etc.

PRE-REQUISITES: None

COURSE OUTCOMES(COs):

After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO
CO1	Describe computer with its characteristics, its usage, limitations and benefits, Computer Memories and its type, Software and its type
CO2	Acquire knowledge about Number Systems, various computer languages and operating system DOS
CO3	Attain skills in Application Software used for word processing, spreadsheet and presentation
CO4	Understand network fundamentals and various communication network, Advance trends in IT

Course Outcomes	Program Outcomes (Scale – 1:very low,2: low,3:medium,4:high)									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	4	4	4	__4	-	2	1	_-	-	1
CO2	4	4	4	__2	-	2	-	_-	-	1
CO3	4	4	4	4	-	2	2	_-	-	3
CO4	4	4	4	__4	-	2	2	_-	-	2

UNIT–I

No. of Hours: 12 Chapter/Book Reference: TB1: [Chapters:1,2,7,8,9], TB2:[Chapters:1,2,3,4];RB1[Chapters:6,7], RB3[Chapters:1a,1b,2a,2b,4a,5a],
Fundamentals of Computers:

Definition and Characteristics of Computer System. Computer Generation from First Generation to Fifth Generation. Classifications of Computers: Micro, Mini, Mainframe and super computers

Computer Hardware: Major Components of a digital computer, Block Diagram of a computer, Input-output devices, Description of Computer Input Units, Output Units, CPU.

Computer Memory: Memory Hierarchy, Primary Memory – RAM and its types, ROM and its types, Secondary Memory, Cache memory. Secondary Storage Devices - Hard Disk, Compact Disk, DVD, Flash memory.

UNIT–II

No. of Hours: 12 Chapter/Book Reference: TB1 [Chapters: 10,12,14]; TB2[Chapters:6,7]; RB1[Chapters:6A, 6B, 12A,12B], RB3 [Chapters: 8, 9]
Interaction with Computers:

Computer Software: System software: Assemblers, Compilers, Interpreters, linkers, loaders. Application Software: Introduction to MS Office (MS-Word, MS Power point, MS-Excel).

Operating Systems: Elementary Operating System concepts, Different types of Operating Systems.

DOS: Booting sequence; Concepts of File and Directory, Types of DOS commands.

Computer Programming and Languages: Algorithms, flow chart, decision tables, pseudo code, Low level languages and introduction to high level languages.

UNIT–III

No. of Hours: 12 Chapter/Book Reference: TB1 [Chapters:3,5,4]; TB2 [Chapters:5]; RB1[Chapter:2]

Computer Number System: Positional and Non-positional number systems, Binary, Decimal, Octal and Hexadecimal Number Systems and their inter-conversion.

Binary Arithmetic: Addition, subtraction, multiplication and division.Use of complement method to represent negative binary numbers, 1's complement, 2's complement, subtraction using 1's complement and 2's complement. Introduction to Binary Coded Decimal (BCD), ASCII Codes, EBCDIC codes.

UNIT–IV

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters:17,18]; TB2[Chapters:9,10]; RB3[7A,7B,8A,8B]

Computer Network & Internet: Basic elements of a communication system, Data transmission modes, Data Transmission speed, Data transmission media, Digital and Analog Transmission, Network Types (LAN, WAN and MAN), Overview of Network devices Hub, Switch, Router, Gateway, Firewall

Basics of Internet: Terminologies related to Internet: Protocol, Domain name, IP address, URL, World Wide Web. Introduction to Client-Server Model, Search Engine Applications of Information Technology in various domains

TEXT BOOKS:
TB1. P. K. Sinha &Priti Sinha, "Computer Fundamentals", BPB Publications, 1992.
TB2. Anita Goel "Computer Fundamentals", Pearson.

REFERENCE BOOKS:
RB1. B.Ram Computer fundamentals Architecture and Organization, New Age Intl.
RB2. Alex Leon & Mathews Leon, "Introduction to Computers", Vikas Publishing.
RB3. Norton Peter, "Introduction to computers", 4th Ed., TMH, 2001.
RB4. Vikas Gupta, "Comdex Computer Kit", Wiley Dreamtech, Delhi, 2004.

Course Code: BCA 105T   **L T C**
Course Name: Web Technologies   **4 0 4**

LEARNING OBJECTIVES:
The objective of this course is to provide the learners the following:
1. Knowledge about the semantic structure of HTML, Javascript, CSS, XML and bootstrap.
2. Ability to compose forms and tables using HTML, Javascript, CSS and Bootstrap.
3. Expertise to design static web pages
4. Skills to create dynamic user interface and perform Client-Side validations using JavaScript

PRE-REQUISITES: Nil

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO
CO1	Develop static web pages through HTML, JavaScript, CSS and Bootstrap.
CO2	Implement different constructs and programming techniques provided by JavaScript.
CO3	Adapt HTML, Javascript, CSS and Bootstrap syntax and semantics to build web pages.
CO4	Develop Client-Side Scripts using JavaScript to display the contents dynamically

Course Outcomes	Program Outcomes (Scale – 1:very low,2: low,3:medium,4:high)									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	4	1	4	_4	2	4	2	1	1	4
CO2	4	1	4	_2	2	4	2	1	1	4
CO3	4	1	4	4	2	4	3	1	1	4
CO4	4	1	4	_4	2	4	3	1	1	4

Applicable from Batch Admitted in Academic Session 2024-25 onwards

UNIT – I

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters: 1-3]; TB2 [Chapters: 2]; TB3 [Chapters: 1-4]

World Wide Web: Introduction, Web page, Home page, Web site, Static and Dynamic website, Client Server computing concepts. Web Client and Web Server, Web Browser, Client Side and server side Scripting Languages.

HTML Overview: Introduction to HTML, HTML Document structure tags, HTML comments, Text formatting, inserting special characters, anchor tag, adding images and Sound, lists types of lists, tables, frames and floating frames, Developing Forms, Image maps.

UNIT – II

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters: 4-5]; TB2 [Chapters: 3-5]; TB3 [Chapters: 5-12]; TB4 [Chapters 1-3]

Cascading Style Sheet: Types of Style Sheets – Internal, inline and External style sheets, creating styles, link tag, CSS Properties, CSS Styling, Style Selector- Id, class name and Pseudo Class.

BootStrap Basics: Introduction to Bootstrap, Responsive web design, Linking with Bootstrap, container class, grids, tables, images, buttons, typography classes, jumbotron, glyphicons,

UNIT – III

No. of Hours:11 Chapter/Book Reference: TB1 [Chapters: 4-5]; TB2 [Chapters: 3-5]; TB3 [Chapters: 5-12]

Introduction to Java Script: Data Types, Control Statements, operators, dialog boxes, Built in and User Defined Functions, Objects in Java Script, Handling Events, basic validations, Document Object Model, Browser Object Model.

UNIT – IV

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters]; TB2 [Chapter: 7, 9]; TB3 [Chapter: 1]

XML: Introduction, Features, XML Naming rules, Building block of XML Document, Difference between HTML & XML, XML Parser, DTD's Using XML with HTML and CSS.

Web Hosting Concepts: Concept of domain- Physical domain, virtual domain, registering a domain, need of IP addressing, Web Hosting and Publishing Concepts

TEXT BOOKS:
TB1. The complete reference HTML and CSS, by Thomas A powell, TMH publication.
TB2. Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Pearson
TB3. Internet and World Wide Web Deitel HM, Deitel ,Goldberg , Third Edition.
TB4. Bootstrap: Responsive Web development, Jake Spurlock, O'reilly, First Edition
REFERENCE BOOKS:
RB1. HTML Black Book , Stephen Holzner, Wiley Dreamtech.
RB2. Rajkamal, "Web Technology", Tata McGraw-Hill, 2001.
RB3. Jeffrey C. Jackson, "Web Technologies : A Computer Science Perspective", Pearson.
RB4. XML How to Program by DeitelDeitel Nieto.

Course Code: BCA 107T   **L T C**

Course Name: Mathematical Foundation for Computer Science   **4 0 4**

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
The objectives of this course are to provide the learners with the following:
1. The Knowledge of mathematical probability
2. Understanding of various numerical techniques
3. Familiarity with the Linear Programming and it's applications

PRE-REQUISITES: Basic Concepts of Mathematics

COURSE OUTCOMES(COs):
After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO
CO1	Understand the various approaches dealing the data using theory of Probability
CO2	Understand various numerical techniques and apply them to solve real life problems
CO3	Understand various techniques to solve linear simultaneous equations
CO4	Analyse and evaluate the accuracy of common Numerical Methods

Course Outcomes	Program Outcomes (Scale – 1:very low,2: low,3:medium,4:high)									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	2	1	2	-	-	1	-	-	-
CO2	-	2	1	2	-	-	1	-	-	-
CO3	-	2	1	2	-	-	1	-	-	-
CO4	-	2	1	2	-	3	1	-	-	-

UNIT -I
No. of Hrs. 12 Chapter/Book Reference: TB2 [chapters 3, 4], TB3 [chapters 2, 3, 4, 5, 6]
PROBABILITY: Introduction, Axiomatic definition of Probability, Addition Theorem, Multiplication theorem, Conditional Probability, Bayes Theorem and its applications

PROBABILITY DISTRIBUTIONS: Random Variable, Probability Mass function, Probability density function, Mathematical Expectations of a Random Variable, Binomial Distribution, Poisson distribution, Normal Distribution.

UNIT -II
No. of Hrs. 10 Chapter/Book Reference: TB1 [chapters 2, 3], TB3 [chapters 7, 8, 9]
INTERPOLATION: Operators: Shift; Forward Difference, Backward Difference Operators and their Inter-relation, Interpolation Formulae-Newton's Forward, Backward and Divided Difference Formulae: Lagrange's Formula
SOLUTIONS OF NONLINEAR EQUATIONS: Bisection Method, False Position Method, Newton – Raphson Method for Solving Equation Involving One Variable only.

UNIT -III
No. of Hrs. 10 Chapter/Book Reference: TB1 [chapters 6], TB3 [chapters 10, 11]
SOLUTION OF LINEAR SIMULTANEOUS EQUATIONS: Gaussian Elimination Method with and without Row Interchange: LU Decomposition: Gauss - Jacobi and Gauss-Seidel Method; Gauss – Jordan Method and to find Inverse of a Matrix by this Method.

UNIT -IV
No. of Hrs. 12 Chapter/Book Reference: TB1 [chapters 6], TB3 [chapters 10, 11]
NUMERICAL DIFFERENTIATION: First and Second Order Derivatives at Tabular and Non-Tabular Points,
NUMERICAL INTEGRATION: Trapezoidal Rule, Simpsons 1/3 Rule: Error in Each Formula (without proof.)

TEXT BOOKS:
TB1. S.S. Sastry, "Numerical Analysis"; Prentice Hall of India, 1998.
TB2. Johnson, R., Miller, I. and Freunds, J., Miller and Freund's "Probability and Statistics for Engineers, Pearson Education (2005) 7th Ed.
TB3. Singh J P "Probability and Numerical Methods" ANE Books, 4th Edition 2019

REFERENCE BOOKS:
RB1. Grewal B S "Numerical Methods in Engineering and Science" Khanna Publishers, 2012
RB2. Walpole, Ronald E., Myers, Raymond H., Myers, Sharon L. and, Keying Ye, Probability and Statistics for Engineers and Scientists, Pearson Education (2007) 8th Ed.
RB3. Gupta S C, Kapoor V K "Fundamental of Mathematical Statistics" Sultan Chand and Sons 11th edition 2002
RB4. Manmohan, Gupta, P K, KantiSwarup "Introduction to Management science operations research" Sultan Chand and Sons

Course Code: BCA 141T   **L T C**
Course Name: Writing Skills   **3 0 3**

LEARNING OBJECTIVES:
This course will provide the learners the following:
1. Understanding the correct use of English Language.
2. The student will improve in oral as well as written communication skills.

PRE-REQUISITES: Nil

COURSE OUTCOMES(COs):
After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO
CO1	The student will become familiar with the basics of communication and its importance in the organizational world.
CO2	To improve the business writing skills also will become well aware how to write effective resume to enter the global world.
CO3	To improve the listening skills by knowing well how to negotiate and give effective presentations.
CO4	To make use of effective business language and give a professional look to oneself.

Course Outcomes	Program Outcomes (Scale – 1:very low,2: low,3:medium,4:high)									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	2	-	2	1	-	1	2	1	2
CO2	-	2	-	2	1	-	1	2	1	2
CO3	-	2	-	2	1	-	1	2	1	2
CO4	-	2	-	2	1	3	1	2	1	2

UNIT–I
No. of Hours: 10 Chapter/Book Reference: TB1, TB2, TB3, TB4

Overview of Technical Writing:Definition and Nature of Technical Writing, Basic Principles of Technical Writing, Styles in Technical Writing. Sentense, Phrase, Kinds of sentences, Parts of sentence and parts of speech

UNIT-II
No. of Hours: 12 Chapter/Book Reference: TB1, TB2, TB3
Note Making, Notice, E-mail Writing.Writing Letters: Business letters, Persuasive letters-Sales letters and complaint letters
Office memorandum, Good news and bad news letters
Report Writing**:** Definition & importance; categories of reports, Elements of a formal report, style and formatting in report

UNIT-III
No. of Hours: 12 Chapter/Book Reference: TB1, TB2, TB3, TB4
Special Technical Documents Writing: Project synopsis and report writing, Scientific Article and Research Paper writing, Dissertation writing: Features, Preparation and Elements
Technical Proposal Writing: Purpose, Types, characteristics and structure

UNIT-IV
No. of Hours: 10 Chapter/Book Reference: TB3, RB1, RB3
Preparing for Job Application, Components of a Formal Application Letter, Formats and Types of official, employment, Resume vs Bio Data, Profile, CV and others, Types of resume, Writing effective resume for employment, Model Letter of Application (Cover Letter) with Resume, Emails, Blog Writing, Memos (Types of Memos) and other recent communication types

TEXTBOOKS:
TB1. Kavita Tyagi and Padma Misra , "Advanced Technical Communication", PHI, 2011
TB2. P.D.Chaturvedi and Mukesh Chaturvedi, "Business Communication – Concepts, Cases and Applications", Pearson, second edition.
TB3. Rayudu, "C.S- Communication", Himalaya Publishing House, 1994.
TB4. Asha Kaul , "Business Communication", PHI, second edition.
TB5. Raymond Murphy, "Essential English Grammar- A self study reference and practice

REFERENCES:
RB1. Book for elementary students of English" , Cambridge University Press, second edition.
RB2. Manalo, E. & Fermin, V. (2007). Technical and Report Writing. ECC Graphics. Quezon City.
RB3. Kavita Tyagi and Padma Misra , "Basic Technical Communication", PHI, 2011.
RB4. Herta A Murphy, Herbert W Hildebrandt and Jane P Thomas, "Effective Business Communication", McGraw Hill, seventh edition.

Course Code: BCA 191T   **L T C**
CourseName: Understanding India   **2 0 2**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

  i.   To have an understanding on history and culture of ancient India.
  ii. The students will be acquainted with the literature, philosophy, art and architectural developments in India during the period concerned.
  iii. To understand ancient India Knowledge system
  iv. The students will also get to know about their constitutional rights and duties.

PRE-REQUISITES: Nil

COURSE OUTCOMES(COs):
After completion of this course, the learners will be

CO#	Detailed Statement of the CO
CO1	Familiar with the History and culture of Ancient India
CO2	Understanding the ancient Indian literature
CO3	Having awareness of the ancient knowledge system of India
CO4	Aware of Basic features of our constitution

Course Outcomes	Program Outcomes (Scale – 1:very low,2: low,3:medium,4:high)									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	-	-	-	-	-	-	3	3	-
CO2	-	-	-	-	-	-	-	3	3	-
CO3	-	-	-	-	-	-	-	3	3	-
CO4	-	-	1	-	-	3	-	3	3	-

UNIT I

Introducing India : The People of India: demography and languages, The Name of our Country: Jambudvipa, Sindhu (Indus), Inde, Hind, Hindustan, BharatIndia

The idea of Bharatvarsha; Ancient Indian literatureSanskrit, Pali, Prakrit, Tamil Religions and philosophies of ancient India-Vedic, Buddhism, Jainism

UNIT II

Science, Technology and Medicine: A general survey of the progress of science,technology and medicine in ancient India

The Knowledge System of India:Traditional Knowledge System: Gurukuls, Pathsalas, Tols, Maktabs, Madrasas

Beginnings of Modern Education: Main features of British Government's educational policies

Growth of higher and technical education in India

UNIT III

The Indian Economy :Features of the Indian economy from past to present (agriculture, industry and trade)

UNIT IV

The Making of Contemporary India The struggle for Independence (1885-1947)

Basic features of Indian constitution: Basic Structure, Doctrine, Fundamental rights, and duties, Directive principles,Federal Structure, Independence of Judiciary and theParliamentary system

TEXT BOOKS:
TB1. A.L. Basham,The Wonder that Was India, Picador India,1971
TB2. R.S.Sharma,India'sAncientPast, NewDelhi, OUP, 2007
TB3. Upinder Singh, The History of the Ancient and Early Medieval India, Pearson, 2008
TB4. Satish Chandra, History of Medieval India, Arihant Publication, 2020.

REFERENCES:
RB1. Durga Das Basu, Introduction to the Constitution of India, Lexis Nexis, 2018 2003
RB2. Tirthankar Ray, The Economic History of India 1857-1947, OUP, 2006
RB3. Vijay Joshi and I.M.D. Little, India's Economic Reforms, 1991-2001, OUP, 1996
RB4. Dr. Prabhakiran Jain & R. Sharma, Understanding India, Mahavir Publication

Course Code: BCA 181T   **L TC**
Course Name: Bridge Course in Mathematics   **2 - -**

Aim: To build mathematical aptitude of the students for understanding the basic concepts of core courses of mathematics of the programme.

LEARNING OBJECTIVES:
The objectives of this course is to provide the learners
- The knowledge about the matrices, determinants and limits.
- Familiarity with basic concepts of differential and integral calculus.

COURSE OUTCOMES(COs):
After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO
CO1	Understand the various approaches dealing the data using theory of matrices
CO2	Understand and apply the concepts of determinants
CO3	Understand the concept of calculus such as limit, continuity and differentiability.
CO4	Appraise and determine the correct logic and solutions for any given real world problem using application of integration& integral calculus.

Course Outcomes	Program Outcomes (Scale – 1:very low,2: low,3:medium,4:high)									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	2	-	2	1	-	1	2	1	2
CO2	-	2	-	2	1	-	1	2	1	2
CO3	-	2	-	2	1	-	1	2	1	2
CO4	-	2	-	2	1	3	1	2	1	2

Applicable from Batch Admitted in Academic Session 2024-25 onwards

UNIT-I
MATRICES: Concept, notation, order, equality, types of matrices, zero and identity matrix, transpose of a matrix, symmetric and skew symmetric matrices. Operations on matrices: Addition, multiplication and multiplication with a scalar. Simple properties of addition, multiplication and scalar multiplication, invertible matrix.
DETERMINANTS: Determinant of a square matrix (up to 3 x 3 matrices), properties of determinants, minors, co-factors and applications of determinants in finding the area of a triangle. Adjoint and inverse of a square matrix, solving system of equations using matrix method, Cramer rule (only two and three unknown).

UNIT-II
INTRODUCTION TO TRIGONOMETRIC FUNCTIONS: Degree and radian measurements of an angle, Quadrant system, allied angles, and Simple problems based: on Sum/difference of angles of t functions, C and D Formulae, t functions of multiple angles.

UNIT-III
LIMITS, CONTINUITY AND DIFFERENTIABILITY: : Limit at a Point, Properties of Limit, Computation of Limits of Various Types of Functions, Continuity and differentiability, derivative of composite functions, chain rule, derivative of implicit functions. Concept of exponential and logarithmic functions. Derivatives of logarithmic and exponential functions. Logarithmic differentiation, derivative of functions expressed in parametric forms.

UNIT-IV
INTEGRATION: Integral as Limit of Sum, Riemann Sum, Fundamental Theorem of Calculus, Indefinite Integrals, Simple problems based on Methods of Integration Substitution, By Parts, Partial Fractions, Integration of Algebraic and transcendental Functions.

TEXT BOOKS:
TB1. Mathur A B, Jaggi V P "A Textbook of Engineering Mathematics" Khanna Publishers,
TB2. Dass H K "Applied Mathematics for polytechnics" CBS publishers
TB3. Singh J P "Calculus" ANE Books

REFERENCE BOOKS:
RB1. Kresyig E., "Advanced Engineering Mathematics", 5th Edition, John Wiley & Sons
RB2. H.K. Dass, "Advanced Engineering Mathematics", S. Chand & Company
RB3. Grewal B S, "Elementary Engineering Mathematics"

Course Code: BCA 101P   **L P C**
Course Name: Programming for Problem Solving using C Lab   0 2 2

INSTRUCTIONS
1.The course objectives and course outcomes are identical to that of BCA 101T as this is the practical component of the corresponding theory paper.
2. The practical list shall be notified by the teacher in the first week of the class commencement

Course Code: BCA 103P   **L P C**
Course Name: Fundamentals of Information Technology Lab   0 2 2

INSTRUCTIONS
1.The course objectives and course outcomes are identical to that of BCA 103T as this is the practical component of the corresponding theory paper.
2. The practical list shall be notified by the teacher in the first week of the class commencement

Course Code: BCA 105P   **L P C**
Course Name: Web Technologies Lab   0 2 2

INSTRUCTIONS
1.The course objectives and course outcomes are identical to that of BCA 105T as this is the practical component of the corresponding theory paper.
2. The practical list shall be notified by the teacher in the first week of the class commencement

BCA SECOND SEMESTER SYLLABUS

Course Code: BCA 102T   **L T C**
Course Name: Database Management System (DBMS)   **4 0 4**

LEARNING OBJECTIVES:
The paper aims to introduce the concept of Back end, data storage in computers, design of a DBMS, Queries to construct database, store and retrieve data from the database.The objective of this course is to provide the learners expertise in the following:
1. Understanding of the requirement of database management System for storing data and its advantages over file management system.
2. Designing the database conceptually, physically and finally implementing the creation of database for any application.
3. Learning of queries in SQL for creating database and performing various operations for manipulating data in the database.
4. Knowledge of database utilities i.e. backup, recovery, transaction processing.

PREREQUISITE: Basic knowledge of data storage and file management system

COURSE OUTCOMES (COS):
 After completion of this course, the learners will be able to: -

CO #	Detailed Statement of the CO
CO1	Understand the DBMS concepts with detailed architecture, characteristics.Describe different database languages and environment and learn various data models, along with the related terminologies
CO2	Explore Structure Query Language, a brief on NOSQL, Query By Example.Also understand the overview of SQL, and try to implement DDL, DML and DCL along with operators, use of joins, nested query, use of views and Indexes Discuss Integrity Constraints
CO3	Describe Relational Data Model, explain Codd's Rules, Relational Algebra, Set theory operations and the concept of functional dependencies and normalization

CO4	Acquire Knowledge about Transaction Processing, concurrency problems, and its controlling techniques, Database backup and recovery and security.

Course Outcomes	Program Outcomes (Scale – 1:very low,2: low,3:medium,4:high)									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	4	1	4	__4	2	4	2	1	1	4
CO2	4	1	4	__2	2	4	2	1	1	4
CO3	4	1	4	4	2	4	3	1	1	4
CO4	4	1	4	__4	2	4	3	1	1	4

UNIT-I
[No. of Hrs.: 10] Chapter/Book Reference: TB1 [Chapter 2]; TB2 [Chapter 1]
Introduction: An overview of database management system, Characteristics of database approach, DBMS architecture, client/server, data Models, Introduction to Distributed Data processing, schema and instances, data independence,

Data Modelling using Entity Relationship Model: Basic introduction about the terminologies like Entity, Entity types, entity set, notation for ER diagram, attributes and keys, Types of attributes (composite, derived and multivalued attributes) and keys (Super Key, candidate key, primary key), relationships, relation types, weak entities, enhanced E-R, specialization and generalization.

UNIT – II
[No. of Hrs.: 13] Chapter/Book Reference: TB1 [Chapter 8]; TB2 [Chapter 2];
Introduction to SQL: Overview, Characteristics of SQL. Advantage of SQL, SQL data types and literals.
Types of SQL commands: DDL, DML, DCL. Basic SQL Queries.
Logical operators: BETWEEN, IN, AND, OR and NOT
Null Values: Disallowing Null Values, Comparisons Using Null Values
Integrity constraints: Primary Key, Not NULL, Unique, Check, Referential key
Introduction to Nested Queries, Correlated Nested Queries, Set-Comparison Operators, Aggregate Operators: The GROUP BY and HAVING Clauses,
Joins: Inner joins, Outer Joins, Left outer, Right outer, full outer joins.
Overview of other SQL Objects: Views, Sequences, Indexes, Triggers and stored procedure.

UNIT – III
[No. of Hrs.: 12] Chapter/Book Reference: TB1 [Chapter 7 & 15]; TB2 [Chapter 3];
Relational Data Models: Relational model terminology domains, Attributes, Tuples, Relations, characteristics of relations, relational constraints domain constraints, key constraints and constraints on null, relational DB schema. Codd's Rules
Relational algebra: Basic operations selection and projection,
Set Theoretic operations: Union, Intersection, set difference and division
Join operations: Inner, Outer, Left outer, Right outer, and full outer join
ER to relational mapping: Steps to map ER diagram to relational schema
Data Normalization: Functional dependencies, Armstrong's inference rule, & Normalization (Upto BCNF)

UNIT – IV
[No. of Hrs.: 9] Chapter/Book Reference: TB1 [Chapter 19 & 20]; TB2 [Chapter 5];

Transaction Processing: Definition of Transaction, Desirable ACID properties

Database recovery and Database Security: System failure, Backup & recovery Techniques, Authentication, Authorization.

Overview of Query by Language, NoSqldatabses

TEXT BOOKS:

TB1. R. Elmarsi and SB Navathe, "Fundamentals of Database Systems", Pearson, 5th Ed.

TB2. Singh S.K., "Database System Concepts, design and application", Pearson Education

[TB3] **TB3.** Ramakrishnan and Gherke, "Database Management Systems", TMH.

TB4. Bipin Desai, "An Introduction to Database Systems", Galgotia Publications, 1991.

REFERENCE BOOKS:

RB1. Abraham Silberschatz, Henry Korth, S. Sudarshan, "Database Systems Concepts", 6th Edition, McGraw Hill, 2010.

RB2. Jim Melton, Alan Simon, "Understanding the new SQL: A complete Guide", Morgan Kaufmann Publishers, 1993.

RB3. A. K. Majumdar, P. Battacharya, "Database Management Systems', TMH, 2017.

RB4. Bipin Desai, "An Introduction to Database Systems", Galgotia Publications, 1991

Course Code: BCA 104T   **L   T   C**
Course Name: Object Oriented Programming using Java   **4   0   4**

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following:
1. Learn how to implement Object Oriented concepts through Java.
2. Identify and apply the Java thread model to program Java applications.
3. Develop GUI applications using Java swings

PRE-REQUISITES:
1. Programming fundamental
2. Object-Oriented concepts

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO
CO1	Illustrate the Object-Oriented paradigm and Java language constructs
CO2	To inculcate concepts of inheritance to create new classes from existing ones and design the Classes needed given a problem specification. To familiarize the concepts of packages and interfaces.
CO3	To manage input output using console and files
CO4	To facilitate students in handling exceptions and defining their own exceptions. To apply the Java Thread model to develop multithreading applications.

Course Outcomes	Program Outcomes (Scale – 1:very low,2: low,3:medium,4:high)									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	4	4	4	2	-	2	1	-	-	2
CO2	4	4	4	2	-	2	1	-	-	2
CO3	4	4	4	2	-	2	1	-	-	2
CO4	4	4	4	2	-	2	1	-	-	2

UNIT–I
No. of Hours: 12 Chapter/Book Reference: TB1 [Chapters – 1, 2, 3, 5, 6], TB2[Chapters - 2, 3, 4, 5, 6, 7, 8]
Object Oriented Paradigm: Procedural vs. object-oriented development, basic concepts of object-oriented programming, applications and benefits of OOP
Java Basics: Java as Object-oriented Programming Language History of Java, Features of Java, Difference between Java and C++, Java Architecture (JDK, JVM, JRE), Java Tokens: Basics of Java programming: Data types, Literals, Variables, Scope and lifetime of variables, Operators. Control Structures including selection, Looping, Arrays.

UNIT – II
No. of Hours: 12 Chapter/Book Reference: TB1 [Chapters – 7, 8, 9], TB2[Chapters - 9, 10, 11]
Introducing Classes: Creating a Class: properties, methods and constructors. Object Access modifiers, this keyword, Static (variable, method, block), final keyword, String class and methods.

Inheritance: Types, Super keyword, method overriding, covariant return type, abstract class.

Interfaces and Packages: Creation and implementing an interface, difference between abstract class and interface, Packages, and importing a package.

Polymorphism : Dynamic binding, Generic programming, Casting objects, Instance of operator, Method Overloading

UNIT – III
No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters – 11, 12], TB2[Chapters - 13]
Using I/O: Elementary concepts of Input/Output, using the byte streams, reading and writing using byte streams, automatically closing a file, using the character-based streams, File I/O using character streams (using a File Writer and using a File Reader)

UNIT – IV
No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters – 17, 18]
Exception Handling: Exception Class, built-in checked and unchecked exceptions, user-defined exceptions, use of try, catch, throw, throws, finally

Multi-threaded programming: Multithreading fundamentals, Thread class, and Runnable interface, the life cycle of thread, creation of single and multiple threads, implementation of Thread methods, Synchronization (using Synchronized methods, synchronized statement).

TEXT BOOKS:
TB1. Herbert Schildt, "Java 2 -The Complete Reference" – Tata McGraw Hill Education Private Limited, 2010
TB2. TrilochanTarai, "Java Core Concepts and Applications", I.K. International Publishing house pvt. Ltd., 2015

REFERENCE BOOKS:
RB1. E.Balaguruswamy,"Programming with Java A Primer", McGraw Hill Education Private Limited, 5th Edition,2015.

RB2. Herbert Schildt, Dale Skrien, "Java Fundamentals A Comprehensive Introduction" – Tata McGraw Hill Education Private Limited, 2013

RB3. Cay S. Horstmann, "Core Java Volume 1 – Fundamentals", 10th edition, Pearson, 2017

RB4. Ken Arnold, Davis Holmes, James Gosling, Prakash Goteti, "The Java Programming
Language", 3rd edition, Pearson, 2008.

Course Code: BCA 106T　　　　　　　　　　　　　　　　**L T C**
Course Name: Data Structures and Algorithms　　　　　**4 0 4**

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be provided expertise in
1. Understanding of the basic concepts of data structures and their operations like, insertion, deletion, searching and sorting
2. Design algorithms and pseudo codes of various linear and non-linear data structures

PRE-REQUISITES:
1. C Programming Skills
2. Discrete Mathematics

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:

CO #	Detailed Statement of the CO
CO1	Familiarize the basics of data structures and algorithms.
CO2	Understand and apply linear and nonlinear data structures and their operations.
CO3	Compare and implement searching, sorting and hashing techniques.
CO4	Appraise and determine the correct data structure for any given real world problem.

Course Outcomes	Program Outcomes (Scale – 1:very low,2: low,3:medium,4:high)									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	4	1	4	__4	2	4	2	1	1	4
CO2	4	1	4	__2	2	4	2	1	1	4
CO3	4	1	4	4	2	4	3	1	1	4
CO4	4	1	4	__4	2	4	3	1	1	4

Applicable from Batch Admitted in Academic Session 2024-25 onwards

UNIT – I
No. of Hours: 14 Chapter / Book Reference: TB1 [Chapters 1, 4, 9], TB2 [Chapters 1, 6, 7], TB3 [Chapters 1, 2,6,10]
Linear Data Structures- Static: Introduction to Algorithms- Attributes, Design Techniques, Time Space Trade Off, Data Structures, Classification and Operations of Data Structures.
Arrays: Single Dimension, Two-Dimension and Introduction to Multi Dimensions, Memory Representation, Address Calculation, Sparse Matrices- Types, Representation.
Searching and Sorting: Linear and Binary Search, Selection Sort, Bubble Sort, Insertion Sort, Merge Sort, Elementary Comparison of Searching and Sorting Algorithms.
Hashing: Hash Table, Hash Functions, and Collision Resolution.

UNIT – II
No. of Hours: 10 Chapter / Book Reference: TB1 [Chapter 5], TB2 [Chapter 4], TB3 [Chapter 3]
Linear Data Structures- Dynamic
Introduction: Dynamic Memory Allocation**,** Dynamic Memory versus Static Memory Allocation.
Linked List Types: Singly Linked List, Circular Linked List**,** Doubly Linked List.
Operations: Creation, Insertion, Deletion, Modification, Searching, Sorting, Reversing, and Merging.

UNIT – III
No. of Hours: 10 Chapter / Book Reference: TB1 [Chapter 6], TB2 [Chapters 2, 4], TB3 [Chapters 4, 5]
Abstract Data Types:
Stacks: Introduction, Static and Dynamic Implementation, Operations, Applications- Evaluation and Conversion between Polish and Reverse Polish Notations.
Queues: Introduction, Static and Dynamic Implementation, Operations, Types- Linear Queue, Circular Queue, Doubly Ended Queue.

UNIT – IV
No. of Hours: 10 Chapter / Book Reference: TB1 [Chapters 7, 8], TB2 [Chapters 5, 8], TB3 Chapters 7, 8]
Non Linear Data Structures:
Introduction to Graphs: Notations & Terminologies, Representation of Graphs- Adjacency Matrix, Incidence Matrix and Linked Representation.
Trees: Notations & Terminologies, Memory Representation, Binary Trees Types- Complete, Full, Strict, Expression Binary Tree, Tree Traversals (Recursive), Binary Search Tree and Basic Operations
Introduction and Creation (Excluding Implementation): AVL Tree, Heap Tree, M- Way Tree, and B Tree.

TEXT BOOKS:
TB1. Schaum's Outline Series, "Data Structures", TMH, Special Indian Ed., Seventeenth Reprint, 2014.
TB2. Y. Langsam, M. J. Augenstein and A.M. Tanenebaum, "Data Structures using C and C++", Pearson Education India, Second Edition, 2015.
TB3. D. Samanta, "Classic Data Structures", PHI, Second Edition, 2009.

REFERENCE BOOKS:

RB1. Ashok N kamthane "Introduction to Data Structures in C", Pearson

RB2. E. Horowitz and S. Sahni, "Fundamentals of Data Structures in C". Universities Press,

RB3. D. Malhotra and N. Malhotra, "Data Structures and Program Design using C", Laxmi Publications, Indian adapted edition from Mercury Learning and Information-USA,

RB4. Y. Kanetkar" Data Structures through C", BPB Publication,

RB5. R.F Gilberg, and B AFrouzan- "Data Structures: A Pseudocode Approach with C", Thomson Learning,

RB6. A. K. Rath, and A.K. Jagadev, "Data Structures and Program Design Using C", Scitech Publications,

Course Code: BCA 108T   **L   T   C**

Course Name: Software Engineering   **4   0   4**

LEARNING OBJECTIVES:
The paper aims to understand the importance, limitations and challenges of processes involved in software development. In this course, the learners will be able to develop expertise related to the following:
1. To gain knowledge of various software models.
2. To gain knowledge of various software design activities.
3. To learn cost estimation, software testing, Maintenance and debugging.

PRE-REQUISITES:
Nil

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO
CO1	Instantiating into the process of designing, coding and testing a software module. Implementing Software Development Life Cycle(SDLC) to develop a software module
CO2	Organizing a software product along with its complete documentation.
CO3	To analyze the use of techniques, skills and modern engineering tools necessary for software development.
CO4	Organizing a complete software module according to SDLC

Course Outcomes	Program Outcomes (Scale – 1:very low,2: low,3:medium,4:high)									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	4	2	4	__4	1	4	1	1	1	4
CO2	4	2	4	__2	1	4	1	1	1	4
CO3	4	2	4	4	1	4	1	1	1	4
CO4	4	2	4	__4	1	4	3	2	1	4

Applicable from Batch Admitted in Academic Session 2024-25 onwards

UNIT – I
No. of Hours: 12   Chapter/Book Reference: TB1 [Chapters - 1, 3], TB2 [Chapters - 3, 5]
Introduction of software engineering: Software Crisis, Software life cycle models, Waterfall, Prototype, Spiral Models, Agile model, Iterative Enhancement model.
Software Requirements analysis & specifications: Requirement engineering, requirement elicitation techniques like FAST, QFD, Requirement analysis using DFD, use-case, sequence and class diagram (with case studies), ER Diagrams, Requirements documentation: SRS, Characteristics & organization of SRS

UNIT – II
No. of Hours: 10   Chapter/Book Reference: TB1 [Chapter - 1, 4]
Software Project Planning: Software Metrics-Definition and Need, Types of Metrics-Product, Process and Project Metrics, Size Estimation like lines of Code & Function Count, Halstead Software Science measure, Cost Estimation: Need, Models COCOMO: Basic model, Intermediate model
Risk Management: Software Risks, Types of risk, risk management activities: risk assessment, risk control.

UNIT – III
No. of Hours: 10   Chapter/Book Reference: TB1 [Chapter - 5, 6], TB2 [Chapter - 24]
Software Design: Cohesion & Coupling, Classification of Cohesiveness & Coupling,
Quality management: Quality concept, software quality assurance, Total Quality Management (TQM), software review, software inspection
Software Implementation: Structured coding techniques, coding style, Standards and guidelines, documentation guidelines. Reverse Engineering, Software Re-engineering, Configuration Management.

UNIT – IV
No. of Hours: 12   Chapter/Book Reference: TB1 [Chapter 8, 9], TB2 [Chapter 8]
Software Testing: Testing Process, Levels of Testing: Unit testing, Integration testing and system testing. Types of Testing: Manual testing, Automation Testing. Methods of Testing: Black box, White box and Grey Box Testing. Validation, Verification, Alpha-Beta testing, Acceptance testing, Functional Testing and its types, Structural Testing Difference between: Testing and Debugging
Software Maintenance: Management of Maintenance, The Maintenance Process and Types of maintenance: Preventive, Perceptive, Adaptive and Corrective Maintenance.

TEXT BOOKS:
TB1. K. K. Aggarwal & Yogesh Singh, "Software Engineering", 2nd Ed., New Age International, 2005.
TB2. I. Sommerville, "Software Engineering", 9th Edition, Pearson Edu.

REFERENCE BOOKS:
RB1. Jibitesh Mishra and Ashok Mohanty, "Software Engineering", Pearson
RB2. R. S. Pressman, "Software Engineering – A practitioner's approach", 5th Ed., McGraw Hill **RB3.** James Peter, W. Pedrycz, "Software Engineering: An Engineering Approach", John Wiley & Sons

Course Code: BCA 142T L T C
Course Name: Soft Skills 3 0 3

LEARNING OBJECTIVES:
This course will provide the learners the following:
To know about various aspects of soft skills and learn ways to develop personality
1. Understand the importance and type of communication in personal and professional environment.
2. To provide insight into much needed technical and non-technical qualities in career planning.
3. Learn about Leadership, team building, decision making and stress management

PRE-REQUISITES: Nil

COURSE OUTCOMES(COs):

CO#	Detailed Statement of the CO
CO1	The student will become familiar with the basics of soft Skills and its importance in their career and life
CO2	To improve the business communication skills
CO3	To improve the listening skills by knowing well how to negotiate and give effective presentations.
CO4	To make use of effective business language and give a professional look to oneself.

Course Outcomes	Program Outcomes (Scale – 1:very low,2: low,3:medium,4:high)									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	2	-	2	1	-	1	2	1	2
CO2	-	2	-	2	1	-	1	2	1	2
CO3	-	2	-	2	1	-	1	2	1	2
CO4	-	2	-	2	1	3	1	2	1	2

Applicable from Batch Admitted in Academic Session 2024-25 onwards

UNIT–I
No. of Hours: 10 Chapter/Book Reference: TB1, TB2, TB3, TB4
Foundations Of Soft Skills: Soft Skills as Essential Life Skills, Meaning, Definition, Types, and Scope of Soft Skills, Prospects and Significance of Developing Soft Skills,Differentiating Skills, Knowledge, Attitudes, and Beliefs, Understanding Technical, Human, and Conceptual Skills
Soft Skills in Career Prospects: Exploring the Role of Soft Skills in Career Success, Implications and Benefits of Incorporating Soft Skills, Coordinating Conceptual and Practical Aspects of Soft Skill Development, Human Values and Work Ethics as Integral Soft Skills

UNIT-II
No. of Hours: 10 Chapter/Book Reference: TB1, TB2, TB3
Communication And Interpersonal Proficiency:
Effective Communication: Meaning and Significance of Effective Communication, Elements of the Communication Process-Verbal and Non-verbal Communication Skills
Overcoming Communication Barriers: Identifying Barriers and Misinterpretations, Strategies to Overcome Communication Challenges, Importance of Active Listening , Conflict Resolution and Negotiation ,Problem Solving and Conflict Handling Techniques,Applying Negotiation skills for Effective Outcomes ,Role of Communication in Conflict Resolution

UNIT-III
No. of Hours: 10 Chapter/Book Reference: TB1, TB2, TB3, TB4
Professional Skills Development:
Group Discussion: Introduction, Definitions, Purpose and Types of Group Discussions Characteristics of Effective Group Discussions Dos and Don'ts of participating in Group Discussion
Interview Skills: Interview Concept and Definition, Purpose/Objective of Interview, Types of Interviews Guidelines for Successful Interview Preparation and Execution
Presentation Skills Importance of Effective Presentations, Essentials for Successful Presentations, Utilizing PowerPoint for Impactful Presentations

UNIT-IV
No. of Hours: 10 Chapter/Book Reference: TB3, RB1, RB3
Personal And Wellness Skills: Self-Development and Awareness, Exploring the Role of the Self in Personal Growth, Stages of Development and Sigmund Freud's Layers of the Self
Emotional Intelligence and Critical Thinking: Importance of Emotional Intelligence, Self-Awareness, Self-Regulation, Motivation
Empathy : Utilizing Critical Thinking for Problem Solving
Stress and Time Management: Recognizing Stress- Signs, Symptoms, and Impact Strategies for Stress Management and Prevention Effective Time Management Techniques

TEXTBOOKS:
TB1. Alex, Dr. K, Soft Skills Know Youself and Know The World, S Chand & Company.
TB2. Kavita Tyagi and Padma Misra , "Advanced Technical Communication", PHI,
TB3. Personality Development and Soft Skills, Barun K. Mitra, Oxford Higher Education
TB4. Goleman, D., Emotional intelligence: Why it can matter more than IQ,Bantam Books.
TB5. Nelson-Jones, R., Life skills, A Handbook, Trowbridge, Wilts: Detesios Ltd.

REFERENCES:
RB1. Kaul, Asha. (2009). Business Communication (2nd edition) PHI Learning..

RB2. Tuhovsky, Ian. Communication Skills Training Rupa Publication India.

RB3. Kavita Tyagi and Padma Misra , "Basic Technical Communication", PHI, 2011.

RB4. Herta A Murphy, Herbert W Hildebrandt and Jane P Thomas, "Effective Business 3.

Course Code: BCA 192T   **L T C**
Course Name: Environment Studies   **2 0 2**

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following:
1. Development of critical thinking for shaping strategies (scientific, social, economic, administrative, and legal) for environmental protection, conservation of biodiversity, environmental equity, and sustainable development.
2. Acquisition of values and attitudes towards understanding complex environmental economic- social challenges, and active participation in solving current environmental problems and preventing the future ones.
3. Encouraging adoption of sustainability as a practice in life, society, and industry.

PRE-REQUISITES: Basic awareness about the natural environment.

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:

CO#	Detailed Statement of the CO
CO1	Gain in-depth knowledge on natural processes and resources that sustain life and govern economy.
CO2	Understand the consequences of human actions on the web of life, global economy, and quality of human life.
CO3	Develop critical thinking for shaping strategies (scientific, social, economic, administrative, and legal) for environmental protection, conservation of biodiversity, environmental equity, and sustainable development.
CO4	Acquire values and attitudes towards understanding complex environmental economic-social challenges, and active participation in solving current environmental problems and preventing the future ones.

Course Outcomes	Program Outcomes (Scale – 1:very low,2: low,3:medium,4:high)									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	-	1	2	1	2	-	2	4	2
CO2	-	-	1	2	1	2	-	1	4	2
CO3	-	-	3	2	1	2	-	1	4	1
CO4	-	-	1	2	1	3	-	1	4	2

UNIT–I
No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters 1, 6]; TB2 [Chapters 8, 11, 25]; TB3 [Chapters 1, 35]
Introduction to Environmental Studies
Multidisciplinary nature of environmental studies; components of environment: atmosphere, hydrosphere, lithosphere, and biosphere.
Scope and importance; Concept of sustainability and sustainable development
Emergence of environmental issues: Climate change, Global warming, Ozone layer depletion, Acid rain etc.
International agreements and programmer: Earth Summit, UNFCCC, Montreal and Kyoto protocols, Convention on Biological Diversity(CBD), Ramsar convention, The Chemical Weapons Convention (CWC), UNEP, CITES, etc

UNIT–II
No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters 2, 3]; TB2 [Chapters 2, 15, 16, 17]; TB3 [Chapters 2, 7, 11, 12]
Ecosystems and Natural Resources
Definition and concept of Ecosystem
Structure of ecosystem (biotic and abiotic components); Functions of Ecosystem: Physical (energy flow), Biological (food chains, food web, ecological succession), ecological pyramids and homeostasis.
Types of Ecosystems: Tundra, Forest, Grassland, Desert, Aquatic (ponds, streams, lakes, rivers, oceans, estuaries); importance and threats with relevant examples from India
Ecosystem services (Provisioning, Regulating, Cultural, and Supporting); Ecosystem preservation and conservation strategies; Basics of Ecosystem restoration
Energy resources: Renewable and non-renewable energy sources; Use of alternate energy sources; Growing energy needs; Energy contents of coal, petroleum, natural gas and bio gas; Agro-residues as a biomass energy source

UNIT–III
No. of Hours: 10 Chapter/Book Reference: TB1 [Chapter 4]; TB2 [Chapters 4, 5, 6]; TB3 [Chapters 22, 23, 24]
Biodiversity and Conservation
Definition of Biodiversity; Levels of biological diversity: genetic, species and ecosystem diversity
India as a mega-biodiversity nation; Biogeographic zones of India; Biodiversity hotspots; Endemic and endangered species of India; IUCN Red list criteria and categories
Value of biodiversity: Ecological, economic, social, ethical, aesthetic, and informational values of biodiversity with examples.
Threats to biodiversity: Habitat loss, degradation, and fragmentation; Poaching of wildlife; Man-wildlife conflicts; Biological invasion with emphasis on Indian biodiversity; Current mass extinction crisis

Biodiversity conservation strategies: in-situ and ex-situ methods of conservation (National Parks, Wildlife Sanctuaries, and Biosphere reserves.

Case studies: Contemporary Indian wildlife and biodiversity issues, movements, and projects (e.g., Project Tiger, Project Elephant, Vulture breeding program, Project Great Indian Bustard, Crocodile conservation project, Silent Valley movement, Save Western Ghats movement, etc)

UNIT–IV
No. of Hours: 9 + 5 for field visit Chapter/Book Reference: TB1 [Chapter5]; TB2 [Chapters7, 20, 21, 23]; TB3 [Chapters25, 26, 27, 28, 30, 31]

Environmental Pollution and Control Measures
Environmental pollution (Air, water, soil, thermal, and noise): causes, effects, and controls; Primary and secondary air pollutants; Air and water quality standards
Nuclear hazards and human health risks
Solid waste management: Control measures for various types of urban, industrial waste, Hazardous waste, E-waste, etc.; Waste segregation and disposal
Environmental Impact Assessment and Environmental Management System
Field work/ Practical's (any one)
Field visit to any of the ecosystems found in Delhi like Delhi Ridge/ Sanjay lake/Yamuna river and its floodplains etc., or any nearby lake or pond, explaining the theoretical aspects taught in the class room
Visit to any biodiversity park/ reserve forest/ protected area/ zoo/ nursery/ natural history museum in and around Delhi, such as Okhla bird sanctuary/ Asola Bhatti Wildlife Sanctuary/ Yamuna Biodiversity Park/ Sultanpur National Park, explaining the theoretical aspects taught in the classroom
Visit to a local polluted site (urban/rural/industrial/agricultural), wastewater treatment plants, or landfill sites, etc

TEXT BOOKS:
TB1. Sanjay Kumar Batra , Kanchan Batra ,Harpreet Kaur; Environmental Studies; Taxmann's, Fifth Edition.
TB2. M.M. Sulphey; Introduction to Environment Management; PHI Learning, 2019
TB3. S.P. Mishra, S.N. Pandey; Essential Environmental Studies; Ane Books Pvt. Ltd. ; Sixth Edition.

REFERENCE BOOKS:
RB1. Asthana, D. K. (2006).Text Book of Environmental Studies. S. Chand Publishing.
RB2. Basu, M., Xavier, S. (2016). Fundamentals of Environmental Studies, Cambridge University Press, India
RB3. Bharucha, E. (2013). Textbook of Environmental Studies for Undergraduate Courses. Universities Press.
RB4. Mahapatra, R., Jeevan, S.S., Das, S. (Eds) (2017). Environment Reader for Universities, Centre for Science and Environment, New Delhi.
RB5. Masters, G. M., & Ela, W. P. (1991).Introduction to environmental engineering and science. Englewood Cliffs, NJ: Prentice Hall.
RB6. Odum, E. P., Odum, H. T., & Andrews, J. (1971).Fundamentals of ecology. Philadelphia: Saunders.
RB7. Sharma, P. D., & Sharma, P. D. (2005).Ecology and environment. Rastogi Publication

Course Code: BCA 102P **L P C**
Course Name: DBMS Lab 0 2 2

INSTRUCTIONS
1.The course objectives and course outcomes are identical to that of BCA 102T as this is the practical component of the corresponding theory paper.
2. The practical list shall be notified by the teacher in the first week of the class commencement

Course Code: BCA 104P **L P C**
Course Name: Object Oriented Programming Using Java Lab 0 2 2

INSTRUCTIONS
1.The course objectives and course outcomes are identical to that of BCA 104T as this is the practical component of the corresponding theory paper.
2. The practical list shall be notified by the teacher in the first week of the class commencement

Course Code: BCA 106P **L P C**
Course Name: Data Structures and Algorithms Lab 0 2 2

INSTRUCTIONS
1.The course objectives and course outcomes are identical to that of BCA 106T as this is the practical component of the corresponding theory paper.
2. The practical list shall be notified by the teacher in the first week of the class commencement

Course Code: BCA 108P **L P C**
Course Name: Software Engineering Lab 0 2 2

INSTRUCTIONS
1.The course objectives and course outcomes are identical to that of BCA 108T as this is the practical component of the corresponding theory paper.
2. The practical list shall be notified by the teacher in the first week of the class commencement