

SCHEME OF EXAMINATION

&

SYLLABI

for

**Bachelor of Computer Applications Programme of Studies
under the aegis of University School of Information, Communication
and Technology offered at Affiliated Institutions of the University**

Applicable to Batch Admitted in 2024-25



University School of Information, Communication and Technology

Sector 16C, Dwarka, Delhi – 110078 [INDIA]

www.ipu.ac.in

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.
3. Scheme of study of BCA programme, its second-year detailed syllabus and implementation rules approved by Board of Study of University School of Information, Communication and Technology on 28.07.2025.
4. Scheme of study of BCA programme, its second-year detailed syllabus and implementation rules approved by Academic Council sub-committee on 01.08.2025.
5. Scheme of study of BCA programme, its third- and fourth-year detailed syllabus and implementation rules approved by Board of Study of University School of Information, Communication and Technology on 08.08.2026
6. Scheme of study of BCA programme, its third- and fourth-year detailed syllabus and implementation rules approved by Academic Council sub-committee on 19.08.2026.

Provision for Smooth Implementation

This document describes the curriculum of the Bachelor of Computer Applications Programmes that are (or allowed to be) offered at the affiliated institutions of Guru Gobind Singh Indraprastha University, Delhi, under the aegis of the University School of Information, Communication, and Technology. In the event of any difficulty of implementation, and/or interpretation of any clause of the document, the same may be brought to the notice of Dean of the University School of Information, Communication, and Technology. The decision of the Dean, University School of Information, Communication, and Technology shall be final and implemented to resolve the issue. The same shall be put up in the subsequent meeting of the Board of Studies (BoS) of the University School of Information, Communication, and Technology for its approval. If the decision of the BoS of the University School of Information, Communication, and Technology is at variance with the decision taken earlier by the Dean of the School, the decision of the Board shall from the date of the approval by the Board of Studies. In the interim period, the decision taken shall stand.

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) 2024-25, 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”.

OR

“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	Students are required to complete Minimum 52 credits including vocational	Students who exit with a BCA certificate are permitted to re-enter	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

Applicable from Batch Admitted in Academic Session 2024-25 onwards

		(Semester I and semester II)	course which is mandatory.	within three years from the date when student took break and may complete the BCA programme.	during the period of BCA programme but the total duration for completing the BCA 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	--	Students will be awarded BCA (Hons.) Degree

Applicable from Batch Admitted in Academic Session 2024-25 onwards

			credits in every semester with a total CGPA of above or equal to 7.5, and the degree is 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.		
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Acronyms for Core Disciplines:

BCA : Bachelor of Computer Applications

Programme Outcomes

Programme Objectives (POs)	Description
PO1	<i>Disciplinary Knowledge:</i> Apply the knowledge of computer application concepts and domain knowledge to solve the problems in IT domain/IT industry
PO2	<i>Problem Analysis:</i> Identify, formulate, review research literature, and analyze complex computer application problem at their workplace and for the society.
PO3	<i>Design /Development of Solutions:</i> 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	<i>Modern Tool Usage:</i> Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computer application activities, with an understanding of the limitations.
PO5	<i>Professional Ethics:</i> Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices.
PO6	<i>Life-long Learning:</i> Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.
PO7	<i>Project management and finance:</i> 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.
PO8	<i>Communication Efficacy with Cooperation/teamwork</i> 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.
PO9	<i>Societal and Environmental Concern:</i> 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.
PO10	<i>Innovation and Entrepreneurship</i> 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.

Applicable from Batch Admitted in Academic Session 2024-25 onwards

Definitions:

Batch: The batch of the student shall mean the year of the first-time enrolment of the students in the programme of study in the first semester. Lateral entry students admitted in the 3rd semester/2nd year shall be designated as students admitted in the previous batch as they are admitted one year later. A student re-admitted in a programme of study in a lower/later batch shall be considered as the student of the original batch for the purpose calculation of duration of study (lateral entry or readmission due to academic break). Programme of study shall mean Bachelor of Computer Applications. Major/Primary specialization/discipline shall mean the discipline in which the student is admitted. Minor specialization shall mean the specializations earned through the EAE or OAE route subject to fulfilment of requirements specified in the scheme of study for the concerned minor specialization. Paper/Course shall be treated as synonyms. A paper is one unit of curriculum taught, in general, in one particular semester.

The document is prepared after extensive discussion among the stakeholders. The following has been guiding principles for the design of this document:

1. AICTE Handbook 2024-25 applicable till 2026-27.
2. Minor specializations shall be offered. This allows the students to study not only the core foundational papers / subjects in the discipline but also subjects in the focus areas and emerging areas of technology that are relevant to the discipline and of related disciplines in the Core Discipline Degrees.
3. Multiple Exit and re-entry after completion of every academic year of study.
4. Value Added Course on “Environment Studies” of 2 credits
5. Value Added Course on “Human Values and Ethics” of 2 credits
6. The Value-Added Courses shall total for 8 credits
7. Inter-disciplinary Courses of 9 Credits to be studied by students from other discipline than their own.
8. Maximum Credits: 185 (4-year BCA (Hons.))
9. Minimum Credits 157 (3-year BCA)
10. Every year of teaching shall be of approximately 40 to 48 credits.

Note:

A. The document currently specifies the following:

1. The scheme and syllabus for the 3rd and 4th year Bachelor of Computer Applications
2. The regulation for exit and re-entry into the programme after completion of one academic year at a time.
3. The regulation for the award of the degree

Other Acronyms:

Table 2: Acronyms

PCC	:	Programme Coordination Committee
APC	:	Academic Programme Committee comprising of all faculty of the department / institutions and as defined in the implementation rules and the Ordinance 11 of the University.
L	:	Number of Lecture hours per week
T/P	:	Number of Tutorial / Practical Hours per week
C	:	Number of credits assigned to a course / paper
COE	:	Controller of Examinations of the Examinations Division of the University.
SGPA/CGPA	:	Semester/Cumulative Grade Point Average
NUES	:	Non-University Examination System - No term end examination shall be held. The evaluation shall be conducted as per the scheme of examinations as described in the scheme of study.
PC	:	Program Core Paper / course
VAC	:	Value Added Course / Paper
BC	:	Bridge Course / paper
SEC	:	Skill Enhancement Course / Paper

Eligibility Criteria: The eligibility criteria for BCA programme for an academic session will be provided in the admission brochure (as for Academic Session (AS) 2024-25. The eligibility criteria of BCA programme for academic session 2024-25 onwards shall be 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 / Informatics Practice / Computer Applications / Multimedia & Web Technology / Data Management Application / Web Application as compulsory subject of non-vocational stream with 50 theory and 50 practical ratio) or equivalent.”

OR

“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.”

Admission Criteria: Admission shall be based on the merit of the written test / Common Entrance Test Conducted by the University and any other mode specified by the University.

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
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
- Applicable from Batch Admitted in Academic Session 2024-25 onwards

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 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 conducted by the examination division of the university.

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.

**Scheme for
Bachelor of Computer Applications of Study
under the aegis of
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Technology
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SEMESTER WISE EVALUATION SCHEME

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 105T#	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 105P#	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)								

Applicable from Batch Admitted in Academic Session 2024-25 onwards

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.

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)

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)

Applicable from Batch Admitted in Academic Session 2024-25 onwards

**** 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.**

SEMESTER WISE EVALUATION SCHEME

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

Applicable from Batch Admitted in Academic Session 2024-25 onwards

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

* 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)

SEMESTER WISE EVALUATION SCHEME

TABLE 9: FOURTH SEMESTER

Code No.	Paper	Course Type	L	T/P	Credits	Marks Internal	Marks External	Max Marks	
							Th		
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	Introduct ion to Data Science and	PCE	4	-	4	40	60	100
	BCA 212P	Data Science Lab	PCE	-	4	2	40	60	100
BCA	BCA 216T	Introduct ion to	PCE	4	-	4	40	60	100

Applicable from Batch Admitted in Academic Session 2024-25 onwards

216		Security, Acts and Cyber Laws and 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

Applicable from Batch Admitted in Academic Session 2024-25 onwards

<u>Multidisciplinary (Generic Elective)</u>								
<u>(Choose any One)</u>								
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

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.

SEMESTER WISE EVALUATION SCHEME

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

Applicable from Batch Admitted in Academic Session 2024-25 onwards

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

* 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 conducted 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.

SEMESTER WISE EVALUATION SCHEME

TABLE 11: SIXTH SEMESTER

Code No.	Paper	Course Type	L	T/P	Cre dits	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 316T	BCA 316T	Web Security	PCE	4	-	4	40	60	100

Applicable from Batch Admitted in Academic Session 2024-25 onwards

316									
	BCA 316P	Web Security Lab	PCE	-	4	2	40	60	100
BCA 318	BCA 318T	Mobile Application Development	PCE	4	-	4	40	60	100
	BCA 318P	Mobile Application Development Lab	PCE	-	4	2	40	60	100
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.

SEMESTER WISE EVALUATION SCHEME

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.

SEMESTER WISE EVALUATION SCHEME

TABLE 13: EIGHTH 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 want to pursue 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.

**Syllabus for
Bachelor of Computer Applications of Study
under the aegis of
University School of Information, Communication, and
Technology
offered at Affiliated Institutions of the University**

FIRST SEMESTER SYLLABUS

Course Code: BCA 101T

L T C

Course Name: Programming for Problem Solving using C

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:

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

Course Code: BCA 103T

Course Name: Fundamental of Information Technology

L T C

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

Applicable from Batch Admitted in Academic Session 2024-25 onwards

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

Applicable from Batch Admitted in Academic Session 2024-25 onwards

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

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 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.

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

Applicable from Batch Admitted in Academic Session 2024-25 onwards

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 Friends, 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

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:

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. Sentence, Phrase, Kinds of sentences, Parts of sentence and parts of speech

Applicable from Batch Admitted in Academic Session 2024-25 onwards

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 (NUES)
Course Name: Understanding India

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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 literature Sanskrit, Pali, Prakrit, Tamil
Religions and philosophies of ancient India-Vedic, Buddhism, Jainism

Applicable from Batch Admitted in Academic Session 2024-25 onwards

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, Pathshalas, Tols, Maktabas, 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 the Parliamentary system

TEXT BOOKS:

TB1. A.L. Basham, The Wonder that Was India, Picador India, 1971

TB2. R.S. Sharma, India's Ancient Past, New Delhi, 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. Prabhakaran Jain & R. Sharma, Understanding India, Mahavir Publication

Course Code: BCA 181T

Course Name: Bridge Course in Mathematics

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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.

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

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 3×3 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	T/P	C
Course Name: Programming for Problem Solving using C Lab		0	4	2
LEARNING OBJECTIVES: In this course, the learners will be able to develop expertise related to: 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.			
List of Practicals				
S. No.	Detailed Statement			Mapping to CO #
Core Practicals (Implement minimum 8 out of 10 practical)				
1	Write a program to convert temperature from Celsius to Fahrenheit by taking input from the user.			CO1
2	Write a program to find the greatest number among 3 numbers given by the user.			CO1
3	Write a program to check if a given number is a prime number or not.			CO1
4	Write a program to display the following pattern upto N rows, taking the value of N from the user: 1 2 3 4 5 6 7 8 9 10			CO1
5	Write a program to input marks of 50 students using an array and display the average marks of the class.			CO2
6	Write a program to search for a number entered by the user in a given array and display the array in ascending order.			CO2
7	Write a program to check if a string is palindrome or not.			CO2
8	Write a program to add, subtract, multiply and divide two numbers using pointers.			CO2
9	Write a program to create a structure for employees containing the following data members: Employee ID,			CO3

Applicable from Batch Admitted in Academic Session 2024-25 onwards

	Employee Name, Age, Address, Department and Salary. Input data for 10 employees and display the details of the employee from the employee ID given by the user.	
10	Write a program to create two files with names EvenFile and OddFile. Input 20 numbers from the user and save even numbers in EvenFile and odd numbers in OddFile.	CO3
Application Based Practicals (Implement minimum 5 out of 10 practicals)		
1	Write a menu driven program to construct a calculator for following arithmetic operations: addition, subtraction, multiplication, division, average and percentage.	CO1
2	Write a menu driven program to perform the following operations: (i) Print armstrong numbers upto N, (ii) Display prime numbers between 1 to N, (iii) Reverse of an integer	CO1
3	Write a program to convert a hexadecimal number into a binary number.	CO1
4	Write a program to calculate factorial of a number and display fibonacci series upto N terms using recursive functions.	CO2
5	Write a program to perform matrix addition, (ii) matrix multiplication, and (iii) Matrix transpose) on 2D arrays.	CO2
6	Write a program to make use of arrays with structures in the following ways: (i) Use array as a structure data member (ii) Create array of structure variables	CO3
7	Write a program to compare the contents of two files by taking names of the files through command line arguments.	CO3, CO4
8	WAP to perform I/O and make use of file positioning functions on Binary files. (using fseek, ftell, rewind functions)	CO4
9	Write a menu driven program to implement the following string operations: (i) Calculate length of a string (ii) Concatenate at the end of a given (iii) Copy one string to another (iv) Compare contents of two strings Copy nth character string to another	CO4
10	Write a program to read time in string format and extract hours, minutes and second also check time validity	CO4
Note: 1. In total 15 practicals to be implemented. 2 additional practicals may be given by the course instructor. 2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.		

Applicable from Batch Admitted in Academic Session 2024-25 onwards

Course Code: BCA 103P		L	T/P	C
Course Name: Fundamental of Information Technology Lab		0	4	2
LEARNING OBJECTIVES: In this course, the learners will be able to develop expertise related to: 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			
List of Practicals				
S. No.	Detailed Statement			Mapping to CO #
Core Practicals (Implement minimum 10 out of 15 practical)				
1	To explore the System settings - Personalisation, System, Devices, Apps, Network & Internet.			CO1
2	To practice basic DOS commands like cd, md, dir, erase, cls, copy, date etc.			CO2
3	To explore Windows Explorer functionalities like create, rename, move, delete folder and files etc.			CO2
4	To practice the use of basic formatting features - Format Painter, Indentation, Line spacing, background color, find, replace, dictate commands.			CO2
5	To practice the use of Bullets, numbering, multilevel lists and use of Table Feature- Insert table with rows and columns, draw tables, excel spreadsheet and quick tables etc.			CO2
6	To practice the use of Insert Features – add picture, Chart, SmartArt, WordArt, Equation, Symbols, Header and Footer, Page Numbering etc. and the use of Design Features – Watermark, Page color, Page Border, Themes implementation etc.			CO2
7	To practice the use of Layout Features – Margins, Orientation, Size, Columns, Indent, Spacing etc.			CO2

Applicable from Batch Admitted in Academic Session 2024-25 onwards

8	To practice the use of Mail Merge Feature to generate Envelops and Labels.	CO2
9	To practice the use of Excel basic formatting features – Wrap Text, Insert and Delete (Cells, Sheet, Row or Column), Format – Cell Height, Cell Width, Hide, Un Hide Cell, Protection, Freeze and Unfreeze panes, Macros etc.	CO3
10	To practice the use of Insert Features- Pivot Table, Pivot Chart, Picture, Chart and its formatting and Design and the use of Page Layout Features- Margins, Orientation, Page Break , Background, Height and Width of Cells.	CO3
11.	To practice the use of Formula Features – user defined function, predefined functions – Logical, Date, Time, Maths and the use of Data Manipulation Features – Sort, Filter, Advanced Filters, Whatif analysis.	CO3
12.	To practice the creation of Blank presentation and Selecting Themes and the use of the basic design features – Adding New Slides, Reuse slides, Slides layout etc.	CO4
13.	To practice the use of Insert Features – add pictures, screenshots, shapes, wordart, audio, video, date-time etc. and use of Design Features- Changing the theme of presentation, format background and design ideas.	CO4
14.	To practice the use of Transition features to be applied on Slides content, setting sound, duration etc. and the use of Animation Features to be applied on presentation of Slide, set animation timings and rehearse etc.	CO4
15.	To practice the use of Slide Show Features – Custom Slide Show, Rehearse Timing etc.	CO4
Application Based Practicals (Implement minimum 5 out of 8 practicals)		
1	Create a Folder by your name in your system, store all the work done in this semester inside that folder.	CO1
2	Create your Resume using basic formatting features like : table, bullets, wordart etc	CO2
3	Design an Invitation to Birthday Party using mail merge features send the invitation to 10 friends.	CO2
4	Write an Article for Magazine with 3 columns and hyperlink.	CO2
5	Create your own marksheet using basic formatting features.	CO3
6	Create a list of marks of 10 students create charts and pivot table.	CO3
7	Prepare a Sales summary and use features like sort, filter etc. to manipulate the data.	CO3
8	Create a Power Point Presentation on any topic of your choice using animation and transition features.	CO4
Note: 1. In total 15 practicals to be implemented. 2 additional practicals may be given by the course instructor. 2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.		

Applicable from Batch Admitted in Academic Session 2024-25 onwards

Course Code: BCA 105P		L	T/P	C
Course Name: Web Technologies Lab		0	2	1
LEARNING OBJECTIVES: In this course, the learners will be able to develop expertise related to: 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: None				
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			
List of Practicals				
S. No.	Detailed Statement			Mapping to CO #
Core Practicals (Implement minimum 10 out of 15 practical)				
1.	Make following five different web pages: i. Formatting Styles and Headings: Include Bold, italics, Underline, Strike, Subscript, superscript and all six type of headings ii. Font Styles and Image tag iii. Marquee: Move text, image and hyperlink iv. Other tags: br, hr, pre, p Include following specifications: • In all these web pages only mention about use, attributes apply them. • Insert a background image on home page • Make all the topics as hyperlinks and go to some other page for description • Insert a marquee showing HTML Tutorial as moving text. • Use different font style for different topics On every page, make a hyperlink for going back to home page and internal link also.			CO1, CO3

Applicable from Batch Admitted in Academic Session 2024-25 onwards

2.	Create an unordered list nested inside ordered list and apply the following : • Insert an image of Main item on top right corner of web page. • Display heading as a marquee. • Use different font styles and colors for different ordered list items. Insert horizontal line after each ordered item.	CO1, CO3				
3.	Design a table with row span and column span and make use of attributes colspan, rowspan, width, height, cellpadding, cellspacing etc.	CO1, CO3				
4.	Design following frame: <table><tr><td>MAIN MENU <u>Topic 1</u> <u>Topic 2</u> <u>Topic 3</u></td><td>Explanation ----- ----- <u>View Example</u></td></tr><tr><td></td><td>Example</td></tr></table>	MAIN MENU <u>Topic 1</u> <u>Topic 2</u> <u>Topic 3</u>	Explanation ----- ----- <u>View Example</u>		Example	CO1, CO3
MAIN MENU <u>Topic 1</u> <u>Topic 2</u> <u>Topic 3</u>	Explanation ----- ----- <u>View Example</u>					
	Example					
5.	Make an image map showing the usage of shape, coords, href attributes in map definition. Link each hotspot to their respective details. All the web pages should be designed with proper background color, images, font styles and headings.	CO1, CO3				
6.	Design Student registration form for admission in college.	CO1, CO3				
7.	Create a webpage and show the usage of inline and internal style sheet and external style sheet?	CO1, CO3				
8.	Create a webpage containing a background image and apply all the background styling attributes?	CO1, CO3				
9.	Create a web page showing the usage of font styling attributes	CO1, CO3				
10.	Create a web page and apply all Text styling attributes use Id and class selector.	CO1, CO3				
11.	Create a webpage and implement all list styling attributes.	CO1, CO3				
12.	Create a Webpage with three equal columns.	CO1, CO3				
13.	Create a webpage containing bootstrap table.	CO1, CO3				
14.	Create a webpage containing various types of images.	CO1, CO3				
15.	Create a webpage containing various types of buttons	CO1, CO3				
16.	Create a webpage containing various, typography classes.	CO1, CO3				
17.	Create a webpage containing to display the heading using. Jumbotron.	CO1, CO3				
18.	Write a program to show the usage of inbuilt functions and dialog boxes.	CO2				
19.	Write a program to show the usage of alert box and confirm box	CO2				
20.	Write a program to implement event handling using onclick, onmouseover and onmouseout events.	CO2				
21.	Write a program to show the usage of all the date, math and string object functions	CO2				

22.	WAP to display the bookstore details in XML with CSS and internal DTD.	CO1, CO3
23.	WAP to format the Teacher details in XML with CSS using external DTD	CO1, CO3
Application Based Practicals (Implement minimum 5 out of 8 practicals)		
24.	Design the registration form for a web site and when the user clicks on submit button the login form should be appeared on the screen (use external javascript file).	CO4
25.	Design a website and apply all the features of HTML, css, javascript and bootstrap to make the website attractive.	CO4
26.	Write a JavaScript function that creates a table, accept row, column numbers from the user, and input row-column number as content (e.g. Row-0 Column-0) of a cell.	CO2
27.	Zebra-striped Tables: Setting different background colors for alternate rows is a popular technique to improve the readability of tables that has large amount of data. This is commonly known as zebra-striping a table. Make use of pseudo classes to create zebra stripped Table.	CO2
28.	Create a Questionnaire related to any topic of your choice by using Form Elements.	CO4
Note: 1. In total 15 practicals to be implemented. 2 additional practicals may be given by the course instructor. 2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.		

SECOND SEMESTER SYLLABUS

Course Code: BCA 102T

Course Name: Database Management System (DBMS)

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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 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.
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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, NoSql databases

TEXT BOOKS:

TB1. R. Elmars 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

Course Name: Object Oriented Programming using Java

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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. Trilochan Tarai, “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.

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

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,

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 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

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 (NUES)
Course Name: Soft Skills

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3 0 3

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.
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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:

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 Yourself 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.

INSTRUCTIONS TO PAPER SETTERS:

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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

Applicable from Batch Admitted in Academic Session 2024-25 onwards

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. Sulphery; 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	T/P	C
Course Name: DBMS Lab		0	2	1
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.				
PRE-REQUISITES: 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.			
List of Practicals				
S. No.	Detailed Statement			Mapping to CO #
Core Practicals (Implement All the mentioned practicals)				
The following are two suggestive databases. The students may use any one or both databases for their core practicals. However, the instructor may provide any other databases for executing these practical. <u>1. COLLEGE DATABASE:</u> STUDENT (USN, SName, Address, Phone, Gender) SEMSEC (SSID, Sem, Sec) CLASS (USN, SSID) SUBJECT (Subcode, Title, Sem, Credits) IAMARKS (USN, Subcode, SSID, Test1, Test2, Test3, FinalIA) <u>2.COMPANY DATABASE:</u> EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo) DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate)				
Applicable from Batch Admitted in Academic Session 2024-25 onwards				

DLOCATION (DNo,DLoc) PROJECT (PNo, PName, PLocation, DNo) WORKS_ON (SSN, PNo, Hours)		
1	Draw an E-R diagram from given entities and their attributes	CO1
2	Convert the E-R diagram into a Relational model with proper constraints.	CO1
3	Write queries to execute following DDL commands : CREATE :Create the structure of a table with at least five columns ALTER:Change the size of a particular column. Add a new column to the existing table. Remove a column from the table. DROP: Destroy the table along with its data.	CO2
4	Write queries to execute following DML commands : INSERT: Insert five records in each table. UPDATE: Modify data in single and multiple columns in a table DELETE: Delete selective and all records from a table	CO4
5	Write queries to execute following DML command : SELECT: Retrieve the entire contents of the table. Retrieve the selective contents (based on provided conditions) from a table. Retrieve contents from a table based on various operators i.e. string operators, logical operators and conditional operators, Boolean operators. Sort the data in ascending and descending order in a table on the basis of one column or more than one column.	CO5
6	Create table using following integrity constraints: Primary Key Unique Key Not Null Check Default Foreign Key	CO3
7	Write queries to execute following Aggregate functions Sum,Avg,Count,Minimum and Maximum value of a numeric column of a table using aggregate function	CO7
8	Retrieve data from a table using alias names.	CO5
9	Retrieve data of a table using nested queries.	CO5
10	Retrieve data from more than one table using inner join, left outer, right outer and full outer joins	CO5
11	Create view from one table and more than one table.	CO6
12	Create index on a column of a table.	CO6
Application Based Practicals		
1	Consider the Insurance company's Database given below. The primary keys are underlined and the data types are specified. PERSON(driver_id# : string, name : string, address : string)	CO7

Applicable from Batch Admitted in Academic Session 2024-25 onwards

	CAR(regno : string, model : string, year : int) ACCIDENT(report_number : int, acc_date : date, location : string) OWNS(driver_id# : string, regno : string) PARTICIPATED(driver_id# : string, regno : string, report_number : int, damage_amount : number(10,2)) - Create the above tables by properly specified the primary key and the foreign key - Enter at least five tuples for each relation - Demonstrate how you can - Update the damage amount for the car with a specific regno, the accident with report number 12 to 25000. - Add a new accident to the database. - Find the total number of people who owned cars that were involved in accident in 2002. - Find the number of accident in which cars belonging to a specific models were involved	
2	Consider the following schema of a library management system. Write the SQL queries for the questions given below; Student(Stud_no : integer, Stud_name: string) Membership(Mem_no: integer, Stud_no: integer) Book_(book_no: integer, book_name:string, author: string) Iss_rec (iss_no:integer, iss_date: date, Mem_no: integer, book_no: integer) - Create the tables with the appropriate integrity constraints - Insert around 10 records in each of the tables - Display all records for all tables - List all the student names with their membership numbers - List all the issues for the current date with student and Book names - List the details of students who borrowed book whose author is Elmarsi & Navathe - Give a count of how many books have been bought by each student - Give a list of books taken by student with stud_no as 1005 - Delete the List of books details which are issued as of today - Create a view which lists out the iss_no, iss_date, stud_name, book name	
3	Use the relations below to write SQL queries to solve the business problems specified. CLIENT (clientno#,name, client_referred_by#) ORDER (orderno#, clientno#, order_date, empid#) ORDER_LINE (orderno#, order_line number#, item_number#, no_of_items, item_cost,shipping_date) ITEM (item_number#, item_type, cost) EMPLOYEE (empid#, emp_type#, deptno, salary, firstname, lastname) Notes: Column followed by # is the primary key of the	

	table. b. Each client may be referred by another client. If so, the client number of the referring client is stored in referred_by. c. The total cost for a particular order line = no_of_items * item_cost.c. Write queries for the following - Create all the above tables. - Insert at least five records. - Display all the rows and columns in the CLIENT table. Sort by client name in reverse alphabetical order. - Display the item number and total cost for each order line (total cost = no of items X item cost). Name the calculated column TOTAL COST. - Display all the client numbers in the ORDER table. Remove duplicates. - Display the order number and client number from the ORDER table. Output the result in the format. Client <clientno> ordered <orderno> - Display full details from the ORDER_LINE table where the item number is (first condition) between 1 and 200 (no > or < operators) OR the item number is greater than 1000 AND (second condition) the item cost is not in the list 1000, 2000, 3000 OR the order number is not equal to 1000. - Display the client name and order date for all orders. - Repeat query (6) but also display all clients who have never ordered anything. - Display the client name and order date for all orders using the join keywords. - Display the client name and order date for all orders using the JOIN method. - Display the client number, order date and shipping date for all orders where the shipping date is between three and six months after the order date. - Display the client number and name and the client number and name of the person who referred that client. - Display the client name in upper case only and in lower case only. - Display the second to fifth characters in each client name.	
Note: 1. In total 15 practicals to be implemented. 2 additional practical may be given by the course instructor. 2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.		

Applicable from Batch Admitted in Academic Session 2024-25 onwards

Course Code: BCA 104P		L	T/P	C
Course Name: Object Oriented Programming using Java Lab		0	4	2
LEARNING OBJECTIVES: In this course, the learners will be able to develop expertise related to the following: 3. Learn how to implement Object Oriented concepts through Java. 4. Identify and apply the Java thread model to program Java applications. 5. Develop GUI applications using Java swings				
PRE-REQUISITES: 3. Programming fundamental 4. 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.			
List of Practicals				
S. No.	Detailed Statement			Mapping to CO #
Core Practicals (Implement minimum 10 out of 15 practical)				
1	Write a program declaring a class Rectangle with data member's length and breadth and member functions Input, Output and CalcArea.			CO1
2	Write a program to demonstrate use of method overloading to calculate area of square, rectangle and triangle.			CO1
3	Write a program to demonstrate the use of static variable, static method and static block.			CO1
4	Write a program to demonstrate concept of ``this``.			CO1
5	Write a program to demonstrate multi-level and hierarchical inheritance.			CO2
6	Write a program to use super() to invoke base class constructor.			CO2
7	Write a program to demonstrate run-time polymorphism.			CO1
8	Write a program to demonstrate the concept of aggregation.			CO2
9	Write a program to demonstrate the concept of abstract class with constructor and ``final`` method.			CO2
10	Write a program to demonstrate the concept of interface when two interfaces have unique methods and same data members.			CO1
11	Write a program to demonstrate checked exception during file handling.			CO4
12	Write a program to demonstrate unchecked exception			CO4

Applicable from Batch Admitted in Academic Session 2024-25 onwards

13	Write a program to demonstrate creation of multiple child threads.	CO4
14	Write a program to use Byte stream class to read from a text file and display the content on the output screen.	CO3
15	Write a program to create User defined exception.	CO4
Application Based Practicals (Implement minimum 5 out of 10 practicals)		
1	Create a class employee which have name, age and address of employee, include methods getdata() and showdata(), getdata() takes the input from the user, showdata() display the data in following format: Name: Age: Address:	CO1
2	Write a Java program to perform basic Calculator operations. Make a menu driven program to select operation to perform (+ - * /). Take 2 integers and perform operation as chosen by user.	CO1
3	Write a program to make use of BufferedStream to read lines from the keyboard until 'STOP' is typed.	CO3
4	Write a program declaring a Java class called SavingsAccount with members ``accountNumber`` and ``Balance``. Provide member functions as ``depositAmount ()`` and ``withdrawAmount ()``. If user tries to withdraw an amount greater than their balance then throw a user-defined exception.	CO4
5	Write a program creating 2 threads using Runnable interface. Print your name in ``run ()`` method of first class and "Hello Java" in ``run ()`` method of second thread.	CO4
Note: 1. In total 15 practicals to be implemented. 2 additional practical may be given by the course instructor. 2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.		

Course Code: BCA 106P		L	T/P	C
Course Name: Data Structures and algorithms Lab		0	2	1
LEARNING OBJECTIVES: In this course, the learners will be able to develop expertise related to: 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: 3. C Programming Skills 4. 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.			
List of Practicals				
S. No.	Detailed Statement			Mapping to CO #
Core Practicals (Implement minimum 8 out of 10 practical)				
1	WAP to implement following operation on one dimensional array (i) Insertion (ii) Deletion (iii) Traversal (iv) Reverse (v) Merge			CO1
2	WAP to Sort an array using menu driven: (i) BUBBLE SORT (ii) MERGE SORT (iii) INSERTION SORT (iv) SELECTION SORT			CO3
3	WAP to implement a Singly Linked List.			CO2
4	WAP to implement a Circular Linked Lists			CO2
5	WAP to implement Doubly Linked Lists			CO2
6	Write a menu driven program to implement (i) Static Stack (ii) Dynamic Stack.			CO1, CO2
7	WAP to implement a (i) Static (ii) Dynamic Circular Queue			CO1, CO2
8	WAP to implement a (i) Static (ii) Dynamic De-Queue.			CO1, CO2
9	Implement recursive algorithms for the following operations on Binary Search Tree - Insertion - Searching			CO1, CO2, CO3, CO4
10	Implement recursive algorithms for BST traversal- Inorder, Preorder, Postorder.			CO1, CO2, CO3
Application Based Practicals (Implement minimum 5 out of 10 practicals)				
1	WAP to search & display the location of an element specified by the user, in an array using (i) Linear Search (ii) Binary Search technique.			CO1, CO3
2	WAP to accept a matrix from user, find out matrix is sparse or not and convert into triplex matrix.			CO1
3	WAP to implement Polynomial addition operation using			CO2. CO4

Applicable from Batch Admitted in Academic Session 2024-25 onwards

	linked list.	
4	Write a C program to create two linked lists from a given list in following way INPUT List:- 1 2 3 4 5 6 7 8 9 10 OUTPUT:- First List:- 1 3 5 7 9 Second List:- 2 4 6 8 10	CO2
5	WAP to implement Student Database using Linked List with the following structure • Name • Rollno • Marks of 5 subjects • Average • Result, If the average < 50, then print 'Fail', otherwise 'Pass'	CO2, CO4
6	Write a program to convert Infix to equivalent (i) Prefix expression (ii) Postfix expression	CO1, CO4
7	Write a program to evaluate (i) Prefix Expression (ii) Postfix Expression using stack.	CO1, CO4
8	Let us assume a Patient's coupon generator for the Doctors' clinic. The patients are given the coupons on first-come-first-serve basis. After the visit of a patient, patient-ID is kept stack-wise. At the end of the day, the count is generated from the stack. Construct a menu-based program for patients' coupons generator using an appropriate data structure.	CO1, CO2, CO4
9	WAP to implement an expression tree. (For example: $(a + b / (c * d) - e)$)	CO3, CO4
10	Sometimes a program requires two stacks containing the same type of items. Suppose two stacks are stored in separate arrays, then one stack might overflow while there is considerable unused space in the other. A neat way to avoid this problem is to put all spaces in one stack and let this stack grow from one end of the array, and the other stack starts from the other end and grows in the opposite direction, i.e., toward the first stack. In this way, if one stack turns out to be large and the other small, then they will still both fit, and there will be no overflow until all space is used. Declare a new structure that includes these two stacks and perform various stack operations.	CO12, CO4
Note: 1. In total 15 practicals to be implemented. 2 additional practical may be given by the course instructor. 2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.		

Course Code: BCA 108P		L	T/P	C
Course Name: Software Engineering Lab		0	2	1
LEARNING OBJECTIVES: In this course, the learners will be able to develop expertise related to: 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: None				
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			
List of Practicals				
S. No.	Detailed Statement	Mapping to CO #		
1	Select and Write down the problem statement for a real time system of relevance.	CO2, CO3		
2	Analyze requirement for a system and develop Software Requirement Specification Sheet (SRS) for suggested system.	CO2, CO3		
3	To create the function oriented diagram: Data Flow Diagram (DFD)	CO2, CO3		
4	To perform the user’s view analysis for the suggested system: Use case diagram.	CO2,CO3, CO4		
5	To draw the structural view diagram for the system: Class diagram	CO4		
6	To draw the behavioral view diagram : State-chart diagram or Activity diagram	CO2, CO3,CO4		
7	To perform the behavioral view diagram for the suggested system : Sequence diagram	CO2, CO3,CO4		
8	Draw the component diagram	CO2, CO3,CO4		
9	Draw the Deployment diagram.	CO2, CO3,CO4		
10	Perform Measurement of complexity with Halstead Metrics for chosen system.	CO4		
Suggested Applications (i) Inventory Management (ii) Library Management (iii) Result Management (iv) Hotel Management System				

Applicable from Batch Admitted in Academic Session 2024-25 onwards

- | | |
|--------|------------------------|
| (v) | Any Website |
| (vi) | Any mobile application |
| (vii) | E-Commerce website |
| (viii) | Any other application |

Note:

1. Students are required to identify an application in the beginning of the semester and conduct all practicals for the same application.
2. In total 10 practicals to be implemented.
3. Students may use any open source software i.e. argoUML for drawing the above diagrams.
4. Students may Use testing tool such as junit.
5. Student may Use configuration management tool-libra.

THIRD SEMESTER SYLLABUS

INSTRUCTIONS TO PAPER SETTERS:

- 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.
- 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.
- Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), 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. To understand why Python is a useful scripting language for developers.
2. To learn how to design and program Python applications.
3. To define the structure and components of a Python program.

PRE-REQUISITES:

1. Computer Fundamentals
2. Basic Programming Concepts

COURSE OUTCOMES(COs):

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

CO#	Detailed Statement of the CO
CO1	Demonstrate knowledge of basic programming constructs in python..
CO2	Illustrates string handling methods and user defined functions in python
CO3	Applying data structures primitives like List, Dictionary and tuples.
CO4	Inspects file handling and object- oriented programming techniques.
CO5	To understand the concept of Reusability.

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

UNIT-I

No. of Hours: 11 Chapter/Book Reference: T1[Chapters 1,2]; T2[Chapters 1,3,6]

Basic Introduction: Origin, Need of Python Programming, Features, program structure, identifiers, reserved words, escape sequences, IDLE-Python Interpreter

Python Programming Introduction: Relational Operators, Logical Operators, Bitwise Operators, Variables and assignment statements, Keywords.

Applicable from Batch Admitted in Academic Session 2024-25 onwards

Control Structures: if-conditional statements, if –else condition, if-elif-else condition, nested if-elif-else condition, Iteration (Loop and while statements), Nested Loops, break.

Strings: Slicing, Membership, Built in functions (count, find, capitalize, title, lower, upper and swap case, replace, join, isspace (), isdigit (), split(), startswith(), endswith()).

UNIT–II

No. of Hours: 11 Chapter/Book Reference: T1 [Chapter 3]; T2[Chapters 7,12]

Mutable and Immutable objects:

List: creating, initializing, accessing, slicing, and traversing List. List operations: length, concatenation, repetition, in, not in, max, min, sum, all, any. List methods: append, extend, count, remove, index, pop, insert, sort, reverse and introduction to sets

Tuples: Tuple operations, functions- tuple, count, index.

Dictionary: Dictionary operations, functions- get, update, copy. Deletion in dictionary.

UNIT–III

No. of Hours: 10 Chapter/Book Reference: T1 [Chapters 5, 7]; T2[Chapters 2,8,9]

Concept of Functions: Functions: Defining, Calling and Types of Functions, Arguments and Return Values, Formal vs. Actual Arguments, Scope and Lifetime, Keyword Arguments, Default Arguments, Recursion and Modules

File handling: Types of Files (Text file, Binary Files, CSV files), Creation, writing, appending, Insertion, deletion, updating, modification of Data in into the files.

UNIT–IV

No. of Hours: 12 Chapter/Book Reference: T2 [Chapters 10, 11]; T3 [Chapters 4]

Object Oriented Programming: Classes, Objects, Attributes and Methods, Access Specifiers, Constructors, Static Methods, Data Hiding, Encapsulation, Inheritance, Polymorphism.

NumPy Library: Introduction to NumPy, Creation of One-Dimensional Arrays, Reshaping of an Array, Element-wise Operations, Aggregate Operations.

Introduction to Matplotlib: Bar Graphs and Pie Chart

TEXTBOOKS:

TB1. Programming in Python 3: A Complete Introduction to the Python Language (2nd Edition), Mark Summerfield.

TB2. Python Programming: A Modular Approach by Taneja Sheetal, Kumar Naveen, Eleventh Impression, Pearson India Education Services Pvt. Ltd.

TB3. Agile tools for real world data : Python for Data Analysis by Wes McKinney, O'Reilly

REFERENCE BOOKS:

RB1. Let Us Python 2Nd Edn: Python Is Future, Embrace It Fast (Second Edition): Yashvant Kanetkar

RB2. Programming Python, 4th Edition by Mark Lutz Released December 2010 Publisher(s): O'Reilly Media, Inc.

RB3. Python: The Complete Reference by Martin Brown

INSTRUCTIONS TO PAPER SETTERS:

- 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.
- 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.
- Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), 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. Understand the syntax and semantics of PHP language
2. Design and develop web applications using PHP as a server side language
3. Perform database connectivity using MYSQL as database server.

PRE-REQUISITES:

1. Basic knowledge of HTML, CSS and JavaScript.
2. Able to Design static Webpage.

COURSE OUTCOMES(COs):

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

CO#	Detailed Statement of the CO
CO1	Design and develop dynamic web pages with good aesthetic sense of designing and latest technical know-how's.
CO2	Have a good understanding of Web Application Terminologies
CO3	Learn how to link and publish web sites

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	3	-	-	-	4	-	-	-
CO2	4	2	3	-	-	-	4	-	-	4
CO3	4	2	3	4	-	-	-	-	-	-

UNIT-I

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters: 1-3, 5]

Introduction to Web Applications, Client Side Scripting Vs Server Side Scripting, Web Servers: Local Servers and Remote Servers, Installation Process-WAMP, LAMP, XAMPP & MAMP Server, Static Website Vs Dynamic Website Development

Applicable from Batch Admitted in Academic Session 2024-25 onwards

Introduction to PHP: Data types, Variables, Super Global Variables, Constants, Comments, Operators and Expressions, Regular Expression, Advantages of PHP

Control statements: Conditional Statement -if else, if elseif else, nested if, switch case, PHP Loops – for, while, do while and foreach loop

Arrays: Indexed Array, Associate Array, Multi-dimensional Array, Array pre-defined Functions

UNIT-II

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter 7]

Functions: Defining and Calling Functions, Passing by Value and passing by references, Inbuilt Functions, variable scope, Mail function, PHP Errors

Working with Forms: Get and Post Methods, HTML form controls and PHP, State Management: Cookies & Sessions Overview, Application State, Query String, Hidden Field.

UNIT-III

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter 6]

Working with Files: Opening and Closing Files, creating directories and files, Reading and Writing to Files, file inclusion, file uploading and downloading, Getting Information on Files.

Implementation of Object Oriented Features in PHP : Classes and Objects, Building Classes, Access Modifiers, Inheritance, Polymorphism etc. & Implementation of Exception Handling.

UNIT-IV

No. of Hours: 11 Chapter/Book Reference: TB1 [8]

PHP Database Connectivity: Using PHP to Access a Database, Relational Databases and SQL, PHP Data Objects, MySQLi Object Interface

Introduction to MYSQL, Creating database and other operations on database, Querying a MySQL database with PHP database, connecting to a database, Parsing of the query results, Database querying using prepared statements, Checking data errors.

PHP with Ajax: Introduction, Create an PHP Ajax application

TEXTBOOKS:

TB1. Programming PHP: Creating Dynamic Web Pages, Kevin Tatroe. Peter Macintyre, Rasmus Lerdorf, O'Reilly, Third Edition

REFERENCE BOOKS:

RB1. Professional PHP Programming, Jesus Castagnetto, Harish Rawat, Sascha Schumann, Chris Scollo, Deepak Veliath - Wrox Publications

RB2. PHP 5 Advanced, Larry Ullman, Peachpit Press

RB3. Core PHP Programming. Leon Atkinson (Prentice Hall, ISBN 0130463469).

RB4. Beginning PHP5 and MySQL: From Novice to Professional, W. Jason Gilmore, 2004, Apress, ISBN: 1-893115-51-8

INSTRUCTIONS TO PAPER SETTERS:

- 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.
- 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.
- Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), 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. Knowledge about various logic gates and design principles of different digital electronic circuits.
2. Implementation and designing of different combinational and sequential circuits.
3. Identify the functional units of the process or and the factors affecting the performance of a computer
4. Understanding about the Input-Output organization of a typical computer

PRE-REQUISITES:

Fundamentals of Computer

COURSE OUTCOMES(COs):

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

CO#	Detailed Statement of the CO
CO1	Able to understand the fundamentals of digital principles and able to design digital circuits by simplifying the Boolean functions
CO2	Implement the combinational and sequential circuits for the given specifications
CO3	Able to trace the execution sequence of an instruction through the processor
CO4	Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os.
CO5	Demonstrate the ability to classify the addressing modes, instructions set

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	3	-	3	-	-	-	3
CO2	4	4	4	3	-	3	-	-	-	3
CO3	4	4	3	2	-	3	-	-	-	1
CO4	4	3	3	2	-	3	-	-	-	1
CO5	4	3	3	2	-	3	-	-	-	1

UNIT-I

No. of Hours:11 Chapter/Book Reference: TB2[Chapter-2, 3, 4, 5], RB1[Chapter-5,6]

Boolean Algebra and Logic: Basics Laws of Boolean Algebra, Logic Gates, Simplifications of Boolean equations using K-maps SOP and POS, Don't Care condition.

Arithmetic Circuits: Adder, Subtractor, Parallel binary adder/Subtractor.

Combinational Circuits: Multiplexers, De-Multiplexers, Decoders, Encoders.

UNIT-II

No. of Hours:11 Chapter/Book Reference: TB2[Chapter-6, 7], RB1[Chapter-6,7]

Sequential Circuits: Latch, S-R,D,J-K,T, Clocked Flip-flop, Race around condition, Master slave Flip-Flop, Realisation of one flip-flop using another flip-flop.

Shift Registers

Serial-in-serial-out, serial-in-parallel-out, parallel-in-serial-out and parallel-in-parallel-out.

Counters

Ripple counter, Synchronous Counter, Modulo Counters.

UNIT-III

No. of Hours:11 Chapter/Book Reference: TB1[Chapter-5, 9], RB3 [Chapter-11]

Data Transfer Operations: Register Transfer, Bus and Memory Transfer, Registers and micro-operations.

Basic Computer Organizations and Design: Instruction Codes, Computer Registers, Instruction Cycle, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes,

UNIT-IV

No. of Hours:11 Chapter/Book Reference: TB1[Chapter-12,13], RB3[Chapter-7]

Input-Output Organization: Peripheral Devices, Input-Output Interfaces, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA).

Memory Organization: Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.

TEXTBOOKS:

TB1. Morris Mano, Computer System Architecture, 3rd Edition Prentice-Hall of India Private Limited, 1999.

TB2. Moris Mano, "Digital Logic and Computer Design", PHI Publications,2002

REFERENCES:

RB1. R.P. Jain, "Modern Digital Electronics", TMH,3rd Edition,2003.

RB2. Wiliam Stallings, Computer Organization and Architecture, 4th Edition, Prentice Hall of India Private Limited, 2001

RB3. Subrata Ghosal, "Computer Architecture and Organization", Pearson2011

RB4. Malvino, "Digital Computer Electronics: An Introduction to Micro-computers", McGraw Hill.

INSTRUCTIONS TO PAPER SETTERS:

- 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.
- 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.
- Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), 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 objective of this course is to provide the learners with the following:

1. Knowledge about sets, relations and functions.
2. Make them familiar with basics of lattices and graphs.
3. Understanding of the concept of propositional logic.

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 basics conceptual math and relations.
CO2	Understand and apply methods of proof and partial order relation
CO3	Compare and design various graphs techniques.
CO4	Appraise and determine the correct logic and solutions 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	3	2	-	-	-	-	2	1	2	-
CO2	4	3	-	-	-	-	-	-	-	-
CO3	-	4	3	2	-	3	-	3	2	3
CO4	3	3	4	4	-	3	3	-	3	2

UNIT I

No. of Hours: 13 Chapter/Book Reference: TB1 [Chapter 1], TB2 [Chapters 1, 2, 3], TB3 [Chapters 2, 9]

SETS: Sets, Subsets, Equal Sets, Universal Sets, Finite and Infinite Sets, Operations on Sets: Union, Intersection difference and Complements of Sets, Algebra of sets, Cartesian product, Simple applications.
RELATION AND FUNCTIONS: Properties of Relations, Equivalence Relation, Partial Order Relation, Composition of relations, and Representation of relations using digraph and Matrix, Function: Domain and Range, onto, into and One to One Functions, Composite and Inverse Functions.

UNIT II

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters 1, 4], TB2 [Chapter 4], TB 3 [Chapters 1, 5]

PROPOSITIONAL LOGIC: Introduction, Proposition, First order logic, Basic logical operations, truth
 Applicable from Batch Admitted in Academic Session 2024-25 onwards

tables, tautologies, contradictions, Algebra of Propositions, logical implications, logical equivalence, predicates, Universal and existential quantifiers.

Methods of Proof: Direct Proof, Indirect Proof, Proof by Exhaustive Cases, Principle of Mathematical Induction.

UNIT- III

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter 6], TB2 [Chapter 5]

PARTIAL ORDER RELATIONS AND LATTICES: Partial Order Sets, Totally ordered sets, Representation of POSETS using Hasse diagram, Chains, Maximal and Minimal elements, Greatest lower bound, least upper bound, Lattices and Algebraic Structure, Principle of Duality, Elementary Properties of Lattices, Atoms. Sub lattices, Bounded lattice, Distributed & Complemented Lattices, Isomorphic lattices.

UNIT -IV

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapter 8], TB2 [Chapters 8, 9], TB3 [Chapter 10]

GRAPHS: Introduction, undirected graph, directed graph, Degree of a vertex, isolated vertex, pendent vertex, in degree, out-degree, Handshaking Theorem

Types of Graphs- Simple graph, null graph, complete graph, regular graph, bipartite graph (complete), Sub graph, Isomorphic graphs, complement of a graph, Matrix representation of a graph: adjacent and incidence matrices.

Walk, trail, path, circuit, cycle, Euler Graph, Seven bridges problem, Hamiltonian graph

TEXT BOOKS:

TB1. Babu Ram, “Discrete Mathematics”, Pearson Education, 1st edition 2010

TB2. Singh J. P. “Discrete Mathematics for Undergraduates” ANE Books, 2nd edition, 2023

TB3. Rosen, K.H., Discrete Mathematics and its Applications, McGraw Hill Education, 8th edition 2021

REFERENCE BOOKS:

RB1. Kumar, Vinay. Discrete mathematics. BPB Publications, 2018.

RB2. S.K. Sarkar “A Text Book of Discrete Mathematics” S. Chand Publications, 9th edition 2019

RB3. Kolman, Busby and Ross, “Discrete Mathematical Structures”, Pearson, 10th edition 2015

RB4. Tremblay J.P. and Manohar, R “Discrete Mathematical Structures with Applications to Computer Science” Tata McGraw Hill

Learning Objectives:

1. Major Aim for this vocational course in BCA Programme is to give students an integrated experience in studying the emerging trends in IT and its applications.
2. This subject will provide good opportunity for the students to build, enhance and sustain high levels of professional conduct and performs and evolves as problem solver frame of mind in students in early semesters.
3. It will also prepare students to understand the role of new technologies in industry too.

General Guidelines:

1. This paper is to prepare students for cutting-edge areas that are fast gaining prominence, such as 3-D machining, big data analysis, Data Analysis using R, IoT to Big Data, AWS Cloud Computing Certification, Quantum Computing, Wireless Communication, Power BI, 3-D machining, Block chain Technology, Big Data & Hadoop Robotic Process Automation or any other emerging technology with important applications to health & environment. As per the market demand the vocational courses can be added by the institution which are not part of their curriculum.
2. The students may be allowed to take vocational courses ONLY after obtaining permission from Head(s) of college/institute/department.
3. The duration of Vocational Courses should be 30 hours with a combination of theory and practical.
4. Course to be opted can be taken either in-house or outside only after prior approval form the Head(s) of college/institute/department

Evaluation:-

1. Viva Voice/ Written Examination/ Case Study Based/ Small Projects/ Presentations/ Research Papers
2. Certificates** are also to be taken while evaluation if Course is not IN-HOUSE.

**** Certificates to be submitted to the department before the initiation of Semester-Three.**

INSTRUCTIONS TO PAPER SETTERS:

- 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.
- 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.
- Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), 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. To get the knowledge about the important management concept sand their applications.
2. To help the students to develop cognizance of the importance of management principles.
3. To have an insight of various functional departments in an organization.
4. To help the organization in understanding Organizational culture.

PRE-REQUISITES: None

COURSE OUTCOMES(COs):

CO#	Detailed Statement of the CO
CO1	To develop basic knowledge about management, management process, managerial roles, levels, skills and decision-making process.
CO2	To give knowledge about planning, organizing, staffing, directing and controlling. To relate all functions of management.
CO3	To discuss about the Organizational behaviour and its application. To describe about the Organizational culture. To learn about the motivation theories.
CO4	To give basic knowledge people management, their Personality, Learning, Perception, Attitude and Leadership. To know Leadership styles.

Course Outcomes	Program Outcomes (Scale-1:verylow,2: low,3:medium,4:high)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	4	-	-	-	-	-	-	4	4	3
CO2	-	4	-	-	-	-	-	-	4	4	3
CO3	-	2	-	-	-	-	-	-	4	4	3
CO4	-	4	-	-	-	-	-	-	4	4	3

UNIT-I

No. of Hours:12 Chapter/Book Reference: TB1[Chapters-1,2,4]

Management: Meaning & Concept of Management, Management Principles (Fayol & Taylor), Management Process (in brief), Managerial Levels; Skills, Roles and Functions of a Manager; Difference between a Manager, a Leader and an Administrator; SWOT Analysis in Management; Decision making: Concept & Process

UNIT–II

No. of Hours: 10 Chapter/Book Reference: TB1[Chapters– 3, 5,6,8,9]

Planning: Meaning, Purpose, Types & Process; **Organizing:** Process, Departmentation, Decentralization; **Staffing:** Concept, Nature & Importance of Staffing; **Directing:** Meaning; **Controlling:** Nature, Importance & Process of control; Relationship among Planning, Organizing, Staffing, Directing and Controlling.

UNIT–III

No. of Hours:12 Chapter/Book Reference: TB1[Chapters– 10, 14, 7]

Organizational Behavior: Concept and Nature of Organizational Behaviour; Importance and Opportunities of Organizational Behaviour; Challenges of OB in the 21st Century; Organizational Culture: Meaning, Importance and Characteristics of Organizational Culture; **Motivation:** Concept & Theories of Motivation (Maslow's Need Hierarchy, Herzberg Two Factor, McGregor's Theory X & Y, and Alderfer's ERG Theory)

UNIT–IV

No. of Hours:10 Chapter/Book Reference: TB1[Chapters–10, 12, 14]

Managing People: Meaning and Need of Understanding Human Behaviour in Organization; Models of OB; Major Concepts in OB (elementary) - Personality, Learning, Perception, Attitude and Leadership; Leadership Styles

TEXTBOOKS:

TB1.Dr.C. B Gupta “Management Process and Organizational Behaviour” S. Chand&Sons,2018 (ISBN: 978-93-5283-071-8)

REFERENCE BOOKS:

RB1.Stoner, Freeman & Gilbert, “Management”6thEdition, Pearson International.

RB2.David S. Bright, Anastasia H. Cortes, Eva Hartmann, Principles of Management, ISBN:9781998109166, 199810916X

RB3.Ankur Chhabra, “Organisational Behaviour”, Sun India Publications, 2009

RB4.Robbins, Stephen P, “Organisational Behaviour”. PHI, 2010

INSTRUCTIONS TO PAPER SETTERS:

- 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.
- 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.
- Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), 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:

1. To understand the significance of values in personal and professional life
2. To understand harm on yat all the levels of human living and live accordingly
3. To facilitate the development of a holistic perspective towards life and profession
4. To apply the understanding of harm only in their profession and lead an ethical life.

PRE-REQUISITES:

None

COURSE OUTCOMES (COs):

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

CO#	Detailed Statement of the CO
CO1	Understanding the concept of human values and their significance in personal, social, moral, and spiritual contexts
CO2	Developing Self-awareness and Self-exploration Techniques
CO3	Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships and field work
CO4	In still Moral & Social Values and appreciate the rights of others
CO5	Comprehend the concept of harmony at all the levels of society and readiness to contribute towards harmony at all levels

Course Outcomes	Program Outcomes (Scale-1:very low, 2: low, 3:medium, 4:high)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	-	-	-	-	-	-	4	2
CO2	-	-	-	-	-	-	-	-	-	4	2
CO3	-	-	-	-	-	-	-	-	-	4	2
CO4	-	-	-	-	-	-	-	-	-	4	2
CO5	-	-	-	-	-	-	-	-	-	4	2

UNIT-I

No. of Hours: 5 Chapter/Book Reference: TB1[Chapters 1-4], TB2[Chapters-1]

Introduction to Human Values: Understanding Value Education; Understanding Personal Values, Social Values, Moral Values, and Spiritual Values, Self-Exploration as the Process for Value Education; Right understanding- relationship and physical facilities; Understanding the thought-provoking issue-continuous happiness and prosperity.

UNIT-II

Applicable from Batch Admitted in Academic Session 2024-25 onwards

No. of Hours:8 Chapter/Book Reference: TB1[Chapters5, 8-10]

Harmony at Various Levels: Understanding the Human being as coexistence of the self with the Body; Harmony in the family - Understanding values in human-human relationships; Harmony in the Society - Understanding Universal Human Order; Harmony in Nature.

UNIT-III

No. of Hours: 5 Chapter/Book Reference: TB1[Chapter 12, 13]

Character, Values and Ethics in Professional Practice: Effects of Thoughts on Character; Core Values for Professional Excellence, Ethics and Profession; Building Trusting Relationships; Respecting the competence of other professions; Ethics at the workplace - cybercrime, plagiarism, sexual misconduct, fraudulent use of institutional resources etc.

UNIT-IV

No. of Hours: 6 Chapter/Book Reference: TB3[Chapters-1, 2]

Indian Ethos in Organizational Culture and Practice: Ethos of Vedanta; Application of Indian Ethos in Organizations; Relevance of Ethics and Values in organizations in current times; Case Studies and Role-Playing Exercises for inculcating values in personal and professional life.

TEXTBOOKS:

TB1. A Foundation Course in Human Values and Professional Ethics by R.R. Gaur, R. Sangal, G.P. Bagaria.

TB2. A Textbook on Professional Ethics and Human Values by R S Naagarazan.

TB3. Indian Ethos and Modern Management by BL Bajpai New Royal Book Co., Lucknow.,2004, Reprinted2008.

REFERENCE BOOKS:

RB1. A N Tripathy, 2003, Human Values, New Age International Publishers

RB2. Human Values and Professional Ethics by Vaishali R Khosla, Kavita Bhagat

RB3. I.C. Sharma. Ethical Philosophy of India Nagin & co Jalandhar

RB4. Kalam, Abdul. My journey –Transforming Dreams into Actions. Rupa Publications, 2013

RB5. Swami Vivekananda, Call to the Youth for Nation Building, Advaita Ashrama, Calcutta, 2018.

Course Code: BCA 201 P		L	T/P	C
Course Name: Python Programming Lab		0	4	2
LEARNING OBJECTIVES: In this course, the learners will be able to develop expertise related to: 6. Basic programming constructs, control flow and functions in Python. 7. Apply the concepts of data structures like List, Tuple, Set and Dictionary in Python applications. 8. Use object-oriented programming features of Python to develop real applications. 9. Learn how to use File handling in applications.				
PRE-REQUISITES: 1. Fundaments of Computer and Information Technology. 2. Basics of Programming				
COURSE OUTCOMES (COs): After completion of this course, the learners will be able to:				
CO #	Detailed Statement of the CO			
CO1	Demonstrate the use of operators and mathematical expression in Python.			
CO2	Use functions and represent Compound data using Lists, Tuples and Dictionaries. Implement Conditionals and Loops for Python Programs.			
CO3	Demonstrate the use of Exception in program and implement the concepts of OOPs.			
CO4	Read and write data from & to files in Python and develop application.			
CO5	Apply the concepts of Numpy, Pandas and Matplotlib and create real time application.			
List of Practicals				
S. No.	Detailed Statement			Mapping to CO #
Core Practicals (Implement minimum 10 out of 15 practicals)				
1	Write a program to demonstrate the use of different operators in python.			CO1
2	Write a program to print Fibonacci Series 0112358.....N			CO1, CO2
3	Write a program to print the sum of first n prime numbers.			CO1, CO2
4	Create a function Pall_n to print of all the palindrome numbers between two ranges.			CO1, CO2
5	Write a Python program to perform the string slicing.			CO1, CO2
6	Write a Python program to demonstrate the use of List, Tuple, Dictionary.			CO1, CO2
7	Write a Python program to demonstrate the use of recursion.			CO1, CO2
8	Write a program illustrating various functions of mathematical library in python			CO1, CO2,CO4
9	Write a program to show the working of Bar Graphs			CO1, CO2,CO3
10	Write a program to show the working of Pie Chart			CO1, CO2,CO3

Applicable from Batch Admitted in Academic Session 2024-25 onwards

11	Write a python program to create Class and Object.	CO1, CO2,CO3
12	Write a Python program to copy the contents of a file to another file in a text file.	CO1, CO2,CO3
13	Write a program illustrating load() and dump() in binary file	CO1, CO2,CO3
14	Write a python program to insert data into CSV file and display it.	CO1, CO2,CO4, CO5
15	Write a python program to create a Numpy array and perform the basic matrix operation.	CO1, CO2,CO4, CO5
Application Based Practicals (Implement minimum 5 out of 10 practicals)		
1	Write a program to perform Linear Search	CO1, CO2
2	Write a function to find all duplicates in two different list	CO1, CO2
3	Write a function to print the sum of numbers in list having 3 at their units place.	CO1, CO2
4	Import and use of basics inbuilt package in python	CO1, CO2
5	Write a program to perform binary search using recursion	CO1, CO2,CO3
6	Demonstrate the use of inheritance.	CO1, CO2,CO3
7	Write a Python program that takes a text file as input and returns the number of words of a given text file.	CO1, CO2,CO4,CO5
8	Write a program to read a binary file having employee data in the form of list and search for the record of a particular employee entered by user.	CO1, CO2, CO5
9	Write a program to create an array with 3 rows and 4 columns with each element set to 0 using Numpy.	CO1, CO2, CO5
10	Write a program to perform Transpose using NumPy.	CO1, CO2, CO5
Note: 1. In total 15 practicals to be implemented. 2 additional practical may be given by the course instructor. 2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.		

Course Code: BCA 203P		L	T/P	C
Course Name: Dynamic Designing Lab		0	2	1
LEARNING OBJECTIVES: In this course, the learners will be able to develop expertise related to: 1. Understand the syntax and semantics of PHP language 2. Design and develop web applications using PHP as a server side language 3. Perform database connectivity using MYSQL as database server.				
PRE-REQUISITES: 1. Knowledge of HTML, CSS, JavaScript, bootstrap and XML. 2. Able to Design Static Website.				
COURSE OUTCOMES (COs): After completion of this course, the learners will be able to:				
CO #	Detailed Statement of the CO			
CO1	Design and develop dynamic web pages with good aesthetic sense of designing and latest technical know-how's.			
CO2	Have a good understanding of Web Application Terminologies			
CO3	Learn how to link and publish web sites			
List of Practicals				
S. No.	Detailed Statement			Mapping to CO #
Core Practicals				
1.	Write a regular expression including modifiers, operators and metacharacters.			CO1, CO2
2.	Write a program in PHP for Type Casting of the variables			CO1, CO2
3.	Write a program to show the usage of nested if statement.			CO1, CO2
4.	Write a program to create a menu driven program and show the usage of switch-case.			CO1, CO2
5.	Write a program to show the usage of for/while/do while loop			CO1, CO2
6.	Write a program to implement arrays and to perform all four types of sorting			CO1, CO2
7.	Write a program to implement Array-pad(), array_slice(), array_splice(), list() functions. (use foreach wherever applicable)			CO1, CO2
8.	Write a program to show the application of user defined functions.			CO1, CO2
9.	Write a program that passes control to another page (include, require, exit and die functions)			CO1, CO2
10.	Write a program to validate the form data using Filter_var() function.			CO1, CO2
11.	Write a program to show the usage of Cookies.			CO1, CO2
12.	Write a program to show the usage of Sessions.			CO1, CO2
13.	Write a program to implement oops concepts.			CO1, CO2
14.	Do Form handling In PHP Design a personal Information			CO1, CO2

Applicable from Batch Admitted in Academic Session 2024-25 onwards

	form , then Submit & Retrieve the Form Data Using \$ _GET(), \$ _POST() and \$ _REQUEST() Variables	
15.	Design A Login Form and Validate that Form using PHP Programming	CO1, CO2
16.	Create Admin Login ,Logout form using session variables	CO1, CO2
17.	Write a program to create a file.	CO1, CO2
18.	Write a program that use various PHP library functions, and that manipulate files and directories.	CO1, CO2
19.	Write a program to read and display the content of previously created file.	CO1, CO2
20.	Write a program to modify the content of an existing file.	CO1, CO2
21.	Create a web page and which provides File uploading and downloading a file.	CO1, CO2
22.	Design a from which upload And Display Image in PHP	CO1, CO2
23.	Use phpMyAdmin and perform the following: import, review data and structure, run SQL statements, create users and privileges	CO1, CO2
24.	Write a program to create a mysql database.	CO1, CO2
25.	Write a program to create a table and insert few records into it using form.	CO1, CO2
26.	Write a program to select all the records and display it in table.	CO1, CO2
27.	Write a program to modify (delete/modify/add) a table.	CO1, CO2
28.	Write a PHP script, to check whether the page is called from 'https' or 'http'.	
29.	Create an PHP Ajax application.	CO1, CO2
Application Based Practical		
30.	Write a program to verify text data as per the pattern.	CO3
31.	Create a dynamic website by incorporating the following functionalities: • Implement a basic registration and login system, with styling, • Make the database connection • Make a connection to a MySQL database, and log in with valid credentials. • Perform some validation check. If any of these operations cause an error, stop execution and print the error message. The script should respond differently depending on the situation. Add a “Log Out” button to logout from the system	CO3
Note: 1. In total 15 practicals to be implemented. 2 additional practical may be given by the course instructor. 2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.		

Course Code: BCA 205P		L	T/P	C
Course Name: Computer Organization and Architecture Lab		0	2	1
LEARNING OBJECTIVES: The objective of this course is to provide the learners: 1. Basic knowledge to implementation of all types of digital logic gates 2. Expertise in implementation of Boolean function. 3. Implementation of all sequential circuits and combinational circuits. 4. Verification of truth table of all circuits.				
PRE-REQUISITES: Fundamentals of Computer				
COURSE OUTCOMES (COs): After completion of this course, the learners will be able to:				
CO #	Detailed Statement of the CO			
CO1	Able to understand the fundamentals of digital principles and able to design digital circuits by simplifying the Boolean functions			
CO2	Implement the combinational and sequential circuits for the given specifications			
List of Practicals				
S. No.	Detailed Statement			Mapping to CO #
Core Practicals				
1.	Implement digital Logic gates – AND, OR, NOT			CO1
2.	Implement Logic gates using NAND and NOR gates			CO1
3.	Design and implement Half and Full Adder Using basic gates Using NAND gates			CO1
4.	Design and implement Half and Full Subtractor Using basic gates Using NAND gates			CO1
5.	Design and implement parallel adder/Subtractor			CO1
6.	Implement any Boolean Function using logic gates in both SOP and POS form			CO1, CO2
7.	Design and implement the 4:1 MUX, 8:1 MUX using gates /ICs.			CO2
8.	To verify the truth table of MUX and DEMUX using NAND.			CO2
9.	Design and implement a decoder using gates			CO2
10.	Design and implement a encoder using gates			CO2
11.	Truth Table Verification of JK Master Slave Flip Flop			CO1, CO2
12.	Truth Table Verification of D- Type Flip Flop			CO1, CO2
13.	Truth Table Verification of T- Type Flip Flop			CO1, CO2

Applicable from Batch Admitted in Academic Session 2024-25 onwards

14.	Design and implement a 4-bit shift register using Flipflops	CO1, CO2
15.	Design and implement a 3-bit synchronous counter	CO1, CO2
Note: 1. In total 10 practical to be implemented. 2 additional practicals may be given by the course instructor. 2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.		

FOURTH SEMESTER SYLLABUS

INSTRUCTIONS TO PAPER SETTERS:

- 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.
- 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.
- Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), 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. Working and functionalities of operating system
2. Understand the concept of process scheduling, memory management, deadlock and file system
3. Understand basic commands of Linux and shell scripts.

PRE-REQUISITES:

1. Basic understanding of hardware and software of computer organization.

COURSE OUTCOMES (COs):

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

CO#	Detailed Statement of the CO
CO1	Understand the basic concept of Operating System with the help of Unix and Linux Architecture.
CO2	Understand the concept of Processes, Process Scheduling, Process Synchronization and applying process commands in Linux environment.
CO3	Understand the concept of memory management and deadlock.
CO4	Understand the concept of file Systems, Types and Access Methods by using Linux commands.

UNIT-I

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

Introduction: What is an Operating System, Functions of Operating System, Simple Batch Systems; Multi programmed Batch systems, Time-Sharing Systems, Personal-computer systems, Parallel systems, Distributed Systems, Real-Time Systems.

Introduction to Linux: Architecture of Linux OS, Basic directory structure of Linux, Basic commands of Linux:- man, info, help, what is, apropos, basic directory navigation commands like cat, mkdir, rmdir, cd, mv, cp, rm, file, pwd, date, cal, echo, bc, ls, who, whoami, hostname, uname, tty, alias

Vi Editor: vi basics, Three modes of vi Editor, how to write, save, execute a shell script in vi editor

UNIT-II

No. of Hours: 12 Chapter/Book Reference: TB1 [Chapters 3, 5, 6]; TB2 [Chapter 9]

Processes: Process Concept, Process Scheduling, Operation on Processes, Threads

CPU Scheduling: Basic Concepts, Scheduling Criteria and Scheduling Algorithms: FCFS, SJF, SRTF, Priority and Round Robin Scheduling algorithms.

Process Synchronization: Background, The Critical-Section Problem, Semaphores solution to critical section Problem, Classical Problem: Consumer Producer

Process related commands in Linux: ps, top, pstree, nice, renice and system calls

Applicable from Batch Admitted in Academic Session 2024-25 onwards

UNIT–III

No. of Hours: 12 Chapter/Book Reference: TB1 [Chapters 7, 8, 9]

Memory Management: Background, Logical versus Physical Address space, swapping, Contiguous allocation, Segmentation, Paging

Virtual Memory: Demand Paging, Performance of Demand Paging, Page Replacement, Page-replacement Algorithms, Allocation of Frames, Thrashing

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

UNIT–IV

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapter 10]; TB2 [Chapter 6]

Information Management: Introduction, File Concept, Access methods, Directory and Disk structure, File Protection

Linux File Security: Permission types, examining permissions, changing permissions (symbolic method and numeric method)

TEXT BOOKS:

TB1. Silberschatz and Galvin, “Operating System Concepts”, John Wiley & Sons, 10 th Ed. 2018

TB2. Sumitabha Das, “Unix Concepts and Application”, TMH

REFERENCE BOOKS:

RB1. Madnick E., Donovan J., “Operating Systems”, Tata McGraw Hill, 2011

RB2. Tannenbaum, “Operating Systems”, PHI, 4th Edition, 2015

RB3. Sivaselvan, Gopalan, “A Beginner’s Guide to UNIX”, PHI Learning

INSTRUCTIONS TO PAPER SETTERS:

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- 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.
- Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), 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. To gain knowledge of various functional and structural testing techniques
2. To gain knowledge of various activities and levels of testing
3. To learn the issues in testing of object oriented and internet-based applications

PRE-REQUISITES:

1. Software Engineering
2. Knowledge and skills of at least one programming language

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Identify the different types of Testing
CO2	Differentiate between the testing and Debugging. Different Models of testing
CO3	Develop test cases for given problem with respect to structural and functional testing techniques.
CO4	Integrating the test planning and Management

UNIT – I

No. of Hours: 11 Chapter/Book Reference: TB1 [1, 2, 4, 5]; TB2[3, 4]; R1 [2, 3, 4]

Introduction: What is software testing and why it is so hard? Goals of Testing, Principles of Software Testing, Error, Fault, Failure, Incident, Error and Fault Taxonomies, Test Cases, Software Testing Life Cycle, Verification and Validation: - V-testing Life cycle, Limitations of Testing, Static and Dynamic Testing, Static: Inspection, Walkthrough, Technical Review

UNIT – II

No. of Hours: 11 Chapter/Book Reference: TB1 [5, 6]; R1[4]; R3 [3]

Functional Testing: Black Box Testing, Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing.

Structural Testing: White Box Testing, Need of white box Testing, Path testing, DD-Paths, Cyclomatic Complexity, Graph Metrics, Data Flow Testing

UNIT – III

No. of Hours: 11 Chapter/Book Reference: TB1 [5]; TB2[4]; R3 [6]

LEVELS OF TESTING: Unit Testing: Overview, Integration Testing, System Testing and its categories, Acceptance Testing, Types of Acceptance Testing

UNIT – IV

No. of Hours: 11 Chapter/Book Reference: TB1 [7]; TB2[6]

TEST PLANNING: Preparing a Test plan, Scope management, Decide Test Approach, Setting up Criteria for testing, Identifying responsibilities, Staffing, training needs, Resource requirements, Test deliverables, Testing Tasks.

TEST MANAGEMENT: Test infrastructure management, Test people management, Integrating with product release, Test Process: Base line a test plan, Test case specification, Update of traceability, Test reporting: Recommending product release

TEXTBOOKS:

TB1. Software Testing: Principles and Practice by Srinivasan Desikan, Gopalaswamy Ramesh, Pearson

TB2. Software Testing: Principles and Practice by Naresh Chauhan, Oxford

REFERENCE BOOKS:

RB1. Paul C. Jorgensen, “Software Testing- a Craftsman’s Approach”, Second Edition, CRC Press, 2018

RB2. Glenford Myers, “The Art of Software Testing”, John Wiley & Sons Inc., New York

RB3. K.K. Aggarwal & Yogesh Singh, “Software Testing”, New Age International Publishers, New Delhi, 2016.

INSTRUCTIONS TO PAPER SETTERS:

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- Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), 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. To cultivate logical and critical thinking abilities in students.
2. To enable to students to apply logical and critical thinking to real world scenarios.

PRE-REQUISITES:

1. Understanding of Logic
2. Research skills

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Develop an understanding of basic logical principles and apply them to various problem-solving scenarios.
CO2	Apply logical frameworks, such as deductive and inductive reasoning, to analyze and evaluate arguments.
CO3	Communicate ideas and arguments effectively, by employing critical thinking skills.
CO4	Students will develop the ability to critically analyse, identifying, evaluating evidence, and recognizing logical fallacies and apply logical and critical thinking skills to real-world scenario by evaluating arguments.

UNIT – I

No. of Hours: 6 Chapter/Book Reference: TB1 [Chapters 1]; TB2[Chapter 2]

Introduction to Logical and Critical Thinking: Definition of logical and critical thinking, Basic concepts of critical thinking, reasoning, logic and language, issues, claims, arguments, explanations, conclusions, fact and opinion, Importance of logical and critical thinking in academia and professional life.

UNIT – II

No. of Hours: 5 Chapter/Book Reference: TB3 [Chapters 4]; TB2[Chapters 5]; TB3 [Chapters 4]

Concept of logic: Techniques of Arguments, Types of Arguments: Deduction and Induction, Difference between Inductive and Deductive Arguments, Evaluating Argument, Validity and Soundness, Strength and Weakness of Deductive and Inductive Arguments.

UNIT – III

No. of Hours: 4 Chapter/Book Reference: TB2[Chapters 6]; TB3 [Chapters 7]

Concept of Critical Thinking: Meaning of critical thinking, Standards of Critical Thinking, Principles of Critical Thinking, Basic Traits of Critical and Uncritical thinkers.

UNIT – IV

No. of Hours: 6 Chapter/Book Reference: TB1 [Chapter 10]; TB3[Chapters 12 and 13]

Fallacies: Defining Fallacies, formal and informal fallacies, common fallacies in reasoning, identifying and analysis of fallacious arguments, Strategies to avoid fallacious reasoning. Critical Thinking in Information Technology, assessing the validity of arguments in technical documents, Ethical considerations in the IT decision making.

TEXT BOOKS:

TB1. "Critical Thinking: A Concise Guide" by Tracy Bowell and Gary Kemp

TB2. "Critical Thinking: A Student's Introduction" by Gregory Bassham, William Irwin, Henry Nardone, and James Wallace

TB3. The Art of Reasoning: An Introduction to Logic and Critical Thinking" by David Kelley

REFERENCE BOOKS:

RB1. Moore and Parker, Critical Thinking, 10th edition "Introduction to Logic" by Irving M. Copi, Carl Cohen, and Kenneth McMahon

Course Code: BCA 234

Course Name: Health and Wellness, Yoga Education and sports & Fitness

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0 4 2

INSTRUCTIONS TO PAPER SETTERS:

- 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.
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- Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), 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. To learn exercise strategies that work best for fat loss or weight gain or general fitness.
- 2 Being fit is a journey not a destination

PRE-REQUISITES:

None

COURSE OUTCOMES (COs):

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

CO#	Detailed Statement of CO
CO 1	To learn exercise strategies that work best for fat loss or weight gain or general fitness.
CO 2	To value our health and each healthy body part.
CO 3	Identify our fitness goals as per our body requirements
CO 4	Being fit is a journey not a destination
CO 5	Improving flexibility to the mental benefits such as reducing stress, improving self-esteem and confidence.

Unit I

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

Health Vs Fitness an overview: Definition of health & fitness, Nutrition pyramids, Definition of Nutrition and components of health

Lifestyle disorders: Diabetes, obesity, PCOS, Metabolic syndrome

Calorie and energy balance: Calorie deficit, calorie surplus, calorie maintenance and overview

Macro nutrients and Micro nutrients: Proteins, Carbohydrates, fats, vitamins, and minerals and their overview.

Introduction to quantified nutrition: Relevance of quantified nutrition

Unit II:

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

Introduction to exercise and its science: Definition of exercise and its importance, types of exercise,

components of fitness, exercise planning and building its routine, impact of exercise on life style disorders along with basic exercise recommendation for general healthy population.

Unit III

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters 6]; RB2[Chapter 6]

Resistance training and its overview: Definition of Resistance training in addition to its importance.

Introduction to basic muscle groups: Shoulders (Deltoids), Chest (pectorals), Back (Latissimus and Trapezius), Arms (Biceps and triceps), Legs (Quadriceps, gluteal, calves, hamstring)

Unit IV

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters 8]; RB2[Chapter 7]

Introduction to training variables and its importance: Intensity, Repetitions range, Training volume, Tempo and exercise ordering, Frequency and interest rest period.

Exercise plan: Basic exercise plan for beginners, Intermediate and advanced athletes.

Introduction to yoga: Importance yoga and its necessity in daily life style, introduction to few asanas that are necessary for fat loss, Diabetes, obesity, PCOS, Metabolic syndrome

TEXTBOOKS:

TB1. Light on Yoga: The Definitive Guide to Yoga Practice by BKS Iyengar

TB2. Fifty Days to Fitness: Be A Fitness Freak and Be Fit for Life by Ravindran

TB3. Faster, Stronger, Higher: A One-Stop Nutrition Framework for Indian Track and Field Athletes by Mihira A R Khopkar

TB4. The Fit Indian by Vishnu Mohan

TB5. The Complete Book of Yoga: Karma Yoga, Bhakti Yoga, Raja Yoga, Jnana Yoga by Swami Vivekananda

REFERENCE BOOKS:

RB1. Science Of Yoga: Understand the Anatomy and Physiology to Perfect your Practice by Ann Swanson MS C-IAYT LMT E-RYT500

RB2. The Running Effect by Sweta Samota

RB3. Hacking Health: The Only Book You'll Ever Need to Live Your Healthiest Life by Mukesh Bansal

RB4. The 12-Week Fitness Project (Updated for 2021 with 12 Extra Guidelines) Rujuta Diwekar

RB5. Know Your Sport by DK

INSTRUCTIONS TO PAPER SETTERS:

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- Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), 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. Apply mathematical principles to the analysis of data.
2. Analyze data sets in the context of real-world problems.
3. Develop and implement data analysis strategies base on theoretical principles, ethical considerations, and knowledge of the underlying data

PRE-REQUISITES: None

COURSE OUTCOMES (COs):

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

CO#	Detailed Statement of CO
CO1	Basics of Data Science and Data Collection strategies
CO2	Illustrating statistical analysis of data.
CO3	Working with the data structures of python like series and Data Frames
CO4	Statistical analysis of data with the help of python

UNIT – I

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters-1, 2,3]

Introduction to data Science: Evolution of Data Science, Data Science Roles, Stages in a Data science Project, Applications of Data Science In various fields, Data security Issues.

Data Collection Strategies, Data Pre-processing overview- Data Cleaning- Data Integration and transformation- Data Reduction- Data Discretization.

UNIT – II

No. of Hours: 11 Chapter/Book Reference: TB2[Chapters 3, 4, 5, 6]; TB3 [Chapters-1, 2, 3]

Why Python? - Essential Python libraries

Introduction to NumPy: NumPy Basics: Arrays and Vectorized Computation- The NumPyndarray- Creatingndarrays- Data Types for ndarrays- Arithmetic with NumPy Arrays- Basic Indexing and Slicing.

Data handling using Pandas in python: Series (creation from ndarray, dictionary; mathematical

operations; Head and Tail functions), Data Frames (creation from dictionary of series, operations on rows and columns) Statistical functions using pandas like min, max, count, sum, quartile, standard deviation, variance & Data Frame operations like aggregation, group by, Sorting, Deleting, Renaming Index, Pivoting.

Statistics for Data Science: Describing a Single Set of Data.

Descriptive Statistics- Bias, Variance, Mean, Median standard Deviation, Range, Inter quartile range Skewness and Kurtosis, Box plots, Pivot Table, Linear Regression.

UNIT – III

No. of Hours: 11 Chapter/Book Reference: TB2[Chapters-4, 8, 9, 10]; TB3 [Chapters-2, 3, 4, 5]

Bayesian Statistics: Probability theory and Distribution of data [Poisson, exponential & Normal Distribution], Central Limit Theorem.

Inferential Statistics: Correlation Analysis, Regression Analysis, Population, Sample, Types of Sampling, Sampling distributions of mean and variance [Z, t, Chi-Square, F], Hypothesis Testing.

UNIT – IV

No. of Hours: 11 Chapter/Book Reference: TB2[Chapters-3, 4, 5]

Case Studies: Checking different patterns in data, Forecasting demand, investigating clinical data

TEXT BOOKS:

TB1. Joel Grus, “Data Science from Scratch”, O’Reilly, 2nd Edition, 2019.

TB2. Data Science and Big Data Analytics, Discovering, Analyzing, Visualizing and Presenting Data, Wiley

TB3. Miller and Freund's - Probability and Statistics for Engineers Paperback – 1 January 2011 by Richard J (Author) is a good book covering above statistics content

REFERENCE BOOKS:

RB1. Python: The Complete Reference by Martin Brown

RB2 Programming Python, 4th Edition by Mark Lutz Released December 2010 Publisher(s): O'Reilly Media, Inc.

Course Code: BCA 216T

L T C

Course Name: Introduction to Security, Acts and Cyber Laws and Cyber Security 4 0 4

INSTRUCTIONS TO PAPER SETTERS:

- 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.
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LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following: -

1. Students will be able to understand and learn the concept of cybercrime and security.
2. Students will be able to understand and learn the concept of cyber laws for cyber security.
3. Students will be able to understand and learn the concept of cyber forensics.
4. To study real-life examples of cybercrimes.

PRE-REQUISITES:

1. Fundamentals of IT.

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Define the basic concepts of cyber security, cybercrime, and cybercriminals.
CO2	Identify various categories of cybercrimes.
CO3	Identify and discuss the ways cybercrimes are perpetuated.
CO4	Discover the appropriate Acts for cybercrimes.
CO5	Evaluate and implement computer forensics.
CO6	Survey recent cybercrime cases focusing on cyber ethics.

UNIT – I

No. of Hours: 11 Chapter/Book Reference: TB1 [1, 2, 3]; TB2[2]

CYBER ETHICS: Cyber ethics and its types, Significance of cyber ethics, Need for cyber ethics.

CYBER CRIME AND CYBER TERRORISM: Introduction and Overview of Cyber Crime and Cyber Terrorism, Cyber Terrorism and Hackers, Sophisticated Cyber Criminal Organizations.

UNIT – II

No. of Hours: 11 Chapter/Book Reference: TB1 [4, 5]; TB2 [5]

CYBER CRIME: Definition, Types of cybercrimes, White-Collar Crimes, Hacking, Attack vectors, Cyberspace and Criminal Behavior, Traditional Problems Associated with Computer Crime, Introduction to Incident Response, Digital Forensics, Viruses and Malicious Code, Victimization and Obscenity on the World Wide Web.

Cyber SECURITY: Introduction to cyber security, Cybercrime and different modes of attack, Intrusion detection system, Cyber security assurance framework, Desktop security and malware, Cyber security initiatives in India, Cyber security strategies and policies

UNIT – III

No. of Hours: 11 Chapter/Book Reference: TB1 [6]; TB2 [5]; RB1 [4]

CONTROLLING CYBER CRIME BY LEGISLATION: Digital Laws and Legislation, Law Enforcement Roles and Responses, The Investigation of Computer-Related Crime, Digital Forensics, Future Trends: A Forecast of Trends and Policy Implications.

UNIT – IV

No. of Hours: 11 Chapter/Book Reference: TB1 [7]; TB2 [6]; RB1 [5]

CYBER LAWS: Recognizing and Defining Computer Crime, Contemporary Crimes, Computers as Targets, Contaminants and Destruction of Data, Indian IT ACT 2000,

TEXTBOOKS:

TB1. Cyber Crime and Cyber Terrorism, 5th edition, Pearson 2023, Robert W. Taylor University Texas at Dallas Eric J. Fritsch John R. Liederbach University Texas at Dallas Michael R. Saylor William L. Tafoya. ISBN-13: 9780137914517

TB2. Nina Godbole, Sunita Belapure, “Cyber Security-Understanding Cyber Crimes, Computer Forensics and Legal Perspectives”, Wiley, 1st Edition, 2020

REFERENCE BOOKS:

RB1. Cyber Security and Cyber Laws, by Nilakshi Jain, Ramesh Menon, Wiley India Publishers, 2020. ISBN-10 : 9390395755, ISBN-13 : 978-9390395750

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LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:-

1. Open-source web app development framework.
2. Rapid development of a secure web site.

PRE-REQUISITES:

1. Python programming
2. CSS, HTML and basic Web development concepts

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Creating routes (or views) and template with Django.
CO2	To create Models and to connect them with Templates and Views.
CO3	To serve static content and files using Django
CO4	To connect templates with models to serve data dynamically.
CO5	To handle and validate forms in Django.

UNIT – I

No. of Hours: 10 Chapter/Book Reference: TB1 [Ch-1, 3, 4]

Introduction to Django, Client server architecture, webserver, web browser, basic of HTML concept, basics of CSS, basics of JavaScript, Bootstrap. What is Web framework, The MVT Design Pattern, Django's History? Installation of Django: Installing Python, Setting up a Database, Starting a Project, Development Server, and Django Commands Overview.

UNIT – II

No. of Hours: Chapter/Book Reference: 12 TB1 [Ch. 3, 5, 6]

The Basics of Dynamic Web Pages (Views and URL confs): Creating View, Dynamic Content, and Mapping URLs to Views, processing a Request, URL configurations and Loose Coupling, Django's Error Pages.

The Django Template System:

Django Template System Basics- Template System Basics, template language: variables, Boolean Operators,

for loop, if, Basic Template Tags and Filters, Comments, Using Templates in Views, Template Loading, Template Inheritance Tags, Creating a Model Manipulating Data (CRUD) Linking Models. Creating Template Objects- Rendering a Template, Playing with Context Objects.

UNIT – III

No. of Hours: 11 Chapter/Book Reference: TB1 [Ch. 7], TB 3 [CH 6]

Understanding Django Apps, Defining Models in Python, Installing the Model, Understanding Model Fields & Options, Creating A Django Model -Adding Model String Representations Making Changes to a Database Schema.

Django Forms: Creating a form using Django Forms, Render HTML Forms (GET & POST), Form Fields, form field custom widgets, Simple Validation

UNIT – IV

No. of Hours: 11 Chapter/Book Reference: TB1 [Ch. 8], TB 3 [Ch. 7, Ch. 15]

Activating the Admin Interface, Using the Admin Interface, Users, Groups and Permissions, Customizing the Admin Interface's Look and Feel, Customizing the Admin Index Page, When and Why to Use the Admin Interface, Form Processing, Form Validation, Save Form Response.

TEXT BOOKS:

TB1. Django for web app development using Python – Leonardo Luis Lazzoro.

TB2. Django 4 By Example - Fourth Edition, Antonio Mele

TB3. Django for Beginners: Build Websites with Python and Django, William D. Vincent

REFERENCE BOOKS:

RB1. Django official Documentation

(<https://django-book-new.readthedocs.io/en/latest/index.html>)

INSTRUCTIONS TO PAPER SETTERS:

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- Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), 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 objective of this course is to provide the learners the following:

1. Identify security threats and analyze security models to understand information security fundamentals.
2. Evaluate cryptographic techniques and their application in securing network communications.
3. Demonstrate proficiency in configuring and managing network security controls such as firewalls and intrusion detection systems.
4. Assess ethical and professional considerations in applying security controls to protect information assets.

PRE-REQUISITES: Nil

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Understand the fundamentals of information security, including threats, attacks, and security models.
CO2	Analyze network security threats and apply security controls such as firewalls and intrusion detection.
CO3	Describe network security controls and technologies.
CO4	Understand cyber threat intelligence and incident response planning.

UNIT I

No. of Hours: 10 Chapter/ Book Reference: TB1 [Chapters 3, 13]; TB2 [Chapters 1, 13]; RB1 [Chapters 1, 2]

Information Security Fundamentals: Threats, Attacks, Vulnerabilities, Types of security attack, Security Models and Frameworks, Need of security, Risk Management in Information Security.

Cryptography and Secure Communication: Concept of cryptography, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, introduction of steganography, Cryptography Algorithms.

UNIT II

No. of Hours: 10 Chapter/ Book Reference: TB2 [Chapters 16, 17]; RB1 [Chapters 6]

Network security: Threats in network, Risk analysis, Physical security, secure emails, administering security, PKI.

Web security: Web security considerations, Secure Socket Layer (SSL), Transport layer security, secure

electronic transaction.

UNIT III

No. of Hours: 10 Chapter/ Book Reference: TB1 [Chapter 23]; TB2 [Chapter 16]; RB1 [Chapter 9]; RB2 [Chapter 6]

Network Security Controls: Architecture, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honeypots, Traffic flow security.

Firewalls: Intruders, virus and firewalls, Design and Types of Firewalls, Firewall Technologies, IDS, IPS, VPN, Email Security–PGP(operation, generation and header format), S/MIME.

Database Security: Features, Multi-level security, Ethical issues, Network Traffic Analysis.

UNIT IV

No. of Hours: 10 Chapter/ Book Reference: TB1 [Chapter 24]; TB2 [Chapter 16]; TB3 [Chapters 6, 7]; RB2 [Chapter 3]

Laws and Regulations: Cyber Threat Intelligence and Incident Response, Incident Investigation, Incident Response Simulation.

IT and Cyber Act: Legal Perspective, The Indian IT Act and Amendments, Cyber Crime and punishments, Computer Forensics, Digital Forensics, Network Forensics, Intellectual Property in cyberspace, copyright issues.

TEXT BOOKS:

TB1. William Stallings, "Cryptography and Network Security: Principles and Practices", Pearson Education, latest Edition.

TB2. Forouzan Behrouz A, "Cryptography and Network Security", McGraw Hill, latest edition.

TB3. Nina Godbole, Sunita Belapure, "Cyber Security-Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley, Latest Edition

REFERENCE BOOKS:

RB1. Atul Kahate, "Cryptography and Network security", McGraw Hill, latest edition.

RB2. Michael E Whitman and Herbert J Mattord, "Principles of information Security", CENGAGE Learning.

RB3. Charles P. Pfleeger and Shari Lawrence Pfleeger, "Security in Computing", PHI.

RB4. Mark Rhodes-Ousley, "Information Security-The Complete Reference", McGraw Hill Education, 2nd Edition, 2012.

Course Code: BCA 222T
Course Name: Digital Marketing

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3 0 3

INSTRUCTIONS TO PAPER SETTERS:

- 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.
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- Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), 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. Understand the basics of Digital Marketing.
2. Comprehend the importance of Digital Marketing Platforms.
3. Gain knowledge about the usefulness of Social Media Marketing (SMM) and Search Engine Optimization (SEO)

PRE-REQUISITES: None

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Understanding the digital marketing concepts and its usefulness in business.
CO2	Planning steps for digital marketing strategy and successfully executing it.
CO3	Understand the importance of Social Media Platforms and Social Media Marketing for online communication.
CO4	Applying Search Engine Optimization techniques (SEO) and Search Engine Marketing (SEM) to maximize reach and enhance engagement of users.
CO5	Analyzing web using analytics tools and gaining insights to various tools for Social Media Marketing.

UNIT – I

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter – 1, 2], TB2 [Chapter – 1, 4-9], TB3 [Chapter –1]

Digital Marketing Basics: Digital Marketing meaning and its importance, Traditional vs Digital Marketing, Benefits of Digital Marketing, Internet Marketing basics, Digital Marketing channels, Digital Marketing strategies (P.O.E.M framework), Inbound and Outbound marketing, Digital Transformation model, 4Cs of Digital Marketing, Audience analysis, Business models for digital marketing.

UNIT – II

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter –3, 4, 5, 6, 7, 8], TB2 [Chapter – 4], TB3 [Chapter – 8]

Social Media Marketing – Introduction, Social Media marketing strategies, Overview of Social media platforms – Instagram, Snapchat, Facebook, Mobile, Twitter, Content Planning and Strategy, Influential marketing, Content marketing, Digital Marketing campaign

Email Marketing- Overview of Email Marketing, Creating Effective and Unique Email Content Designing, Marketing Emails.

UNIT – III

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter – 2, 3, 10]

Search Engine Optimization – Introduction to SEO, On-Page and Off-Page Optimization, Role of Keywords in SEO, Organic vs Non-Organic SEO, Blogging as marketing strategy, Types of Blogs

Search Engine Marketing – Introduction to Paid marketing, Google Adwords, Types of campaigns and Campaign creation

UNIT – IV

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter – 1, 5, 11]

Tools for SMM and Marketing communication – Overview of Buffer, Hootsuite, Canva, Trello and Hot jar

Web Analytics: Meaning, Purpose and process, Types, Tools for analytics – Google analytics, Audience analytics, Acquisition analytics, Behavior analytics, Conversion analytics

TEXT BOOKS:

TB1. Rajan Gupta, Supriya Madan, “Digital Marketing”, BPB Publication, 2nd Edition, 2023

TB2. Seema Gupta, “Digital Marketing”, McGraw Hill, 2nd Edition, 2018.

TB3. Puneet Singh Bhatia, “Fundamentals of Digital Marketing”, Pearson, 2nd Edition, 2020.

REFERENCE BOOKS:

RB1. Ian Dodson, “The Art of Digital Marketing”, Wiley, 2017.

RB2. Nitin Kamat, Chinmay Nitin Kamat, “Digital Marketing”, Himalaya Publishing House, 1st Edition, 2017.

RB3. Vandana Ahuja, “Digital Marketing”, Oxford University Press, 8th Edition, 2019. **RB4.** Judy Strauss, Raymond Frost, “E- Marketing”, PHI learning, 5th Edition, 2009. **RB5.** Moutusy Maity, “Internet Marketing”, Oxford University Press, 2018.

RB6. Stephanie Diamond, “Digital Marketing”, Wiley, 2019.

RB7. T. N. Swaminathan, Karthik Kumar, “Digital Marketing From Fundamentals to Future”, Cengage, 1st Edition, 2019

INSTRUCTIONS TO PAPER SETTERS:

- 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.
- 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.
- Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), 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. To get the knowledge about the important concepts & characteristics of accounting.
2. To study the application of accounting in the general business environment.

PRE-REQUISITES:

None.

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Basic accounting knowledge, accounting equations, accounting concepts & convention.
CO2	Rules of debit & credit, journal, ledger, trial balance.
CO3	Final A/c's (Trading A/c, Profit & Loss A/c, Balance Sheet) without adjustment & with adjustment.
CO4	Sub division of Journal: Cash Journal, Petty Cash Book, Purchase Journal, Purchase Return Journal, Sales Journal, Sales Return Journal
CO5	Inventory valuation, Inventory System, Methods of valuation of Inventories (FIFO, LIFO & Weighted Average Method).
CO6	Depreciation concept & causes, Method of recording depreciation & Method of providing depreciation.

UNIT-I

No. of Hours: 11 Chapter / Book Reference: TB2[Chapters - 1,2,3], RB4 [Chapters - 1, 2]

Meaning and nature of accounting, Scope of financial accounting, Interrelationship of Accounting with other disciplines, Branches of Accounting, Accounting concepts and convention, Accounting standards in India. Introduction of IFRS ,Distinction between Indian Accounting standards and IFRS

UNIT-II

No. of Hours: 11 Chapter / Book Reference: TB2 [Chapters - 6, 8], RB4 [Chapters - 5, 6]

Journal, Rules of Debit and Credit, Sub Division of Journal: Cash Journal, Petty Cash Book, Purchase Journal, Purchase Return, Sales Journal, Sales Return Journal, Ledger, Trial Balance.

IT application in accounting:- Computerized accounting system (using any popular accounting software)
Creation of vouchers, recording of transactions, preparing reports , cash books, bankbook, ledger accounts trial balance

UNIT–III

No. of Hours: 11 Chapter / Book Reference: TB2 [Chapter – 9], RB4 [Chapter – 8]

Preparation of Final Accounts, Profit & Loss Account, Balance Sheet-Without adjustments and with adjustments.

IT application in accounting Computerized accounting system (using any popular accounting software)
Creation of profit and loss account, balance sheet.

UNIT–IV

No. of Hours: 11 Chapter / Book Reference: TB2 [Chapters - 11, 12], RB4 [Chapters - 7, 10]

Meaning of Inventory, Objectives of Inventory Valuation, Inventory Systems, Methods of Valuation of Inventories FIFO, LIFO and Weighted Average Method, Concept of Depreciation, Causes of Depreciation, Meaning of Depreciation Accounting, Method of Recording Depreciation, Methods of Providing Depreciation.

TEXT BOOKS:

TB1. Maheshwari, S.N. and Maheshwari, S. K., (2023) An Introduction to Accountancy, Eighth Edition, Vikas Publishing House.

TB2. Tulsian, P.C., (2023) Financial Accountancy, 2nd edition, Pearson Education.

TB3. Goyal, Bhusan Kumar , Basic Financial Accounting, 2022, International Book House Pvt. Ltd.

REFERENCE BOOKS:

RB1. Gupta R. L., & Gupta V.K., “Principles & Practice of Accounting”, Sultan Chand & Sons, 2020.

RB2. Monga J R, “Introduction to Financial Accounting”, Mayur Paperbacks, 2022.

RB3. Raja Sekaran/Lalitha, “Financial Accounting”, Pearsons.

RB4. Goyal V.K. & Goyal Ruchi (2022) Financial accounting, PH

Course Code: BCA 202P		L	T/P	C
Course Name: Operating Systems Lab		0	2	1
LEARNING OBJECTIVES: In this course, the learners will be able to develop expertise related to: 1. Unix/Linux environment 2. Understanding of Linux commands and scripts				
PRE-REQUISITES: Nil				
COURSE OUTCOMES (COs): After completion of this course, the learners will be able to:				
CO #	Detailed Statement of the CO			
CO1	Understand Linux Environment with the help of its architecture.			
CO2	Understand the Linux environment by using general Linux Commands.			
CO3	Implement Process Related commands.			
CO4	Implement File Permission concept.			
CO5	Understanding the shell script by combining commands.			
List of Practical's				
S. No.	Detailed Statement			Mapping to CO #
Core Practicals				
1.	Connect to the Linux Server and understand the basic Directory Structure of Linux.			CO1
2.	To understand help commands like:- man, info, help, whatis, apropos			CO2
3.	To understand basic directory navigation commands like cat,cd, mv, cp, rm, mkdir,rmdir, file, pwd command.			CO2
4.	To understand basic commands like:- date, cal, echo, bc, ls, who, whoami, hostname, uname, tty, aliase			CO2
5.	To understand vi basics, Three modes of vi Editor, how to write, save, execute a shell script in vi editor.			CO5
6.	To understand process related commands like: -ps, top, pstree, nice, renice in Linux.			CO3
7.	To understand how to examine and change File permissions.			CO4
8.	Set a file to be read-only with the chmod command. Interpret the file permissions displayed by the ls -l command.			CO4
9.	Delete one or more directories with the rmdir command. See what happens if the directory is not empty. Experiment (carefully!) with the rm -r command to delete a directory and its content.			CO2
10.	Change your directory to the directory exercises. Create a file in that directory, named the file as example1 using the cat command containing the following text: water, water everywhere and all the boards did shrink; water, water everywhere, no drop to drink.			CO2
11.	Write basic shell script to display the table of a number.			CO5
12.	Write basic shell script to input a character from user and then check whether it is uppercase, lowercase or digit.			CO5
13.	Write basic shell script to calculate factorial of a number.			CO5
14.	Write basic shell script to input the month number and generate			CO5

	corresponding calendar.	
15.	Write basic shell script to list all directories.	CO5
16.	Write basic shell script to display greatest of three numbers.	CO5
17.	Write basic shell script to check whether the number entered by user is prime or not.	CO5

Note:

1. In total 15 practicals to be implemented. 2 additional practical may be given by the course instructor.
2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.

Course Code: BCA 204 P		L	T	C
Course Name: Software Testing Lab		4	0	4
LEARNING OBJECTIVES: In this course, the learners will be able to develop expertise related to: 1. To gain knowledge of various functional and structural testing techniques 2. To gain knowledge of various activities and levels of testing 3. To learn the issues in testing of object oriented and internet-based applications				
PRE-REQUISITES: 1. Software Engineering 2. Knowledge and skills of at least one programming language				
COURSE OUTCOMES (COs): After completion of this course, the learners will be able to:				
CO #	Detailed Statement of the CO			
CO1	Identify the different types of Testing.			
CO2	Differentiate between the testing and Debugging. Different Models of testing.			
CO3	Develop test cases for given problem with respect to structural and functional testing techniques.			
CO4	Integrating the test planning and Management			
List of Practicals				
S. No.	Detailed Statement			Mapping to CO #
Core Practicals (Implement minimum 10 out of 15 practicals)				
1	Write a small program in Python or Java with intentional bugs. Identify and classify them as error, fault, or failure.			CO1
2	Create a test case document for a calculator or login form and perform testing.			CO3
3	Create a flowchart or diagram of STLC using online or offline drawing tools.			CO2
4	Write test cases for form validation and explain how it satisfies verification and validation.			CO2
5	Review a piece of code for logic, formatting, and style issues.			CO1
6	Write test cases with different input combinations without looking at the code.			CO3
7	Test a form that accepts age (1–100). Check with values 0, 1, 2, 99, 100, 101.			CO3
8	Test valid and invalid data classes for a mobile number field (10 digits).			CO3
9	Design a decision table for login credentials (valid/invalid username/password).			CO3
10	Write a program and calculate the cyclomatic complexity using online tools.			CO3
11	Write unit test cases for a Java function (e.g., factorial, sum).			CO3
12	Integrate and test two modules (e.g., login + dashboard).			CO3
13	Test the application as a whole (input → output correctness).			CO3

14	Create test cases that simulate client acceptance (UI, behavior).	CO3
15	Draft a test plan covering objectives, scope, resources, responsibilities, and timeline.	CO4
Note: 1. In total 15 practicals to be implemented. 2 additional practical may be given by the course instructor. 2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.		

Course Code: BCA 212P		L	T/P	C
Course Name: Data Science Lab		0	4	2
LEARNING OBJECTIVES: In this course, the learners will be able to develop expertise related to: 1. Basic Statistical programming functions in Python. 2. Apply the concepts of data structures like Series and Data Frames in Python applications.				
PRE-REQUISITES: Basics of python.				
COURSE OUTCOMES (COs): After completion of this course, the learners will be able to:				
CO #	Detailed Statement of the CO			
CO1	Demonstrate the use of operators and mathematical expression in Python data structures like Series and Data frames.			
CO2	Use statistical functions Python Programs which will help in analysis.			
CO3	Read and write data from & to files in Python and develop application.			
CO4	Apply the concepts of Pandas in real time application.			
List of Practical's				
S. No.	Detailed Statement			Mapping to CO #
Core Practical's (Implement minimum 8 out of 10 practical's)				
1.	Create a pandas series from a dictionary of values and an ndarray.			CO1
2.	Create a Series and print all the elements that are above 75 th percentile.			CO1, CO2
3.	Perform sorting on Series data.			CO1, CO2
4.	Program to show sorting on DataFrames			CO1, CO2
5.	Program to shoe Deleting/Renaming Columns/Rows			CO1, CO2
6.	Program to use cumprod(),cumsum(), cummin() and cummax().			CO1, CO2
7.	Write a program to implement pivot() and pivot-table() on a DataFrame.			CO1, CO2,CO3
8.	Write a program to find mean absolute deviation on a DataFrame.			CO1, CO2,CO3
9.	Write a program to show functions on a subset of Dataframe.			CO1, CO2,CO4, CO5
10.	Adding/Modifying a row in DataFrame.			CO1, CO2
Application Based Practicals (Implement minimum 5 out of 10 practicals)				
11.	Two Series object, Population stores the details of four metro cities of India and another object AvgIncome stores the total average income reported in four years in these cities .Calculate income per capita for each of these metro cities.			CO1, CO2,CO5
12.	Create a DataFrame based on E-Commerce data and generate mean, mode, median.			CO1, CO2
13.	Create a DataFrame based on employee data and generate quartile and variance.			CO1, CO2

14.	Program to implement Skewness on Random data.	CO1, CO2
15.	Create a DataFrame on any Data and compute statistical function of Kurtosis.	CO1, CO2, CO3
16.	Series objects Temp1, temp2, temp3, temp 4 stores the temperature of days of week 1, week 2, week 3, week 4. Write a script to:- 1. Print average temperature per week 2. Print average temperature of entire month	CO1, CO2, CO3, CO5
17.	Write a Program to read a CSV file and create its DataFrame.	CO1, CO2, CO4, CO5
18.	Consider the DataFrame QtrSales where each row contains the item category, item name and expenditure and group the rows by category, and print the average expenditure per category.	CO1, CO2, CO5
19.	Create a DataFrame having age, name, weight of five students. Write a program to display only the weight of first and fourth rows.	CO1, CO2, CO3
20.	Write a program to create a DataFrame to store weight, age and name of three people. Print the DataFrame and its transpose.	CO1, CO2, CO5
Note: 1. In total 15 practicals to be implemented. 2 additional practical may be given by the course instructor. 2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.		

Course Code: BCA 216P		L	T/P	C
Course Name: Introduction to Security, Acts and Cyber Laws and Cyber Security Lab		0	4	2
LEARNING OBJECTIVES: In this course, the learners will be able to develop expertise related to the following: - 1. Students will be able to understand and learn the concept of cybercrime and security. 2. Students will be able to understand and learn the concept of cyber laws for cyber security. 3. Students will be able to understand and learn the concept of cyber forensics. 4. To study real-life examples of cybercrimes.				
PRE-REQUISITES: 1. Fundamentals of IT.				
COURSE OUTCOMES (COs): After completion of this course, the learners will be able to:				
CO #	Detailed Statement of the CO			
CO1	Define the basic concepts of cyber security, cybercrime, and cybercriminals.			
CO2	Identify various categories of cybercrimes.			
CO3	Identify and discuss the ways cybercrimes are perpetuated.			
CO4	Discover the appropriate Acts for cybercrimes.			
CO5	Evaluate and implement computer forensics.			
CO6	Survey recent cybercrime cases focusing on cyber ethics.			
List of Practical's				
S. No.	Detailed Statement	Mapping to CO #		
Core Practicals				
1.	Install and configure any Antivirus software on System	CO1		
2.	Implement prevention mechanisms to protect PC from Cyber Attack	CO1		
3.	Implement Steganography Algorithms	CO2		
4.	Implement and install the key loggers to understand their working.	CO5		
5.	Implement hashing algorithm like MD5, SHA256.			
6.	Implement hiding of Data in image using tools.	CO3		
7.	Apply security to Files/ Folder/Applications using access permissions	CO4		
8.	Study of System threat attacks - Denial of Services.	CO4		
9.	Study of Techniques uses for Web Based Password Capturing.	CO5		
10.	Study of Anti-Intrusion Technique – Honey pot.	CO6		
11.	Study of Sniffing and Spoofing attacks.	CO6		
Note: 1. In total 10 practical's are to be implemented. 2. This is a suggestive list of practical's. However, the instructor may add or change five problem statements as per the requirement.				

Course Code: BCA 218P	L	T/P	C
Course Name: Web Development Using Python Lab	0	4	2

LEARNING OBJECTIVES: In this course, the learners will be able to develop expertise related to the following: - 1. Dynamic web app development framework. 2. Rapid development of a secure web site.		
PRE-REQUISITES: 1. Python programming 2. CSS, HTML and basic Web development concepts		
COURSE OUTCOMES (COs): After completion of this course, the learners will be able to:		
CO #	Detailed Statement of the CO	
CO1	Creating routes (or views), template and forms with Django.	
CO2	To handle and validate forms in Django.	
CO3	To serve static content and files using Django	
CO4	To create User models and forms and implement login and registration.	
CO5	To develop an application making use of python and Django	
List of Practical's		
S. No.	Detailed Statement	Mapping to CO #
Core Practicals		
1.	Install Python including installation of pip, installation and setting up virtual environment, installation of Django. Create a new Django project using command line.	CO1
2.	Create a Django Form using forms.py	CO2
3.	Create a Django app Using Django Templates features i.e. Creating Template Objects , Rendering a Template	CO2
4.	Create a Django app Using Django Templates features i.e. Multiple Contexts, Context Variable Lookup, Template Loading, include Template Tag.	CO2, CO3
5.	App to connect templates with models to serve data dynamically	CO2, CO3
6.	Rendering a model in Django Admin Interface	CO4
7.	Write a Django web app to use parameters in Views.py	CO2
8.	Write a Django web app using control statements (If, for etc.)	CO3
9.	Work with Django Template built in Tags and Filter	CO2
10.	Check to build even or odd number using Django form	CO3
11.	Create a Dynamic Feedback form with validations.	CO3
12.	Creating and using CRUD class based view	CO2
13.	Handling 404, 502 pages	CO2
Note: 1. In total 10 practical's are to be implemented. 2. This is a suggestive list of practical's. However, the instructor may add or change five problem statements as per the requirement.		

Course Code: BCA 220P	L T/P C
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Course Name: Information Security Lab		0	4	2
LEARNING OBJECTIVES: In this course, the learners will be able to develop expertise related to the following: - 1. Identify security threats and analyze security models to understand information security fundamentals. 2. Evaluate cryptographic techniques and their application in securing network communications. 3. Demonstrate proficiency in configuring and managing network security controls such as firewalls and intrusion detection systems. 4. Assess ethical and professional considerations in applying security controls to protect information assets.				
PRE-REQUISITES: Nil				
COURSE OUTCOMES (COs): After completion of this course, the learners will be able to:				
CO #	Detailed Statement of the CO			
CO1	Understand the fundamentals of information security, including threats, attacks, and security models.			
CO2	Analyze network security threats and apply security controls such as firewalls and intrusion detection.			
CO3	Describe network security controls and technologies.			
CO4	Understand cyber threat intelligence and incident response planning.			
List of Practical's				
S. No.	Detailed Statement			Mapping to CO #
Core Practicals				
1.	To study different open source tools for network security and analysis.			CO1
2.	To perform encryption, decryption using the substitution techniques.			CO1
3.	To perform encryption and decryption using transposition techniques.			CO1
4.	To download the N-Stalker Vulnerability Assessment Tool and explore the features.			CO2
5.	To apply the RSA algorithm.			CO2
6.	To apply the DES algorithm for practical applications.			CO2
7.	To apply the AES algorithm for practical applications.			CO2
8.	Write a program to perform Encryption/Decryption using Diffie-Hellman Key exchange.			CO2, CO3
9.	To implement the Digital Signature algorithm.			CO2, CO3
10.	To implement a hash algorithm.			CO2, CO3
11.	To set up a honey pot and monitor the honeypot on the network (KF - Sensor).			CO3
12.	To set up a simple VPN using free VPN software and discuss its			CO3

	benefits for secure remote access.	
13.	Demonstrate any ten N-map commands.	CO3
14.	Design and configure LAN in CISCO packet tracer.	CO3
15.	To demonstrate Intrusion Detection System (IDS) using Snort software tool.	CO2, CO4
Note: 1. In total 10 practical's are to be implemented. 2. This is a suggestive list of practical's. However, the instructor may add practicals as per the requirement of the course.		

FIFTH SEMESTER SYLLABUS

Course Code: BCA 301T

L T C

Course Name: Computer Networks

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

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. To study different types of media, multiplexing, switched networks, the Internet, TCP/IP suite, fiber-optic communications and the state-of-art networking applications.
2. To develop an understanding of different components of computer networks, various protocols, modern technologies and their applications.
3. Identify and discuss the underlying concepts of IPv4 & IPv6 protocols, along with their characteristics and functionality.
4. Details of IP operations in the Internet and associated routing principles.
5. Analyzing various layering protocols in computer networks

PRE-REQUISITES:

1. Fundamentals of Computers and IT

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Utilize the fundamentals of data communication and networking to identify the topologies and connecting devices of networks module
CO2	Understand and describe the layered protocol model (OSI and TCP/IP model)
CO3	Analyze the elements and protocols for peer – peer and communication between layers.
CO4	Evaluate and implement routing algorithms and Router basic configuration.
CO5	Evaluate the protocols and Principles in computer networking

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

Applicable from Batch Admitted in Academic Session 2024-25 onwards

CO3	4	2	4	4	1	4	1	1	1	4
CO4	4	2	4	4	1	4	3	2	1	4
CO5	4	2	4	4	1	4	4	2	1	4

UNIT – I

No. of Hours: 12 **Chapter/Book Reference: TB1, TB2**

Basic Concepts: Components of data communication, distributed processing, Line configuration, topology, transmission mode, and categories of networks. OSI and TCP/IP **Models:** Layers and their functions, comparison of models. Transmission Media: Guided and unguided, Attenuation, distortion, noise, throughput, propagation speed and time, wavelength, Shannon Capacity.

UNIT – II

No. of Hours: 12 **Chapter/Book Reference: TB1, TB2**

Telephony: Multiplexing, WDM, TDM, FDM, circuit switching, packet switching and message switching. Data Link

Layer: Types of errors, Framing (character and bit stuffing), error detection & correction methods; Flow control; Protocols: Stop & wait ARQ, Go-Back- NARQ, Selective repeat ARQ.

UNIT – III

No. of Hours: 12 **Chapter/Book Reference: TB1, TB2**

Network Layer: Internetworking & Devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway, Modems; Addressing: IPv4 and IPv6 addressing, IPv4 subnetting; Routing: Unicast Routing Protocols: RIP, OSPF, BGP; Routing: Routing Methods- Static and Dynamic Routing, Routing basic commands, Distance vector protocol, Link state protocol

UNIT – IV

No. of Hours: 10 **Chapter/Book Reference: TB1, TB2**

Transport and upper layers in OSI Model: Transport layer functions and Protocols, connection management, functions of session layers, Presentation layer, and Application layer.

TEXT BOOKS:

TB1. A. S. Tanenbaum, Nick Feamster, and David J. Wetherall, “Computer Networks”; Pearson Education, 6th Ed., 2021.

TB2. Behrouz A. Forouzan, “Data Communications and Networking”, 5th Edition, McGraw-Hill Education, 2013.

REFERENCE BOOKS:

RB1. D. E. Comer, “Internetworking with TCP/IP, Volume 1: Principles, Protocols, and Architecture”; Pearson Education, 6th Ed., 2014.

RB2. William Stallings, “Data and Computer Communications”; Pearson Education, 11th Ed., 2023.

RB3. Leinwand, A., & Pinsky, B., “Cisco Router Configuration Handbook”, 2nd Edition, Cisco Press, 2001.

Course Code: BCA 303T

L T C

Course Name: Artificial Intelligence

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:

1. To learn the basics of designing intelligent agents that can solve general purpose problems.
2. To represent and process knowledge, plan and act, reason under uncertainty and can learn from experiences.

PRE-REQUISITES:

1. Basic Programming Skills

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	To understand elements constituting problems and learn to solve it by various uninformed and informed (heuristics based)
CO2	To understand formal methods for representing the knowledge and the process of inference to derive new representations of the knowledge
CO3	Analyze and apply the notion of uncertainty and some of probabilistic reasoning methods to deduce inferences under uncertainty.
CO4	Apply some mechanisms to create and improve AI system.

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	2	1	4
CO2	4	2	4	4	1	4	1	2	1	4
CO3	4	2	4	4	1	4	1	2	1	4
CO4	4	2	4	4	1	4	3	2	1	4

UNIT-I

No. of Hours: 12

Chapter/Book Reference: TB1; TB2

Applicable from Batch Admitted in Academic Session 2024-25 onwards

Overview of AI: Introduction to AI, Importance of AI, AI and its related field, AI techniques, Criteria for success.

Problems, problem space and search: Defining the problem as a state space search, Production Systems and its characteristics, Issues in the design of the search programs.

Heuristic search techniques: Generate and test, hill climbing, best first search technique, problem reduction, constraint satisfaction.

UNIT-II

No. of Hours: 12 **Chapter/Book Reference: TB1; TB2; RB1**

Knowledge Representation: Definition and importance of knowledge, Knowledge representation, various approaches used in knowledge representation, Issues in knowledge representation.

Logical Reasoning: Logical agents, propositional logic, inferences, Syntax and semantics of First Order Logic, Inference in First Order Logic Knowledge Base, forward chaining, backward chaining, unification, resolution, Expert system: Case study of Expert system in PROLOG

UNIT-III

No. of Hours: 10 **Chapter/Book Reference: TB1; TB2**

Handling Uncertainty: Non-Monotonic Reasoning, Probabilistic reasoning, Bayes 'Theorem, Certainty factors and Rule-based Systems, Bayesian Networks, Dempster-Shafer Theory, Introduction to Fuzzy logic. Fuzzy set definition & types. Membership functions. Designing a fuzzy set for a given application

Natural Language Processing: Introduction, Syntactic Processing, Semantic Processing, Pragmatic Processing.

UNIT-IV

No. of Hours: 10 **Chapter/Book Reference: TB1; TB2**

Learning: Introduction to Learning, Rote Learning, learning by taking advice, learning in problem solving, learning from examples: Induction, Explanation-based Learning, Discovery, Analogy, Neural Networks, and Genetic Learning.

TEXT BOOKS:

TB1. Elaine Rich, Kevin Knight and Shivashankar B. Nair, "Artificial Intelligence", 3rd Edition, McGraw Hill Education, 2009.

TB2. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", Pearson Education, 4th Edition, 2022

REFERENCE BOOKS:

RB1. Ivan Bratko, "Prolog Programming for Artificial Intelligence", Addison-Wesley, 4th Edition, 2011

RB2. George F. Luger, "Artificial Intelligence: Principles and Practice", Springer, 1st Edition, 2025

RB3. Ben Coppin, "Artificial Intelligence Illuminated", Jones & Bartlett Learning, 1st Edition, 2004

Course Code: BCA 305T

L T C

Course Name: Natural Language Processing

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. To understand the fundamentals of Natural Language Processing (NLP), its scope, challenges, and real-world applications.
2. To develop an understanding of text preprocessing techniques and basic linguistic concepts used in NLP.
3. To learn fundamental methods for text representation, language modeling, and text classification.
4. To understand the concepts of word embeddings and gain an introductory knowledge of modern NLP techniques.
5. To explore practical applications of NLP, including sentiment analysis, machine translation, chatbots, and generative AI.

PRE-REQUISITES:

1. Fundamentals of Computers and IT
2. Basic knowledge of Python programming.

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Explain the fundamental concepts, challenges, and applications of Natural Language Processing and perform basic text preprocessing tasks.
CO2	Apply basic linguistic techniques such as tokenization, Part-of-Speech tagging, Named Entity Recognition, and language modeling for text analysis.
CO3	Use feature extraction techniques and basic machine learning methods for text classification and sentiment analysis.
CO4	Describe the concepts of word embeddings, deep learning, Transformers, and Large Language Models used in modern NLP.
CO5	Identify and analyze real-world applications of NLP, including machine translation, question answering, chatbots, and generative AI systems.

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	4	4	4	4	4	1
CO2	4	3	3	3	1	3	1	2	1	1
CO3	4	4	3	4	2	3	2	2	1	2
CO4	3	3	3	4	2	4	2	2	1	3
CO5	3	3	3	3	3	3	2	3	2	4

UNIT – I

No. of Hours: 12 Chapter/Book Reference: TB1, TB2

Introduction to Natural Language Processing (NLP): scope, challenges, and applications. Levels of language processing: morphological, lexical, syntactic, semantic, and discourse. Text preprocessing: tokenization, normalization, stemming, lemmatization, stop-word removal. Regular expressions.

UNIT – II

No. of Hours: 12 Chapter/Book Reference: TB1, TB2

Part-of-Speech (POS) tagging. Introduction to Context-Free Grammar (CFG) and syntactic parsing. Named Entity Recognition (NER). Word Sense Disambiguation (WSD). Introduction to language models and n-grams.

UNIT – III

No. of Hours: 12 Chapter/Book Reference: TB1, TB2

Feature Extraction- Introduction, Need, importance. Feature extraction techniques: Bag of Words (BoW) and TF-IDF. Text classification using Naïve Bayes. Sentiment analysis. Information extraction. Introduction to text summarization.

UNIT – IV

No. of Hours: 10 Chapter/Book Reference: TB1, TB2

Word embeddings: Word2Vec. Introduction to deep learning for NLP. Introduction to Transformers and Large Language Models (LLMs). Applications of Natural Language Processing: sentiment analysis, machine translation, question answering, text summarization, chatbots, speech assistants, and generative AI.

TEXT BOOKS:

TB1. Jacob Eisenstein, "Introduction to Natural Language Processing", MIT Press, 2019.

TB2. Steven Bird, Ewan Klein and Edward Loper, "Natural Language Processing with Python", O'Reilly Media, 2009.

REFERENCE BOOKS:

RB1. Yoav Goldberg, "Neural Network Methods for Natural Language Processing", Morgan & Claypool Publishers, 2017.

RB2. Dipanjan Sarkar, "Text Analytics with Python: A Practitioner's Guide to Natural Language Processing", 3rd Ed., Apress, 2021.

Course Code: BCA 307T

L T C

Course Name: Network Security

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. To learn the basic security issues and fundamental concepts of Network Security.
2. To understand the applications of Cryptography and Steganography for securing information.
3. To develop the ability to identify, analyse, and mitigate network security breaches.
4. To understand the concepts, principles, and applications of Firewalls in network security.
5. To understand the concept of Kerberos authentication and its applications in secure communication.
6. To design and implement different network security algorithms using programming techniques.
7. To understand computer network security issues, secure communication challenges, and their possible remedies.
8. To learn and evaluate different network security algorithms through practical implementation.

PRE-REQUISITES:

1. Computer Network
2. C, C++ (Programming Knowledge of C/C++)

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Define and explain the issues and basic concepts of Network Security. To understand how to draw a network model.
CO2	To Explain, understand and summarize the concepts, types and features of Firewall.
CO3	Explain and implement working of authentication, authorization, Packet security, IP Security, Firewall by using some suitable examples.
CO4	Classify and organize the architecture of network security management.
CO5	Evaluate different Network Security algorithms with the help of program.
CO6	Design and create a network security architecture for an organization.

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	3	2	1	2	4	2	1	2
CO2	4	2	3	2	2	2	4	2	1	2
CO3	4	2	4	4	2	3	4	3	1	2
CO4	4	2	3	4	2	3	4	3	1	2
CO5	4	2	4	4	2	4	4	4	1	2
CO6	4	3	4	4	3	4	4	4	2	3

UNIT-I

No. of Hours: 12 Chapter/Book Reference: TB2

Introduction to Network Security and related issues- authentication, confidentiality, integrity, anonymity, etc. Network Security Models, Network Security Threats, Secure socket layer (SSL)/ Transport layer security (TLS), Public Key Infrastructure, Digital Signature Schemes.

UNIT-II

No. of Hours: 11 Chapter/Book Reference: TB1

Firewalls: Overview, Types, Features, User Management, Intrusion Detection and Prevention Systems, Intruders, Viruses and Related Threats, Firewall Design Principles, Packet filtering firewall, VPN

UNIT-III

No. of Hours: 11 Chapter/Book Reference: TB1

Authentication applications - Kerberos, X.509, E-Mail security, pretty good privacy (PGP), Secure Multipurpose Internet Mail Extensions (S/MIME), IP security overview, IP security policy, Encapsulating security payload (ESP). Network Management Security: Overview of SNMP Architecture. Available software platforms/case tools, Configuration Management.

UNIT-IV

No. of Hours: 10 Chapter/Book Reference: TB2

Intrusion Detection: Intruders, Intrusion Detection, Host-Based Intrusion Detection, Distributed Host-Based Intrusion Detection, Network-Based Intrusion Detection, Distributed Adaptive Intrusion Detection, Intrusion Detection Exchange Format, Honeypots, Virtual Private Network.

TEXT BOOKS:

TB1. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security: Private Communication in a Public World", 2nd Ed., Prentice Hall, 2002.

TB2. William Stallings and Lawrie Brown, "Computer Security: Principles and Practice", 5th Ed., Pearson, 2024.

REFERENCE BOOKS:

RB1. Wade Trappe and Lawrence C. Washington, "Introduction to Cryptography with Coding Theory", 3rd Ed., Pearson, 2020

RB2. Michael E. Whitman and Herbert J. Mattord, "Principles of Information Security", 7th Ed., Cengage Learning, 2022.

RB3. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security: Private Communication in a Public World", 2nd Ed., Prentice Hall, 2002.

RB4. Wenbo Mao, "Modern Cryptography: Theory and Practice", Pearson Education, 2004.

Course Code: BCA 309T

L T C

Course Name: Full Stack Development 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

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. To understand the fundamentals of full stack web development and the architecture of modern web applications.
2. To develop responsive and interactive web pages using HTML5, CSS3, JavaScript, and Bootstrap.
3. To learn server-side web application development using Java Servlets, JSP, and JDBC.
4. To understand database connectivity, RESTful web services, and the basics of Spring Boot and Hibernate.
5. To develop simple full stack web applications by integrating front-end, back-end, and database technologies.

PRE-REQUISITES:

1. Fundamentals of Computers and IT.
2. Basic knowledge of Java programming.
3. Basic knowledge of HTML and Database Management Systems.

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Explain the fundamentals of full stack web development and develop responsive web pages using HTML5, CSS3, JavaScript, and Bootstrap.
CO2	Develop server-side web applications using Java Servlets, JSP, and session management techniques.
CO3	Design database-driven web applications using JDBC and MySQL by performing CRUD operations.
CO4	Explain the concepts of RESTful web services, Spring Boot, and Hibernate for developing modern Java web applications.
CO5	Develop and integrate front-end, back-end, and database components to build simple full stack web 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	2	1	3	3	2	1	1	1	1	1
CO2	2	2	3	4	2	1	1	2	1	1
CO3	3	2	4	4	3	2	1	2	1	1
CO4	2	2	3	4	3	2	1	2	1	2
CO5	3	3	4	4	3	3	2	3	2	3

UNIT – I

No. of Hours: 12 Chapter/Book Reference: TB1, TB2

Introduction to Full Stack Development: Client-server architecture, front-end, back-end and database technologies.

HTML5: Structure of web pages, text formatting, lists, tables, hyperlinks, images, forms and multimedia elements.

CSS3: Selectors, colors, fonts, box model, positioning, responsive web pages using Bootstrap.

JavaScript: Variables, operators, control statements, functions, events, DOM manipulation and client-side form validation.

UNIT – II

No. of Hours: 12 Chapter/Book Reference: TB1, TB2

Java Web Development: Java EE overview, HTTP protocol and web application architecture.

Servlets: Servlet life cycle, request and response handling, deployment, session management using cookies and HttpSession.

JavaServer Pages (JSP): JSP life cycle, directives, Expression Language (EL), JSTL and introduction to MVC architecture.

UNIT – III

No. of Hours: 12 Chapter/Book Reference: TB1, TB2

Database Connectivity: JDBC architecture, MySQL connectivity, CRUD operations, PreparedStatement and ResultSet.

RESTful Web Services: Introduction to REST APIs, HTTP methods (GET, POST, PUT and DELETE) and JSON.

UNIT – IV

No. of Hours: 10 Chapter/Book Reference: TB1, TB2

Spring Boot: Introduction, project structure, Dependency Injection and Spring MVC.

Hibernate/JPA: Introduction to ORM, entity mapping and basic CRUD operations.

Full Stack Application Development: Integration of front-end, back-end and database to develop a simple full stack web application.

TEXT BOOKS:

TB1. Herbert Schildt and Danny Coward, "Java: The Complete Reference", 13th Edition, McGraw Hill, 2024.

TB2. Y. Daniel Liang, "Introduction to Java Programming and Data Structures, Comprehensive Version", 13th Edition, Pearson, 2025.

Applicable from Batch Admitted in Academic Session 2024-25 onwards

TB3. Jon Duckett, "HTML and CSS: Design and Build Websites", Wiley, 2011.

REFERENCE BOOKS:

RB1. Marty Hall and Larry Brown, "Core Servlets and JavaServer Pages", 2nd Edition, Pearson Education.

RB2. Craig Walls, "Spring Boot in Action", Manning Publications, 2016.

RB3. Vasan Subramanian, "Pro Spring Boot 3 with Spring Framework 6", Apress, 2023

Course Code: BCA 311*

L T C

Course Name: Summer Training*

0 0 4

Summer Training Project Guidelines

Objective:

All the students enrolled for BCA Programme, have to undergo compulsory summer training/ Project of minimum 06weeks in an organization in the IT field. The aim of the project is to give the students an integrated experience in solving a real-life problem by applying knowledge and skills gained on completion of theory papers and in-house practical papers during BCA course. It provides an occasion for students to realize the importance of resource and time management, ownership of task towards deliverables, innovation and efficiency in the task management. It also provides a good opportunity for students to build, enhance and sustain high levels of professional conduct and performance and evolves a problem solver frame of mind in students at early stage. It also prepares students for taking up responsible assignments in the corporate establishment.

General Guidelines:

1. The project should be original, of real-life value, and not copied from existing material from any source. A student should ensure that he understands what is expected by preparing a requirement document of his understanding and get it reviewed by the guide.
2. Design document should also be reviewed and code should also be peer reviewed.
3. A user manual has to be prepared and reviewed.
4. Testing has to be thorough and at various levels, followed by an acceptance test based on the requirement document and user manual.
5. Students should follow the steps as discussed in Software Development Life Cycle while writing dissertation and use Software Engineering Methodologies for development of deliverables, mere programming will not be sufficient. Students must note that interviewers for job are often more interested in the problem solved, alternatives that could have been tried and the benefits derived from the developed application, rather than just implementation details.
6. One Project will be submitted only by one student. However, if the nature of the project is very big & large enough to be divided in different independent big modules having an estimated required effort of minimum 06weeks to be developed by one person, can be taken up and designed in such a way that every student will be responsible for one module and will submit only that specific module as it were a complete software project.
7. Every student has to get his / her synopsis approved from the guide.
8. The synopsis must be brief i.e., not more than 4-6 pages. It must address details like (however, students may follow the SRS format of IEEE for writing Synopsis).
 - a. Name / title of the project
 - b. Statement about the problem
 - c. Why the Particular topic is chosen? It must address Present State of the Art.
 - d. Objective and scope of the project
 - e. Analysis, Design, Development & Testing Methodology
 - f. H/W & S/W to be used
 - g. Testing Technologies to be used

Applicable from Batch Admitted in Academic Session 2024-25 onwards

- h. What contribution / value addition would the project make
 - i. Limitations / constraints of the project
 - j. Conclusion, Future Scope for Modification
 - k. References and Bibliography.
9. After approval of the Synopsis, Students will need to give Two Presentations / Demonstration, as per the schedule fixed by their respective Institutions or University. First Presentation will ideally be given after Design phase is over. Second should be given when System Testing is over. First Presentation (Summer Training) should be given in the first month. Second Presentation (Projects) is in second month. Final Project reports should be given latest by the end of the third month of the semester.
10. Summer Training report has to be submitted by 31st October of every academic year.
11. The student will submit his/her project report/thesis in the prescribed format, as given hereunder, after the second presentation. The project report/thesis should include:
- a. ONE hard copy (Maroon color with golden print) of the project report / thesis.
 - b. Soft copy of project on CD including all resource code/ compiled binary code and the manuscript in MS-Word document format.
12. Note the following guidelines with respect to Preparation of the Documentation. Please note that documentation is meant for other people, and hence it must be self-explanatory, in all respect.
- 12.1 The sequence of the Pages in the Project Report will be as follows:
- 1. One Transparency Sheet
 - 2. Title Page (Strictly as per the sample supplied)
 - 3. Institute's Certificate
 - 4. Company's Certificate
 - 5. Candidate Declaration of originality of work
 - 6. Acknowledgement.
 - 7. Abstract
 - 8. List of Figures (Strictly as per the sample supplied)
 - 9. List of Tables (Strictly as per the sample supplied)
 - 10. List of Abbreviations (Strictly as per the sample supplied)
 - 11. Contents (Strictly as per the sample supplied) and then body of the dissertation according to the content.
- 12.2 The pages coming under the preview of the CONTENTS will only be numbered in the BOTTOM of the Page Centrally Aligned.
- 12.3 ONE Hardbound Copies (One Original and Two Xerox) will be submitted with the Institute out of which one will be given back to the candidate. All the students are required to follow the same binding format in maroon color with back quote mentioning title of the project, name of the student and year.
- 12.4 At the end of the Project Report Two White blank sheets must be attached.
- 12.5 At the beginning of each chapter one blank page (Strictly as per the sample supplied) must be attached. These pages will neither be numbered nor counted in total numbering of pages. They will only indicate the beginning of a New Chapter with its learning objectives.
- 12.6 Font size of the documentation will be 12 Times New Roman and the pages will be one and half line spaced. The page margin will be as under: -
- Top – 1 inch, Bottom – 1 inch,
 - Left – 1.5 inch, Right – 1 inch.

Applicable from Batch Admitted in Academic Session 2024-25 onwards

12.7 Kindly note that all-methodological details and theoretical aspects must be written in students' own words. Copying from books or other students will not be accepted, in any case.

All students are informed not to write definition of various concepts in index, mention the topics w. r. t. to your project (i.e., how various concepts have been implemented in the project)

*** No detailed theories required**

TEMPLATE FOR CHAPTER SCHEME

C O N T E N T S

(font size -18)

CHAPTER 1: PROBLEM FORMULATION		Page No.
1.1	Introduction about the Company	1
1.2	Introduction about the Problem	4
1.3	Present State of the Art	6
1.4	Need of Computerization	10
1.5	Proposed Software / Project	13
1.6	Importance of the work	15
 CHAPTER 2: SYSTEM ANALYSIS		 Page No.
2.1	Feasibility Study	20
	2.1.1 Technical Feasibility	20
	2.1.2 Economic Feasibility	22
	2.1.3 Operational Feasibility	22
	2.1.4 Other Feasibility Dimensions	23
2.2	Analysis Methodology	24
2.3	Choice of the Platforms	25
	2.3.1 S/W used	26
	2.3.1 H/W used	28
 CHAPTER 3: SYSTEM DESIGN#		 Page No.
3.1	Design Methodology	32
3.2	Database Design	36
	3.2.1 ERD	37
	3.2.2 DFD	39
3.3	Input Design	42
3.4	Output Design	48
3.5	Code Design and Development	49
 CHAPTER 4: TESTING AND IMPLEMENTATION##		 Page No.
4.1	Testing Methodology	52
	4.1.1 Unit Testing	55
	4.1.2 Module Testing	56

4.1.3	Integration Testing	57
4.1.4	System Testing	59
4.1.5	White Box / Black Box Testing	62
4.1.6	Acceptance Testing	69
4.2	Test Data & Test Cases	70
4.3	Test Reports and Debugging	71
4.4	Implementation Manual	73
4.5	Implementation	75
4.6	Users' Training	76
4.6	Post Implementation Maintenance	79
CHAPTER 5: CONCLUSION AND REFERENCES		Page No.
5.1	Conclusion	81
5.2	System Specifications	83
5.2.1	H/W Requirement	83
5.2.2	S/W Requirement	84
5.3	Limitations of the System	85
5.4	Future Scope for Modification	86
5.5	References/Bibliography (as per format)	88
CHAPTER 6: ANNEXURES (Screen Snapshots must be annexed)		Page No.
A-1	Menu Flow Diagram	92
A-2	Structure Chart	94
A-3	Decision Table/Tree	95
A-4	Data Dictionary	97
A-5	Test Reports	106
A-6	Sample Inputs	109
A-7	Sample Outputs	111
A-8	Coding (Optional)	118

Please note that for all the System Design (Database, Input & Output) the basic Prototype, format, Table Structure, etc. is to be discussed along with related validations, verifications & normalization. However, the sample Input & Output (Screen Snapshots) will be attached in the annexure.

Under Testing, you have to discuss the approach of Testing, Test Data, Test Cases and Test Report. How Debugging has been performed, on the basis of Test Report, must be also discussed?

Course Code: BCA 313T

L T C

Course Name: Introduction to Management & Entrepreneurship Development3 0 3

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

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. Development of critical thinking and to inspire students to developed an entrepreneurial mind-set.
2. Acquisition of values and attitudes towards understanding complex business problems.
3. Promoting active participation in solving current business problems and preventing the future ones.
4. Encouraging students to understand the fundamentals of management.

PRE-REQUISITES:

1. Basic awareness about the Entrepreneurship Development.

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 Entrepreneurial development in today's global scenario.
CO2	Understand the concept of entrepreneurs and to help the students to develop an entrepreneurial mind-set.
CO3	Develop critical thinking for shaping strategies and help them to become an successful entrepreneur.
CO4	Acquire values and attitudes towards understanding complex business problems, and active participation in solving current business problems.
CO5	Understand the concept of the fundamentals of management

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	4	2	2	1	3	1	1	4	3
CO2	2	4	3	2	2	4	1	1	4	3
CO3	2	4	4	4	2	4	1	2	4	3

Applicable from Batch Admitted in Academic Session 2024-25 onwards

CO4	2	4	4	4	3	3	1	2	4	4
CO5	3	4	2	3	2	2	1	1	4	3

UNIT – I

No. of Hours: 10 Chapter/Book Reference: TB1, TB2, TB3

Introduction to Entrepreneurship: Meaning and concept of entrepreneurship, the history of entrepreneurship development, Role of entrepreneurship in economic development, General characteristics and personality traits of entrepreneurs. Factors affecting entrepreneurship, Agencies in entrepreneurship development in India.

UNIT – II

No. of Hours: 10 Chapter/Book Reference: TB1, TB2, TB3

Creativity: Necessity of Creativity in the development of entrepreneur, Steps in Creativity, Defining Innovation, importance of innovation. Identification of opportunities for problem solving with innovation. Decision making and Problem Solving (steps indecision making). Example from industry, day to day operations.

UNIT – III

No. of Hours: 10 Chapter/Book Reference: TB1, TB2

Role of an Entrepreneur: The Entrepreneur's role in the context of contribution to society; Examples from industry; the role of changing the mindset and the development of out of box thinking. Introduction to Design Thinking. Entrepreneurs as role models, mentors and influencers. Entrepreneurial success stories. Historical Perspective, Global Indian Entrepreneurs, Institutions, Modern Entrepreneurs.

UNIT – IV

No. of Hours: 10 Chapter/Book Reference: TB3

Fundamentals of Management: Meaning of Business and its management the role and importance of leadership in entrepreneurship. Difference between Management and Leadership. The importance of planning in entrepreneurship venture. The role and importance of business plan in entrepreneurship venture.

TEXT BOOKS:

TB1. S. S. Khanka, "Entrepreneurial Development", 5th Edition, S. Chand Publishing, 2026.

TB2. Sangram Keshari Mohanty, "Fundamentals of Entrepreneurship", Revised Edition, PHI Learning Private Limited, 2019.

TB3. Abha Mathur, "Entrepreneurship Development", 3rd Edition, Taxmann Publications, 2024

REFERENCE BOOKS:

RB1. S. B. Srivastava, "A Practical Guide to Industrial Entrepreneurs", Latest Edition, Sultan Chand & Sons.

RB2. Prasanna Chandra, "Projects: Planning, Analysis, Selection, Financing, Implementation and Review", 9th Edition, McGraw Hill Education, 2021.

RB3. T. N. Chhabra, "Entrepreneurship Development", Latest Edition, Sun India Publications

Course Code: BCA 301P

L P C

Course Name: Computer Networks Lab

- 2 1

INSTRUCTIONS

1. The course objectives and course outcomes are identical to that of BCA 301T 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 303P

L P C

Course Name: Artificial Intelligence Lab

- 4 2

INSTRUCTIONS

1. The course objectives and course outcomes are identical to that of BCA 303T 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 305P

L P C

Course Name: Natural Language Processing Lab

- 4 2

INSTRUCTIONS

1. The course objectives and course outcomes are identical to that of BCA 305T 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 307P

L P C

Course Name: Network Security Lab

- 4 2

INSTRUCTIONS

1. The course objectives and course outcomes are identical to that of BCA 307T 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 309P

L P C

Course Name: Full Stack Development using Java Lab

- 4 2

INSTRUCTIONS

1. The course objectives and course outcomes are identical to that of BCA 309T 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

SIXTH SEMESTER SYLLABUS

Course Code: BCA 302T

L T C

Course Name: Distributed systems and Cloud Computing

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

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. To understand the fundamentals of distributed systems, their architecture, characteristics, and applications.
2. To learn the concepts of communication, synchronization, and resource sharing in distributed systems.
3. To understand cloud computing models, virtualization, and cloud service architectures.
4. To explore cloud platforms, cloud storage, and data-intensive computing concepts.
5. To develop an understanding of cloud-based applications and emerging trends in distributed and cloud computing.

PRE-REQUISITES:

1. Fundamentals of Computers and Information Technology.
2. Basic knowledge of Computer Networks.
3. Basic understanding of Operating Systems.

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Explain the fundamental concepts, architecture, characteristics, and applications of distributed systems.
CO2	Describe communication, synchronization, resource sharing, and fault tolerance in distributed systems.
CO3	Explain cloud computing concepts, virtualization, deployment models, and service models.
CO4	Demonstrate knowledge of cloud platforms, cloud storage, and data-intensive computing techniques.
CO5	Analyze cloud-based applications and emerging trends in distributed and cloud computing.

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	2	2	2	1	2	1	1	1	1
CO2	3	3	2	3	2	2	1	1	1	1
CO3	3	2	3	3	3	2	1	1	1	2
CO4	2	3	3	3	3	2	1	2	1	2
CO5	2	3	3	3	2	3	2	2	2	3

UNIT – I

No. of Hours: 10 Chapter/Book Reference: TB1, TB2

Introduction to Distributed Systems: Definition, goals, characteristics, architecture, distributed system models, advantages and challenges.

Communication in Distributed Systems: Client-server architecture, Remote Procedure Call (RPC), Remote Method Invocation (RMI), sockets, message passing.

Applications of Distributed Systems: Distributed databases, distributed file systems, web-based applications.

UNIT – II

No. of Hours: 11 Chapter/Book Reference: TB1, TB2

Synchronization and Resource Management: Clock synchronization, mutual exclusion, process coordination, deadlocks, fault tolerance.

Introduction to Cloud Computing: Characteristics, historical evolution, cloud architecture, cloud deployment models (Public, Private, Hybrid, Community), cloud service models (IaaS, PaaS, SaaS).

UNIT – III

No. of Hours: 12 Chapter/Book Reference: TB2, TB3

Virtualization: Concepts, types of virtualizations, virtual machines, hypervisors, advantages of virtualization.

Cloud Platforms and Services: Cloud storage, cloud databases, cloud computing platforms, introduction to AWS, Microsoft Azure and Google Cloud Platform.

UNIT – IV

No. of Hours: 10 Chapter/Book Reference: TB2, TB3

Data Intensive Computing: Introduction to Big Data, MapReduce, cloud-based data processing. Cloud

Applications: E-learning, healthcare, e-commerce, social media, IoT applications. Emerging Trends: Edge computing, serverless computing, containerization, green cloud computing.

TEXT BOOKS:

TB1. George Coulouris, Jean Dollimore, Tim Kindberg and Gordon Blair, "Distributed Systems: Concepts and Design", 6th Edition, Pearson, 2021.

TB2. Rajkumar Buyya, Christian Vecchiola and S. Thamarai Selvi, "Mastering Cloud Computing: Foundations and Applications Programming", 1st Edition, Morgan Kaufmann, 2013.

TB3. Kai Hwang, Geoffrey Fox and Jack Dongarra, "Distributed and Cloud Computing: From Parallel Processing to the Internet of Things", 1st Edition, Morgan Kaufmann, 2012.

REFERENCE BOOKS:

RB1. Andrew S. Tanenbaum and Maarten Van Steen, "Distributed Systems", 4th Edition, Pearson, 2024.

RB2. Thomas Erl, Ricardo Puttini and Zaigham Mahmood, "Cloud Computing: Concepts, Technology & Architecture", Pearson, 2013.

Applicable from Batch Admitted in Academic Session 2024-25 onwards

RB3. Barrie Sosinsky, "Cloud Computing Bible", 2nd Edition, Wiley, 2019.

RB4. Michael J. Fischer, Nancy Lynch and Michael S. Paterson, "Distributed Computing: Principles, Algorithms and Systems", latest available edition

Course Code: BCA 304T

L T C

Course Name: Machine Learning

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

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. To make student able to learn mathematical concepts, and algorithms used in machine learning techniques for solving real world problems and developing new applications based on machine learning.
2. To introduce students to the state-of-the-art concepts and techniques of Machine Learning using Python.

PRE-REQUISITES:

1. Basics of Python Programming.

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Explain machine learning concepts on real world applications and problems
CO2	Analyze and Implement Regression techniques.
CO3	Solve and design solution of Classification problem.
CO4	Understand and implement Unsupervised learning algorithms.
CO5	Interpret various machine learning algorithms in a range of real-world 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	3	3	3	2	4	1	2	1	2
CO2	4	2	4	4	2	4	1	3	1	2
CO3	4	2	4	4	2	4	1	3	1	2

Applicable from Batch Admitted in Academic Session 2024-25 onwards

CO4	4	2	4	4	2	4	1	3	1	2
CO5	4	3	4	4	3	4	2	4	2	3

UNIT – I

No. of Hours: 11 **Chapter/Book Reference: TB1, TB2**

Introduction to Machine Learning, Why Machine learning, Types of Machine Learning Problems, Applications of Machine Learning. Supervised Machine Learning- Regression and Classification. Binary Classifier, Multiclass Classification, Multilabel Classification. Performance Measures- Confusion Matrix, Accuracy, Precision & recall, ROCCurve. Advanced Python- NumPy, Pandas. Python Machine Learning Library Scikit-Learn, Linear Regression with one Variable, Linear Regression with Multiple Variables, Logistic Regression.

UNIT – II

No. of Hours: 11 **Chapter/Book Reference: TB1, TB2**

Supervised learning Algorithms: Decision Trees, Tree pruning, Rule-based Classification, Naïve Bayes, Bayesian Network. Support Vector Machines, k-Nearest Neighbor, Ensemble Learning and Random Forest algorithm.

UNIT – III

No. of Hours: 11 **Chapter/Book Reference: TB1, TB3**

Artificial Neural Networks, HebbNet, Perceptron, Adaline, Multilayer Neural Network, Architecture, Activation Functions, Loss Function, Hyper parameters, Gradient Descent, Backpropagation, Variants of Backpropagation, Avoiding overfitting through Regularization, Applications of Neural Networks.

UNIT – IV

No. of Hours: 11 **Chapter/Book Reference: TB1, TB2, TB3**

Unsupervised learning algorithms: Introduction to Clustering, K-means Clustering, Hierarchical Clustering, Kohonen Self-Organizing Maps. Implementation of Unsupervised algorithms. Feature selection and Dimensionality reduction, Principal Component Analysis.

TEXT BOOKS:

TB1. Aurélien Géron, "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow", 3rd Edition, O'Reilly Media, 2022.

TB2. U. Dinesh Kumar and Manaranjan Pradhan, "Machine Learning using Python", Wiley, 2019.

TB3. Laurence Fausett, "Fundamentals of Neural Networks: Architectures, Algorithms and Applications", Pearson Education, 1st Edition, 1994

REFERENCE BOOKS:

RB1. Tom M. Mitchell, "Machine Learning", 1st Edition, McGraw-Hill Education, 1997.

RB2. Timothy A. Budd, "Exploring Python", 1st Edition, McGraw-Hill Education, 2011.

RB3. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", 1st Edition, O'Reilly Media, 2016

Course Code: BCA 306T

L T C

Course Name: Software Project Management

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. To understand the fundamentals of software project management and software development life cycle.
2. To learn project planning, estimation and scheduling techniques used in software projects.
3. To understand project execution, quality assurance and risk management practices.
4. To develop effective communication and teamwork skills required for software project management.
5. To understand project monitoring, stakeholder management and software project documentation.

PRE-REQUISITES:

1. Fundamentals of Software Engineering.

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Explain the fundamental concepts, phases and activities involved in software project management.
CO2	Apply project planning, estimation and scheduling techniques for software projects.
CO3	Describe project execution, quality assurance, risk management and configuration management practices.
CO4	Demonstrate effective communication, teamwork and stakeholder management in software projects.
CO5	Analyze software project progress using project monitoring, reporting and documentation techniques.

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	2	2	2	2	1	1	2	1	1
CO2	3	3	3	2	3	1	1	2	1	2
CO3	3	3	3	3	3	2	1	2	1	2
CO4	2	2	2	2	2	2	1	3	2	2
CO5	3	3	3	3	3	2	2	2	2	3

UNIT – I

No. of Hours: 10 Chapter/Book Reference: TB1, TB2, TB3

Introduction to Software Project Management: Project management concepts, software project characteristics, project life cycle, Software Development Life Cycle (SDLC), role and responsibilities of the project manager, project stakeholders, project constraints, project feasibility study.

UNIT – II

No. of Hours: 11 Chapter/Book Reference: TB1, TB2

Project Planning and Estimation: Project initiation, project scope, Work Breakdown Structure (WBS), project estimation techniques (COCOMO and Function Point Analysis), scheduling using Gantt Charts and PERT, resource allocation, project budgeting, project documentation, project milestones and deliverables.

UNIT – III

No. of Hours: 11 Chapter/Book Reference: TB1, TB2, TB3

Project Execution and Control: Software development methodologies (Waterfall and Agile), team organization and roles, project monitoring and control, software quality assurance, software testing basics, risk management, change management, configuration management, project performance evaluation.

UNIT – IV

No. of Hours: 10 Chapter/Book Reference: TB1, TB2, TB3

Project Communication and Maintenance: Communication planning, stakeholder identification and management, team collaboration, project reporting, status meetings, software maintenance, project closure, software project documentation, customer relationship management, case studies of software projects.

TEXT BOOKS:

TB1. Kathy Schwalbe, "Information Technology Project Management", 10th Edition, Cengage Learning, 2024.

TB2. Bob Hughes, Mike Cotterell and Rajib Mall, "Software Project Management", 7th Edition, McGraw Hill Education, 2022.

TB3. Roger S. Pressman and Bruce R. Maxim, "Software Engineering: A Practitioner's Approach", 9th Edition, McGraw Hill Education, 2023.

REFERENCE BOOKS:

RB1. Kim Heldman, "Project Management JumpStart", 4th Edition, Wiley, 2018.

RB2. Scott Berkun, "Making Things Happen: Mastering Project Management", Revised Edition, Applicable from Batch Admitted in Academic Session 2024-25 onwards

O'Reilly Media, 2008.

RB3. Andrew Stellman and Jennifer Greene, "Head First PMP", 4th Edition, O'Reilly Media, 2021.

RB4. Timothy C. Lister and Tom DeMarco, "Peopleware: Productive Projects and Teams", 3rd Edition, Addison-Wesley Professional, 2013

Course Code: BCA 312T

L T C

Course Name: Data Visualization & Analytics

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

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. Students will develop relevant programming abilities.
2. Students will demonstrate proficiency with statistical analysis of data.
3. Conduct exploratory data analysis using visualization.
4. Craft visual presentations of data for effective communication.

PRE-REQUISITES:

1. Basics of Python Programming.

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Illustrating the features of Multithreading in python
CO2	Analyzing data using suitable python library.
CO3	Visualizing data using Matplotlib, Seaborn library.
CO4	Develop python applications with database connectivity operations.

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	3	2	4	1	2	1	1
CO2	4	2	4	4	2	4	1	3	1	2
CO3	4	2	4	4	3	4	1	3	2	2
CO4	4	2	4	4	4	4	2	3	2	2

UNIT – I

No. of Hours: 11 **Chapter/Book Reference: TB1, TB2**

Analytics: Basic Nomenclature, Analytics Process Model, Analytics part in different profiles, Analytical
Applicable from Batch Admitted in Academic Session 2024-25 onwards

Model Requirements.

Data Sources for data collection, Sampling and Sampling distribution, Types of data elements, Missing Values, Outlier Detection and Treatment, Standardization using Min/max and z-score, categorization, Segmentation.

UNIT – II

No. of Hours: 11 **Chapter/Book Reference: TB2, TB3**

Statistical Hypothesis Testing, p-Values, Confidence Intervals.

Correlation, Simpson's Paradox, Some Other Correlational Caveats, Correlation and Causation, Correlation Statistics-ANOVA.

UNIT – III

No. of Hours: 11 **Chapter/Book Reference: TB3, TB4**

Data Visualization: Graphs in Python: Line Graph, Bar charts, Pie-charts, Scatter plots, multiple plots, Subplots, Legends, changing figure Size, Styling plots using Matplotlib Library. Functions like relplot(), displot() and catplot (). Seaborn Library: Introduction, Line plot, Distplot, Lmplot, Count plot, Color palettes.

UNIT – IV

No. of Hours: 11 **Chapter/Book Reference: TB5, TB3**

GUI Programming: Creating User-interface, GUI Widgets with Tkinter, Creating Layouts, Check Box, Radio Buttons, List Box, Menus, Menus Options, Dialog Boxes

Database Access: Database Connectivity Operations: Create, Insert, Select, Delete, Drop, Update.

TEXT BOOKS:

TB1. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley, 1st Edition, 2014.

TB2. UEMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley, 1st Edition, 2015.

TB3. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media, 2nd Edition, 2019.

TB4. Wes McKinney, "Python for Data Analysis: Data Wrangling with pandas, NumPy, and Jupyter", O'Reilly Media, 3rd Edition, 2022.

TB5. John E. Grayson, "Python and Tkinter Programming", Manning Publications, 2000.

REFERENCE BOOKS:

RB1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", O'Reilly Media, 2nd Edition, 2015.

RB2. Reema Thareja, "Python Programming using Problem Solving Approach", Oxford University Press, 1st Edition, 2017.

RB3. Tony Gaddis, "Starting Out with Python", Pearson, 5th Edition, 2024.

RB4. Y. Daniel Liang, "Introduction to Programming Using Python", Pearson, 1st Edition, 2013.

RB5. Mark Summerfield, "Programming in Python 3: A Complete Introduction to the Python Language", Addison-Wesley Professional, 2nd Edition, 2010.

RB6. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media, 2nd Edition, 2019.

Course Code: BCA 314T

L T C

Course Name: Deep Learning with Python

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

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. To present the mathematical, statistical and computational challenges of building neural networks
2. To study the concepts of deep learning and important deep learning techniques
3. To introduce important Deep Learning architectures
4. To enable the students to apply deep learning techniques to support real-life applications.

PRE-REQUISITES:

1. Basics of Python Programming.

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Understand the basic concepts of Deep Learning and differentiate between shallow learning and deep learning
CO2	Implement various Deep Learning Models.
CO3	Understand different Deep Learning architectures and training algorithms
CO4	Understanding Dimensionality Reduction and optimization in Deep Learning.
CO5	Understanding and implementing Recurrent Neural Network(RNN).27
CO6	Applying Deep Learning techniques in real life applications such as object detection and analysis

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	3	3	2	4	1	2	1	2
CO2	4	2	4	4	3	4	1	3	1	2
CO3	4	2	4	4	3	4	1	3	1	2

Applicable from Batch Admitted in Academic Session 2024-25 onwards

CO4	4	2	4	4	2	4	1	4	1	2
CO5	4	2	4	4	3	4	1	3	1	2
CO6	4	3	4	4	3	4	1	4	2	3

UNIT – I

No. of Hours: 11 **Chapter/Book Reference: TB1, TB2**

Introduction – Overview of Machine Learning, Introduction to Artificial Neural Network (ANN), Perceptron, training a Neural Network, Activation Functions, Loss Function, Hyperparameters, Gradient Descent, Stochastic Gradient Descent, Backpropagation and regularization, Batch normalization, Building an ANN in Python, Frameworks-TensorFlow, Keras.

UNIT – II

No. of Hours: 12 **Chapter/Book Reference: TB1, TB2**

What is Deep Learning? Deep vs Shallow Networks, Convolution Neural Networks (CNN) –Convolution Layers, Pooling Layer, Flattening, Fully Connected Layers, Softmax and Cross-Entropy, building a CNN in Python, Fully Connected CNN, CNN Architectures – LeNet, AlexNet, ZFNet, GoogLeNet, VGGNet, ResNet, DenseNet, Training a Convnet: weights initialization, batch normalization, hyperparameter optimization.

UNIT – III

No. of Hours: 11 **Chapter/Book Reference: TB1**

Deep Belief Networks, Auto Encoders, Concept of Dimensionality Reduction, Autoencoder, Denoising Autoencoders, Deep Autoencoders, Concept of Reinforcement Learning.

UNIT – IV

No. of Hours: 11 **Chapter/Book Reference: TB2, TB3**

Recurrent Neural Networks (RNN), LSTM, Sequence Prediction and Time Series Forecasting with LSTM, Overview of Object Detection Techniques using Deep Learning, Overview of Transfer Learning.

TEXT BOOKS:

TB1. Adam Gibson and Josh Patterson, Deep Learning: A Practitioner's Approach, O'Reilly Media, First Edition, 2017.

TB2. Mohamed Elgendy, Deep Learning for Vision Systems, Manning Publications, First Edition, 2020.

TB3. Navin Kumar Manaswi, Deep Learning with Applications Using Python, Apress, First Edition, 2018.

REFERENCE BOOKS:

RB1. Cosma Rohilla Shalizi, Advanced Data Analysis from an Elementary Point of View, Cambridge University Press, First Edition, 2015.

RB2. Li Deng and Dong Yu, Deep Learning: Methods and Applications, Now Publishers Inc., First Edition, 2014.

RB3. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press, First Edition, 2016.

RB4. Michael Nielsen, Neural Networks and Deep Learning, Determination Press, First Edition, 2015

RB5. Charu C. Aggarwal, Neural Networks and Deep Learning, Springer, First Edition, 2018.

RB6. M. Arif Wani, Farooq Ahmad Bhat, Saduf Afzal, Asif Iqbal Khan, Advances in Deep Learning, Springer, First Edition, 2020

Course Code: BCA 316T

L T C

Course Name: Web Security

4 0 4

INSTRUCTIONS TO PAPER SETTERS:

4. 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.
5. 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.
6. 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

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

6. To understand and learn web application and its Architecture.
7. Students will be able to develop awareness regarding Cyber laws and crimes.
8. Students will be able to understand the internet and web application security issues.
9. Students will be able to learn and understand wireless network security issues.
10. To learn and understand the concept of web services, ajax and other technology which are helpful.

PRE-REQUISITES:

4. Computer Network
5. C/C++/HTML (Programming Knowledge of C/C++/HTML/JS)

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Define overall web security infrastructure, components, issues and basic concept etc.
CO2	Describe briefly various types of security like social media security, email security, web application and web services security etc. Explain Web related services.
CO3	Apply and implementing various vulnerabilities for Ethically hacking a websites / Web Applications.
CO4	Focusing Penetration Testing, Computer Forensics.
CO5	Evaluate different web security algorithms with the help of program.
CO5	Design and implement XSS attacks, SQL Injection attack, password hashing and cracking

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	2	2	2	2	1	1	1	1	1
CO2	3	3	2	2	3	1	1	2	1	2
CO3	3	3	3	3	3	2	1	2	1	2
CO4	3	3	3	3	2	2	1	2	2	2
CO5	3	3	3	3	3	2	2	2	2	3

UNIT – I

No. of Hours: 12 Chapter/Book Reference: TB1, TB2

Components of Internet, Weak points of Internet, HTTP vs HTTPS, Overview of web authentication technologies, Web application architecture, Recent attack trends, Types of Web Security, Web infrastructure security/Web application firewalls, managing configurations for web apps, Techniques of Web Hacking, Methods of Attacking users, Importance of Web Application Security, Web Application Security vs Network Security. Social Media security - What is Online Social Networks, data collection from social networks, challenges, opportunities, and pitfalls in online social networks, APIs Collecting data from Online social media. Trust, credibility, and reputations in social systems.

UNIT-II

No. of Hours: 11 Chapter/Book Reference: TB1, TB2

Internet and Web Application Security: Email security (PGP and SMIME), Web Security: Web authentication, Injection Flaws, Programming Bugs and Malicious code, XSS and SQL Injection, Memory corruption exploits, Web Browser Security, E-Commerce Security

UNIT-III

No. of Hours: 11 Chapter/Book Reference: TB1, TB2

Wireless Network Security: Components, Security issues, Securing a Wireless Network, Mobile Security Management: Disaster Recovery, Ethical Hacking, Penetration Testing, Computer Forensics, Cyber laws and crime, Security Audit and Investigation, Cyber Security Solutions

UNIT-IV

No. of Hours: 10 Chapter/Book Reference: TB1, TB2

Web services overview, Honeypot, XML security, AJAX attack trends and common attacks, REST security, Content Security Policy Serialization security, Clickjacking, DNS rebinding, HTML5 security, Logging collection and analysis for web apps, Security testing, IPv6 impact on web security

TEXT BOOKS:

TB1. Joel Scambray, Mike Shema and Caleb Sima, "Hacking Exposed Web Applications: Web Application Security Secrets and Solutions", 3rd Edition, McGraw-Hill Education, 2010. (Latest edition available.)

TB2. Rafay Baloch, "Ethical Hacking and Penetration Testing Guide", CRC Press, 2015.

TB3. Georgia Weidman, "Penetration Testing: A Hands-On Introduction to Hacking", 2nd Edition, No Starch Press, 2021.

REFERENCE BOOKS:

RB1. Dafydd Stuttard and Marcus Pinto, "The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws", 2nd Edition, Wiley, 2011.

RB2. EC-Council, "Computer Forensics: Investigating Network Intrusions and Cyber Crime", 2nd Edition, Cengage Learning, 2010.

Applicable from Batch Admitted in Academic Session 2024-25 onwards

- RB3.** John W. Rittinghouse and William M. Hancock, "Cyber Security Operations Handbook", Elsevier, 2020.
- RB4.** Deborah G. Johnson, "Computer Ethics", 4th Edition, Pearson Education, 2009.
- RB5.** Ernest A. Kallman and John P. Grillo, "Ethical Decision Making and Information Technology: An Introduction with Cases", 6th Edition, McGraw-Hill Education, 2016.

Course Code: BCA 318T

L T C

Course Name: Mobile Application Development

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

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. Identify various concepts of mobile application programming that make it unique from programming for other platforms.
2. To help learner to gain a basic understanding of Android application development.
3. Program mobile applications for the Android operating system that use basic and advanced phone features, and deploy applications to the Android marketplace for distribution.

PRE-REQUISITES:

1. Java Programming.
2. Programming fundamental

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Recognize the concept of application development for mobile devices.
CO2	Understand the basic technologies used by the Android platform.
CO3	Recognize and use Android Environment Emulator and Application life cycle
CO4	Develop mobile applications for the Android operating system that use basic and advance phone features
CO5	Deploy applications to the Android marketplace for distribution

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	3	2	2	4	1	1	1	2
CO2	4	2	3	3	3	4	1	2	1	2
CO3	4	2	4	4	3	4	1	2	2	2

Applicable from Batch Admitted in Academic Session 2024-25 onwards

CO4	4	2	4	4	4	4	2	3	2	2
CO5	4	3	4	4	4	4	2	3	2	3

UNIT – I

No. of Hours: 11 **Chapter/Book Reference: TB1, TB2**

Introduction: Brief history of mobile applications, Different types of mobile applications, Brief history of Android, Introduction to Android Development Environment, Android Application Design Essentials: Anatomy of an Android applications, Creating First Android Application, Creating Android project , Project organization, Setting up real Android device , Setting up Android emulator, Developing simple user interface , Running your first application Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.

UNIT – II

No. of Hours: 11 **Chapter/Book Reference: TB1, TB2**

User Interface in Android: Adaptive and responsive user interfaces, User Input Controls, Menus, Screen Navigation, RecyclerView, Drawables, Themes and Styles, Fragments Fragment Life Cycle, Introduction to Material Design. Android Application Components: App Widgets, Processes and Threads, User Interface Components, Views and layouts, Input controls, Input Events, Settings, Dialogs, Menus, Notifications, Toasts, Testing the user interface.

UNIT – III

No. of Hours: 11 **Chapter/Book Reference: TB1, TB2**

Background tasks: AsyncTask, AsyncTask Loader, Connecting App to Internet, Broadcast receivers, Services, Notifications, Alarm managers. Sensor, Location and Maps: Sensor Basic, Motion and Position Sensors, Location services, Google maps API, Google Places API.

UNIT – IV

No. of Hours: 11 **Chapter/Book Reference: TB1, TB2**

Working with data in Android: Shared Preferences, App Setting, SQLite primer, Store data using SQLite database, Content Providers, Content Resolver, Loader Publishing Your App: Preparing for publishing, Signing and preparing the graphics, publishing to the Android Market Using Common Android APIs: Using Android Data and Storage APIs, Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

TEXT BOOKS:

TB1. Lauren Darcey and Shane Conder, Android Wireless Application Development, Pearson Education.

TB2. Wei-Meng Lee, Beginning Android Application Development: Android 6 Edition, Wiley India Pvt. Ltd., 2015.

TB3. J. F. DiMarzio, Android: A Programmer's Guide, McGraw-Hill Education (India) Private Limited, 2008

REFERENCE BOOKS:

RB1. aul Deitel, Harvey Deitel, Abbey Deitel and Michael Morgano, Android for Programmers: An App-Driven Approach, Pearson Education, 2015.

RB2. Wei-Meng Lee, Beginning Android Application Development, Wiley Publishing, 2015.

Course Code: BCA 320
Course Name: Minor Project

L T/P C
0 14 6

PROJECT REPORT

All the students are required to submit a report based on the project work done by them during the sixth semester.

SYNOPSIS (SUMMARY/ABSTRACT) :

All students must submit a summary/abstract separately with the project report. Summary, preferably, should be of about 3-4 pages. The content should be as brief as is sufficient enough to explain the objective and implementation of the project that the candidate is going to take up. The write up must adhere to the guidelines and should include the following:

- Name / Title of the Project
- Statement about the Problem
- Why is the particular topic chosen?
- Objective and scope of the Project
- Methodology (including a summary of the project)
- Hardware & Software to be used
- Testing Technologies used
- What contribution would the project make?

TOPIC OF THE PROJECT- This should be explicitly mentioned at the beginning of the Synopsis. Since the topic itself gives a peep into the project to be taken up, candidate is advised to be prudent on naming the project. This being the overall impression on the future work, the topic should corroborate the work.

OBJECTIVE AND SCOPE: This should give a clear picture of the project. Objective should be clearly specified. What the project ends up to and in what way this is going to help the end user has to be mentioned.

PROCESS DISCRIPTION: The process of the whole software system proposed, to be developed, should be mentioned in brief. This may be supported by DFDs / Flowcharts to explain the flow of the information.

RESOURCES AND LIMITATIONS: The requirement of the resources for designing and developing the proposed system must be given. The resources might be in form of the hardware/software or the data from the industry. The limitation of the proposed system in respect of a larger and comprehensive system must be given.

CONCLUSION: The write-up must end with the concluding remarks- briefly describing innovation in the approach for implementing the Project, main achievements and also any other important feature

Applicable from Batch Admitted in Academic Session 2024-25 onwards

that makes the system stand out from the rest.

The following suggested guidelines must be followed in preparing the Final Project Report:

Good quality white A4 size paper should be used for typing and duplication. Care should be taken to avoid smudging while duplicating the copies.

Page Specification: (Written paper and source code)

- Left margin - 3.0 cms
- Right margin- 2.0cms
- Top margin 2.54cms
- Bottom margin 2.54cms
- Page numbers - All text pages as well as Program source code listing should be numbered at the bottom center of the pages.

Normal Body Text: Font Size: 12, Times New Roman, Double Spacing, Justified. 6 point above and below para spacing

Paragraph Heading Font Size: 14, Times New Roman, Underlined, Left Aligned. 12 point above & below spacing.

Chapter Heading Font Size: 20, Times New Roman, Centre Aligned, 30 point above and below spacing.

Coding Font size :10, Courier New, Normal.

Submission of Project Report to the University: The student will submit his/her project report in the prescribed format.

The Project Report should include:

1. One copy of the summary/abstract.
2. One hard Copy of the Project Report.
3. The Project Report may be about 75 pages (excluding coding).

FORMAT OF THE STUDENT PROJECT REPORT ON COMPLETION OF THE PROJECT

I. Cover Page as per format

II. Acknowledgement

III. Certificate of the project guide

IV. Synopsis of the Project

V. Main Report

i. Objective & Scope of the Project

ii. Theoretical Background Definition of Problem

iii. System Analysis & Design vis-a-vis User Requirements

iv. System Planning (PERT Chart)

v. Methodology adopted, System Implementation & Details of Hardware & Software used System Maintenance & Evaluation

vi. Detailed Life Cycle of the Project

a. ERD, DFD

Applicable from Batch Admitted in Academic Session 2024-25 onwards

- b. Input and Output ScreenDesign
- c. Processinvolved
- d. Methodology usedtesting
- e. Test Report, Printout of the Report & CodeSheet
- VI. Coding and Screenshots of the project
- VII. Conclusion and Future Scope
- VIII. References

Formats of various certificates and formatting styles are as:

1. Certificate from the Guide
CERTIFICATE This is to certify that this project entitled “ xxxxxx
xxxxxx xxxxx xxxx xxxx xxx” submitted in partial fulfillment of the degree of Bachelor of
Computer Applications to the “xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx” through xxxxxx xxxxx
doneby Mr./Ms.,RollNo..... is an is an authentic
work carried out by him/heratunder my guidance.
The matter embodied in this project work has not been submitted earlier for award of any degree
to the best of my knowledge andbelief.

Signature of the student

Signature of the Guide

2. Project Report Cover PageFormat:

Title of the Project/report
(Times New Roman, Italic, Font size = 24)

**Submitted in partial fulfilment of the requirements for the award of the
degree of**

Bachelor of Computer Applications
(Bookman Old Style, 16 point, centre)

Submitted to:
(Guide Name)

Submitted by:
(Student'sname)
Roll No
College Name

3. Self-Certificate by the students

SELF CERTIFICATE

This is to certify that the dissertation/project report entitled “.....” is
done by me is an authentic work carried out for the partial fulfilment of the requirements for the
Applicable from Batch Admitted in Academic Session 2024-25 onwards

award of the degree of Bachelor of Computer Applications under the guidance of.....
The matter embodied in this project work has not been submitted earlier for award of any degree or diploma to the best of my knowledge and belief.

Signature of the student

Name of the Student

Roll No.

4. ACKNOWLEDGEMENTS

In the “Acknowledgements” page, the writer recognizes his indebtedness for guidance and assistance of the thesis adviser and other members of the faculty. Courtesy demands that he also recognizes specific contributions by other persons or institutions such as libraries and research foundations. Acknowledgements should be expressed simply, tastefully, and tactfully.

Course Code: BCA 302P **L P C**
Course Name: Distributed systems and Cloud Computing Lab **0 2 1**

INSTRUCTIONS

1. The course objectives and course outcomes are identical to that of BCA 302T 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

Course Code: BCA 304P **L P C**
Course Name: Machine Learning Lab **0 2 1**

INSTRUCTIONS

1. The course objectives and course outcomes are identical to that of BCA 304T 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

Course Code: BCA 306P **L P C**
Course Name: Software Project Management Lab **0 2 1**

INSTRUCTIONS

1. The course objectives and course outcomes are identical to that of BCA 306T 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

Course Code: BCA 312P **L P C**
Course Name: Data Visualization & Analytics Lab **- 4 2**

INSTRUCTIONS

1. The course objectives and course outcomes are identical to that of BCA 312T 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

Course Code: BCA 314P **L P C**
Course Name: Deep Learning with Python Lab **- 4 2**

INSTRUCTIONS

1. The course objectives and course outcomes are identical to that of BCA 314T 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 316P
Course Name: Web Security Lab

L P C
- 4 2

INSTRUCTIONS

1. The course objectives and course outcomes are identical to that of BCA 316T 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 318P
Course Name: Mobile Application Development Lab

L P C
- 4 2

INSTRUCTIONS

1. The course objectives and course outcomes are identical to that of BCA 318T 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

SEVENTH SEMESTER SYLLABUS

Course Code: BCA 401T

L T C

Course Name: E-Commerce

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 2.5 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 12.5 marks, including its sub parts, if any.
3. Examiners are requested to go through the Course Outcomes(CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy(BT), 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. To learn and understand the basic nature of e-commerce.
2. To study how the internet and web support e-commerce.
3. To explain how to use technologies to build e-commerce websites.
4. To make students aware of the business environment associated with e-commerce.

PRE-REQUISITES:

1. Basic Knowledge of computers and business concepts.
2. Basic knowledge of the Internet.

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Understand the framework and business models of E-commerce.
CO2	Explain the concept of network infrastructure and gain knowledge about mobile commerce.
CO3	Demonstrate the process of secure electronic transactions for E-commerce.
CO4	Analyze various e-commerce secure payment gateway.
CO5	Evaluate Internet banking platform to work with E-commerce infrastructure.
CO6	Implement ecommerce website for online business.

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	4	1	1	-	-	-	-	2	2

Applicable from Batch Admitted in Academic Session 2024-25 onwards

CO2	2	3	1	2	1	2	4	-	1	1
CO3	2	3	2	2	2	2	4	3	1	2
CO4	1	3	2	3	2	2	3	3	1	2
CO5	1	4	2	3	2	2	3	2	2	2
CO6	2	3	4	4	4	3	2	3	2	1

UNIT – I

No. of Hours: 10 Chapter/Book Reference: TB1

Introduction: Definition of Electronic Commerce, Evolution of e-commerce, E-Commerce & E Business, Unique features of e-commerce, applications of E-Commerce, advantages and disadvantages of E-commerce, Types of e-commerce: B2B, B2C, C2C, M-commerce, Social Commerce.

E-commerce infrastructure: Technological building blocks: Internet, web and mobile applications

UNIT – II

No. of Hours: 10 Chapter/Book Reference: TB1, RB1, RB3

Building an e-commerce presence: Planning, System Analysis, Design, Choosing Software, Hardware, Other Ecommerce site tools: Tools For website design, Tools for SEO, Interactivity and active contents (Server-side scripting)

Important Components of E-commerce website: Product Cataloging, Product Listing Page, Product description Page, Cart building and Checkout, Third party integrations: Payment systems, Data Layer Integrations for analytics, Customer support integration, Order tracking, Shipping, return and cancellation.

New Technologies for E-commerce: Chatbots, Recommendation systems (Personalization), Smart Search, Product Comparison, Augmented reality, Big data, Cloud computing

UNIT – III

No. of Hours: 10 Chapter/Book Reference: TB2, RB1, RB3

Electronic Payment Systems- Overview of Electronics payments, electronic Fund Transfer, Digital Token based Electronics payment System, Smart Cards, Credit Cards, Debit Cards, Emerging financial Instruments Smartphone wallet, Social / Mobile Peer to Peer Payment systems, Digital Cash and Virtual Currencies, Online Banking, Payment Gateway, Electronic Billing Presentment and Payment.

UNIT – IV

No. of Hours: 10 Chapter/Book Reference: TB1, RB4

Security Threats and Issues: Cyber-crimes, Credit card frauds/theft, Identity fraud, spoofing, sniffing, DOS and DDOS attacks, social network security Issues, Mobile Platform Security issues, Cloud security issues

Technology Solutions: Encryption: Secret Key Encryption, Public Key Encryption, Digital Certificates and public key infrastructure

Securing channels: Secured Socket Layer (SSL), Transport Layer Security (TLS), Virtual Private Network (VPN), Protecting Networks: Firewalls, Proxy Servers, Intrusion detection and protection systems, Anti-Virus software.

TEXT BOOKS:

TB1. Kenneth C. Laudon, Carol Guercio Traver, E-Commerce: Business, Technology, Society, 18th Edition, Pearson, 2024

TB2. K. K. Bajaj and Debjani Nag, E-Commerce: The Cutting Edge of Business, 3rd Edition, McGraw Hill Education, 2021

TB3. Efraim Turban, David King, Jae Kyu Lee, Ting-Peng Liang and Deborrah C. Turban, Electronic Commerce: A Managerial and Social Networks Perspective, 9th Edition, Springer, 2018.

REFERENCE BOOKS:

RB1. Margaret Levine Young, The Complete Reference: Internet, 7th Edition, McGraw Hill Education, 2014.

Applicable from Batch Admitted in Academic Session 2024-25 onwards

RB2. C. S. V. Murthy, E-Commerce: Concepts, Models, Strategies, 2nd Edition, Himalaya Publishing House, 2021.

RB3. Ravi Kalakota and Andrew B. Whinston, Frontiers of Electronic Commerce, Pearson Education, 1997.

RB4. William Stallings, Network Security Essentials: Applications and Standards, 7th Edition, Pearson, 2023.

Course Code: BCA 403T
Course Name: Internet of Things (IOT)

L T C
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 2.5 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 12.5 marks, including its sub parts, if any.
3. Examiners are requested to go through the Course Outcomes(CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy(BT), 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

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. To learn and understand the concept of Internet of Things (IOT).
2. To study the constituent components of Internet of Things.
3. To design and develop IoT applications using different, Sensors/actuators.
4. To seek working knowledge of Arduino, Raspberry pi Boards and to develop cloud based IOT projects.

PRE-REQUISITES:

1. Basic Programming Knowledge
2. Use of Internet

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Understand the architecture and the functional blocks of Internet of Things.
CO2	Explain the concepts of Internet of Things and gain knowledge to design IoT applications.
CO3	Demonstrate the process of capturing and analyzing data in Internet of Things.
CO4	Examine the various components involved in IoT design methodology.
CO5	Evaluate an IoT device to work with a Cloud Computing infrastructure.
CO6	Implement IoT protocols for communication.

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	2	2	2	1	3	3	1	1	1
CO2	2	2	3	3	2	4	2	2	2	1
CO3	2	2	3	3	2	4	3	3	2	1
CO4	2	2	3	3	3	4	3	2	1	1
CO5	2	2	3	4	3	4	3	3	2	1
CO6	2	2	4	4	3	4	4	3	2	1

Applicable from Batch Admitted in Academic Session 2024-25 onwards

UNIT-I

No. of Hours: 10 Book Reference: TB1 ,TB2

Internet of Things (IoT): Vision, Definition, Conceptual framework, Architectural view, Technology behind IoT, Sources of the IoT, M2M Communication, IoT examples.

Design Principles for Connected Devices: IoT/M2M systems layers and design standardization, Communication technologies, Data enrichment and consolidation, Ease of designing and affordability.

UNIT-II

No. of Hours: 10 Book Reference: TB1, TB2 ,TB4

Hardware for IoT: Sensors, Digital sensors, Actuators, Radio frequency identification (RFID) technology, Wireless sensor networks, Participatory sensing technology.

Embedded Platforms for IoT: Embedded computing basics, Overview of IOT supported hardware platforms such as Arduino, NetArduino, Raspberry Pi, Beagle Bone, Intel Galileo boards and ARM cortex.

UNIT-III

No. of Hours: Book Reference: TB1, TB2, TB4

Network & Communication Aspects in IoT: Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination Programming the Arduino: Arduino platform boards anatomy, Arduino IDE, Coding using emulator, Using libraries, Additions in Arduino, Programming the Arduino for IoT.

UNIT-IV

No. of Hours: 11 Book Reference: TB1, TB3, RB1

Challenges in IoT Design Challenges: Development challenges, Security challenges, Other challenges.

IoT Applications: Smart metering, E-health, City automation, Automotive applications, Home automation, Smart cards, Communicating data with H/W units, Mobiles, Tablets, Designing of smart street lights in smart city.

TEXT BOOKS:

TB1. Rajan Gupta and Supriya Madan, Fundamentals of IoT, 2nd Edition, BPB Publications, 2025

TB2. Olivier Hersent, David Boswarthick and Omar Elloumi, The Internet of Things: Key Applications and Protocols, 3rd Edition, Wiley, 2023.

TB3. Jeeva Jose, Internet of Things, 2nd Edition, Khanna Publishing House, 2022.

TB4. Michael Miller, The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World, 1st Edition, Pearson Education, 2015.

TB5. Raj Kamal, Internet of Things: Architecture and Design Principles, 3rd Edition, McGraw Hill Education, 2024

REFERENCE BOOKS:

RB1. Arshdeep Bahga and Vijay Madiseti, Internet of Things: A Hands-on Approach, 2nd Edition, Universities Press, 2024

RB2. Pethuru Raj and Anupama C. Raman, The Internet of Things: Enabling Technologies, Platforms, and Use Cases, 2nd Edition, CRC Press, 2023.

Course Code: BCA 405
Course Name: Major Project-1

L T/P C
0 12 6

PROJECT REPORT

All the students are required to submit a report based on the project work done by them during the seventh semester.

SYNOPSIS (SUMMARY/ABSTRACT) :

All students must submit a summary/abstract separately with the project report. Summary, preferably, should be of about 3-4 pages. The content should be as brief as is sufficient enough to explain the objective and implementation of the project that the candidate is going to take up. The write up must adhere to the guidelines and should include the following:

- Name / Title of the Project
- Statement about the Problem
- Why is the particular topic chosen?
- Objective and scope of the Project
- Methodology (including a summary of the project)
- Hardware & Software to be used
- Testing Technologies used
- What contribution would the project make?

TOPIC OF THE PROJECT- This should be explicitly mentioned at the beginning of the Synopsis. Since the topic itself gives a peep into the project to be taken up, candidate is advised to be prudent on naming the project. This being the overall impression on the future work, the topic should corroborate the work.

OBJECTIVE AND SCOPE: This should give a clear picture of the project. Objective should be clearly specified. What the project ends up to and in what way this is going to help the end user has to be mentioned.

PROCESS DISCRIPTION: The process of the whole software system proposed, to be developed, should be mentioned in brief. This may be supported by DFDs / Flowcharts to explain the flow of the information.

RESOURCES AND LIMITATIONS: The requirement of the resources for designing and developing the proposed system must be given. The resources might be in form of the hardware/software or the data from the industry. The limitation of the proposed system in respect of a larger and comprehensive system must be given.

CONCLUSION: The write-up must end with the concluding remarks- briefly describing innovation in the approach for implementing the Project, main achievements and also any other important feature

Applicable from Batch Admitted in Academic Session 2024-25 onwards

that makes the system stand out from the rest.

The following suggested guidelines must be followed in preparing the Final Project Report:

Good quality white A4 size paper should be used for typing and duplication. Care should be taken to avoid smudging while duplicating the copies.

Page Specification: (Written paper and source code)

- Left margin - 3.0 cms
- Right margin- 2.0cms
- Top margin 2.54cms
- Bottom margin 2.54cms
- Page numbers - All text pages as well as Program source code listing should be numbered at the bottom center of the pages.

Normal Body Text: Font Size: 12, Times New Roman, Double Spacing, Justified. 6 point above and below para spacing

Paragraph Heading Font Size: 14, Times New Roman, Underlined, Left Aligned. 12 point above & below spacing.

Chapter Heading Font Size: 20, Times New Roman, Centre Aligned, 30 point above and below spacing.

Coding Font size :10, Courier New, Normal.

Submission of Project Report to the University: The student will submit his/her project report in the prescribed format.

The Project Report should include:

1. One copy of the summary/abstract.
2. One hard Copy of the Project Report.
3. The Project Report may be about 75 pages (excluding coding).

FORMAT OF THE STUDENT PROJECT REPORT ON COMPLETION OF THE PROJECT

I. Cover Page as per format

II. Acknowledgement

III. Certificate of the project guide

IV. Synopsis of the Project

V. Main Report

i. Objective & Scope of the Project

ii. Theoretical Background Definition of Problem

iii. System Analysis & Design vis-a-vis User Requirements

iv. System Planning (PERT Chart)

v. Methodology adopted, System Implementation & Details of Hardware & Software used System Maintenance &Evaluation

vi. Detailed Life Cycle of the Project

a. ERD, DFD

Applicable from Batch Admitted in Academic Session 2024-25 onwards

- b. Input and Output Screen Design
- c. Process involved
- d. Methodology used testing
- e. Test Report, Printout of the Report & Code Sheet
- VI. Coding and Screenshots of the project
- VII. Conclusion and Future Scope
- VIII. References

Formats of various certificates and formatting styles are as:

5. Certificate from the Guide
CERTIFICATE This is to certify that this project entitled “ xxxxxx
xxxxxx xxxxxx xxxxx xxxxx xxx” submitted in partial fulfillment of the degree of Bachelor of
Computer Applications to the “xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx” through xxxxxx xxxxxx
doneby Mr./Ms.,Roll No..... is an is an authentic
work carried out by him/her atunder my guidance.
The matter embodied in this project work has not been submitted earlier for award of any degree
to the best of my knowledge and belief.

Signature of the student

Signature of the Guide

6. Project Report Cover Page Format:

Title of the Project/report
(Times New Roman, Italic, Font size = 24)

**Submitted in partial fulfilment of the requirements for the award of the
degree of**

Bachelor of Computer Applications
(Bookman Old Style, 16 point, centre)

Submitted to:
(Guide Name)

Submitted by:
(Student's name)
Roll No
College Name

7. Self-Certificate by the students

SELF CERTIFICATE

This is to certify that the dissertation/project report entitled “.....” is
done by me is an authentic work carried out for the partial fulfilment of the requirements for the
Applicable from Batch Admitted in Academic Session 2024-25 onwards

award of the degree of Bachelor of Computer Applications under the guidance of.....
The matter embodied in this project work has not been submitted earlier for award of any degree or diploma to the best of my knowledge and belief.

Signature of the student

Name of the Student

Roll No.

8. ACKNOWLEDGEMENTS

In the “Acknowledgements” page, the writer recognizes his indebtedness for guidance and assistance of the thesis adviser and other members of the faculty. Courtesy demands that he also recognizes specific contributions by other persons or institutions such as libraries and research foundations. Acknowledgements should be expressed simply, tastefully, and tactfully.

Course Code: BCA 401P
Course Name: E-Commerce Lab

L P C
- 2 1

INSTRUCTIONS

3. The course objectives and course outcomes are identical to that of BCA 401T as this is the practical component of the corresponding theory paper.
4. The practical list shall be notified by the teacher in the first week of the class commencement

Course Code: BCA 403P
Course Name: Internet Of Things (IOT) Lab

L P C
- 2 1

INSTRUCTIONS

3. The course objectives and course outcomes are identical to that of BCA 403T as this is the practical component of the corresponding theory paper.
4. The practical list shall be notified by the teacher in the first week of the class commencement

EIGHTH SEMESTER SYLLABUS

PROJECT REPORT

All the students are required to submit a report based on the project work done by them during the eight semester.

SYNOPSIS (SUMMARY/ABSTRACT):

All students must submit a summary/abstract separately with the project report. Summary, preferably, should be of about 3-4 pages. The content should be as brief as is sufficient enough to explain the objective and implementation of the project that the candidate is going to take up. The write up must adhere to the guidelines and should include the following:

- Name / Title of the Project
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- Testing Technologies used
- What contribution would the project make?

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OBJECTIVE AND SCOPE: This should give a clear picture of the project. Objective should be clearly specified. What the project ends up to and in what way this is going to help the end user has to be mentioned.

PROCESS DISCRIPTION: The process of the whole software system proposed, to be developed, should be mentioned in brief. This may be supported by DFDs / Flowcharts to explain the flow of the information.

RESOURCES AND LIMITATIONS: The requirement of the resources for designing and developing the proposed system must be given. The resources might be in form of the hardware/software or the data from the industry. The limitation of the proposed system in respect of a larger and comprehensive system must be given.

CONCLUSION: The write-up must end with the concluding remarks- briefly describing innovation in the approach for implementing the Project, main achievements and also

any other important feature that makes the system stand out from the rest.

The following suggested guidelines must be followed in preparing the Final Project Report:

Good quality white A4 size paper should be used for typing and duplication. Care should be taken to avoid smudging while duplicating the copies.

Page Specification: (Written paper and source code)

- Left margin - 3.0 cms
- Right margin- 2.0cms
- Top margin 2.54cms
- Bottom margin 2.54cms
- Page numbers - All text pages as well as Program source code listing should be numbered at the bottom center of the pages.

Normal Body Text: Font Size: 12, Times New Roman, Double Spacing, Justified. 6 point above and below para spacing

Paragraph Heading Font Size: 14, Times New Roman, Underlined, Left Aligned. 12 point above & below spacing.

Chapter Heading Font Size: 20, Times New Roman, Centre Aligned, 30 point above and below spacing.

Coding Font size :10, Courier New, Normal.

Submission of Project Report to the University: The student will submit his/her project report in the prescribed format.

The Project Report should include:

1. One copy of the summary/abstract.
2. One hard Copy of the Project Report.
3. The Project Report may be about 75 pages (excluding coding).

FORMAT OF THE STUDENT PROJECT REPORT ON COMPLETION OF THE PROJECT

I. Cover Page as per format

II. Acknowledgement

III. Certificate of the project guide

IV. Synopsis of the Project

V. Main Report

i. Objective & Scope of the Project

ii. Theoretical Background Definition of Problem

iii. System Analysis & Design vis-a-vis User Requirements

iv. System Planning (PERT Chart)

v. Methodology adopted, System Implementation & Details of Hardware & Software used System Maintenance &Evaluation

vi. Detailed Life Cycle of the Project

Applicable from Batch Admitted in Academic Session 2024-25 onwards

- a. ERD, DFD
- b. Input and Output Screen Design
- c. Process involved
- d. Methodology used testing
- e. Test Report, Printout of the Report & Code Sheet
- VI. Coding and Screenshots of the project
- VII. Conclusion and Future Scope
- VIII. References

Formats of various certificates and formatting styles are as:

9. Certificate from the Guide CERTIFICATE This is to certify that this project entitled “ xxxxxx xxxxx xxxxx xxxx xxxx xxx” submitted in partial fulfillment of the degree of Bachelor of Computer Applications to the “xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx” through xxxxxx xxxxx doneby Mr./Ms.,Roll No..... is an authentic work carried out by him/her atunder my guidance. The matter embodied in this project work has not been submitted earlier for award of any degree to the best of my knowledge and belief.

Signature of the student

Signature of the Guide

10. Project Report Cover Page Format:

Title of the Project/report
(Times New Roman, Italic, Font size = 24)

**Submitted in partial fulfilment of the requirements for the award of the
degree of
Bachelor of Computer Applications
(Bookman Old Style, 16 point, centre)**

**Submitted to:
by:
(Guide Name)**

Submitted

(Student's name)
Roll No
College Name

11. Self-Certificate by the students

SELF CERTIFICATE

This is to certify that the dissertation/project report entitled “.....” is done by me is an authentic work carried out for the partial fulfilment of the requirements for the award of the degree of Bachelor of Computer Applications under the guidance of..... The matter embodied in this project work has not been submitted earlier for award of any degree or diploma to the best of my knowledge and belief.

Signature of the student

Name of the Student

Roll No.

12. ACKNOWLEDGEMENTS

In the “Acknowledgements” page, the writer recognizes his indebtedness for guidance and assistance of the thesis adviser and other members of the faculty. Courtesy demands that he also recognizes specific contributions by other persons or institutions such as libraries and research foundations. Acknowledgements should be expressed simply, tastefully, and tactfully.