Scheme of Studies and Examinations, and the Syllabi

for

Under Graduate Degree Programme

Bachelor of Computer Applications
(Artificial Intelligence and Machine Learning)

(in phased manner)

as per NEP-2020 guidelines

With Multiple Entry-Exit and Internship
w.e.f. Academic Session 2025-26

DEPARTMENT OF COMPUTER APPLICATIONS - UG

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Vision of the Department

To be acknowledged as a center of excellence for academic eminence in developing competent, ethical, innovative, team-oriented Computer Application Professionals who can make a global impact on industry, environment, and the society at large.

Mission of the Department

M1: Equip students with knowledge and industry-oriented practical skills in Computer Applications.
M2: To provide a conducive environment for promoting research and innovation, imbibing ethics and values and instilling teamwork in students
M3: Foster analytical mindset, soft skills and competence in students to provide sustainable solutions for the real-life problems.
M4: Facilitate industrial and institutional linkages globally to provide experiential learning opportunities in emerging technologies.

Program Educational Objectives (PEOs)

The Graduate of the program will be able to:
PEO1: To exhibit analytical abilities practical and soft skills, competence, experiential learning and innovation.
PEO2: To demonstrate team work and supportive roles in agile work environment with ethics and values in their profession
PEO3: To excel in careers in the emerging technologies of computer applications, higher education and entrepreneurship.

Program Outcomes (POs)

PO1	Foundation Knowledge	Apply knowledge of mathematics, programming logic and coding fundamentals for solution architecture and problem solving.
PO2	Problem Analysis	Identify, review, formulate and analyse problems for primarily focussing on customer requirements using critical thinking frameworks.
PO3	Development of Solutions	Design, develop and investigate problems with as an innovative approach for solutions incorporating ESG/SDG goals.
PO4	Modern Tool Usage	Select, adapt and apply modern computational tools such as development of algorithms with an understanding of the limitations including human biases.
PO5	Individual and Teamwork	Function and communicate effectively as an individual or a team leader in diverse and multidisciplinary groups. Use methodologies such as agile.
PO6	Project Management and Finance	Use the principles of project management such as scheduling, work breakdown structure and be conversant with the principles of Finance for profitable project management.
PO7	Ethics	Commit to professional ethics in managing software projects with financial aspects. Learn to use new technologies for cyber security and insulate customers from malware.
PO8	Life-long learning	Change management skills and the ability to learn, keep up with contemporary technologies and ways of working.

Program Specific Outcomes (PSOs)

PSO1: Ability to design, implement and maintain real-world applications using artificial intelligence and machine learning techniques

PSO2: Ability to use state-of-the-art machine learning tools to optimize applications in agreement with ethical standards and societal responsibilities.

Scheme of Studies and Examinations (w.e.f. Session 2025 - 2026)
Bachelor of Computer Applications (AIML) Semester – I

Course Code	Course Title	Period(s) L	Period(s) T	Period(s) P	Hours/ Week	Credit (s)	Continuous Internal Examination (CIE) Max	Semester End Examination (SEE) Max	Total Marks (CIE+SEE) Max	Duration of Exam (Hours)
Core Course (CC)										
BCA-101A	Foundations of Computer Science	3	0	0	3	3	40	60	100	3
BCA-121A	Office Automation Tools	3	0	0	3	3	40	60	100	3
ASH-MAT-121A	Mathematics for Computing - I	2	0	0	2	2	40	60	100	3
Value Added Course (VAC)										
BT-CE-104A	Environmental Studies	2	0	0	2	2	40	60	100	3
Skill Enhancement Course (SEC)										
BCA-105A	Problem Solving through C	3	0	0	3	3	40	60	100	3
Ability Enhancement Course (AEC)										
ASH-HUM-117A	English Language and Communication-1	2	0	0	2	2	40	60	100	3
Multi Disciplinary Course (MDC)										
BBA-215A	Digital Marketing	2	0	0	2	2	40	60	100	3
Practicum Course (PC)										
BCA-191A	Office Automation Tools Lab	0	0	4	4	2	50	50	100	3
BCA-173A	Problem Solving through C Lab	0	0	4	4	2	50	50	100	3
Total		17	0	8	25	21	380	520	900	

Scheme of Studies and Examinations (w.e.f. Session 2025 - 2026)
Bachelor of Computer Applications (AIML) Semester – II

Course Code	Course Title	Period(s) L	Period(s) T	Period(s) P	Hours/ Week	Credit (s)	Continuous Internal Examination (CIE) Max	Semester End Examination (SEE) Max	Total Marks (CIE+SEE) Max	Duration of Exam (Hours)
Core Course (CC)										
BCA-126A	Artificial Intelligence and Applications	3	0	0	3	3	40	60	100	3
BCA-128A	Database Systems	3	0	0	3	3	40	60	100	3
BCA-130A	Computer System Architecture	2	0	0	2	2	40	60	100	3
ASH-MAT-122A	Mathematics for Computing - II	2	0	0	2	2	40	60	100	3
Value Added Course (VAC)										
ASH-HUM-107A	Universal Human Values	2	0	0	2	2	40	60	100	3
Skill Enhancement Course (SEC)										
BCA-122A	Programming with Python	3	0	0	3	3	40	60	100	3
Ability Enhancement Course (AEC)										
ASH-HUM-118A	English Language and Communication-2	2	0	0	2	2	40	60	100	3
Multi Disciplinary Course (MDC)										
ASH-HUM-119A	Indian Knowledge System	2	0	0	2	2	40	60	100	3
Practicum Course (PC)										
BCA-192A	Programming with Python Lab	0	0	4	4	2	50	50	100	3
BCA-198A	Computer System Architecture Lab	0	0	4	4	2	50	50	100	3
BCA-196A	Database Systems Lab	0	0	4	4	2	50	50	100	3
Total		19	0	12	31	25	470	630	1100	
Grand Total (Exit with 1 year Certificate)		36	0	20	56	50	950	1150	2100	

Note 1: The Industrial Internship shall be of 4 credits duration of 45-60 days after the 2nd semester. If a student takes exit after 2nd semester with **Under Graduate Certificate in Computer Applications (Artificial Intelligence and Machine Learning)**, marks of Industrial Internship shall be counted in 2nd semester itself.

Scheme of Studies and Examinations (w.e.f. Session 2025 - 2026)
Bachelor of Computer Applications (AIML) Semester – III

Course Code	Course Title	Period(s) L	Period(s) T	Period(s) P	Hours/Week	Credit(s)	Continuous Internal Examination (CIE) Max	Semester End Examination (SEE) Max	Total Marks (CIE+SEE) Max	Duration of Exam (Hours)
Core Course (CC)										
ASH-MAT-215A	Probability and Statistics	3	0	0	3	3	40	60	100	3
BCA-112A	Data Structures using C++	3	0	0	3	3	40	60	100	3
BCA-102A	Operating System	3	0	0	3	3	40	60	100	3
BCA-225A	Fundations of Machine Learning	3	0	0	3	3	40	60	100	3
Skill Enhancement Course (SEC)										
BCA-106A	Introduction to Web Technology	3	0	0	3	3	40	60	100	3
Ability Enhancement Course (AEC)										
BBA-217A	Personality Development	2	0	0	2	2	40	60	100	3
Practicum Course (PC)										
BCA-271A	Data Structures using C++ Lab	0	0	4	4	2	50	50	100	3
BCA-293A	Fundations of Machine Learning Lab	0	0	4	4	2	50	50	100	3
BCA-295A	Web Technology Lab	0	0	4	4	2	50	50	100	3
Total		17	0	12	29	23	390	510	900	

Scheme of Studies and Examinations (w.e.f. Session 2025 - 2026)
Bachelor of Computer Applications (AIML) Semester – IV

Course Code	Course Title	Period(s) L	Period(s) T	Period(s) P	Hours/Week	Credit(s)	Continuous Internal Examination (CIE) Max	Semester End Examination (SEE) Max	Total Marks (CIE+SEE) Max	Duration of Exam (Hours)
Core Course (CC)										
BCA-228A	Applied Statistical Analysis	3	0	0	3	3	40	60	100	3
BCA-224A	Data Mining and Warehousing	3	0	0	3	3	40	60	100	3
BCA-230A	Advanced Machine Learning	3	0	0	3	3	40	60	100	3
Value Added Course (VAC)										
BCA-232A	Ethics and Social Implications of AI	2	0	0	2	2	40	60	100	3
Skill Enhancement Course (SEC)										
BCA-215A	Full Stack Development-I (MERN)	3	0	0	3	3	40	60	100	3
Discipline specific Elective Course (DSE)										
	Elective-I	3	0	0	3	3	40	60	100	3
Practicum Course (PC)										
BCA-292A	Data Mining and Warehousing Lab	0	0	4	4	2	50	50	100	3
BCA-296A	Advanced Machine Learning Lab	0	0	4	4	2	50	50	100	3
BCA-274A	Full Stack Development-I (MERN) Lab	0	0	4	4	2	50	50	100	3
Total		17	0	12	29	23	390	510	900	
Grand Total (Exit with 2 years Diploma)		70	0	44	114	96	1730	2170	3900	

Note 2: The Industrial Internship shall be of 4 credits duration of 45-60 days after the 4th semester. If a student takes exit after 4th semester with **Under Graduate Diploma in Computer Applications (Artificial Intelligence and Machine Learning)**, marks of Industrial Internship (either done after 2nd or 4th semester) shall be counted in 4th semester itself.

Scheme of Studies and Examinations (for the students admitted in the year 2024-25 and onwards)
Bachelor of Computer Applications (AIML) Semester – V

Course Code	Course Title	Period(s) L	Period(s) T	Period(s) P	Hours/ Week	Credit(s)	Continuous Internal Examination (CIE) Max	Semester End Examination (SEE) Max	Total Marks (CIE+SEE) Max	Duration of Exam (Hours)
Core Course (CC)										
BCA-212A	Data Communication and Computer Networks	3	0	0	3	3	40	60	100	3
BCA-325A	Soft Computing	3	0	0	3	3	40	60	100	3
BCA-327A	Deep Learning	3	0	0	3	3	40	60	100	3
Discipline specific Elective Course (DSE)										
BCA-	Elective-II	3	0	0	3	3	40	60	100	3
Skill Enhancement Course (SEC)										
BCA-371A	Seminar	0	0	2	2	1	100	-	100	-
Practicum Course (PC)										
BCA-389A	Deep Learning Lab	0	0	4	4	2	50	50	100	3
BCA-	Elective-II Lab	0	0	4	4	2	50	50	100	3
Industrial Internship (INTR)										
BCA-377A	Industrial Internship	0	0	0	0	4	100	-	100	-
	Total	12	0	10	22	21	460	340	800	-

Note 3: If a student pursues 3 years UG Programme without taking Exit option, the Industrial Internship (either done after 2nd or 4th semester) will be taken into account in 5th semester.

Scheme of Studies and Examinations (for the students admitted in the year 2024-25 and onwards)
Bachelor of Computer Applications (AIML) Semester – VI

Course Code	Course Title	Period(s) L	Period(s) T	Period(s) P	Hours/ Week	Credit(s)	Continuous Internal Examination (CIE) Max	Semester End Examination (SEE) Max	Total Marks (CIE+SEE) Max	Duration of Exam (Hours)
Core Course (CC)										
BCA-201A	Software Engineering	3	0	0	3	3	40	60	100	3
BCA-326A	Reinforcement Learning	3	0	0	3	3	40	60	100	3
Discipline specific Elective Course (DSE)										
BCA-	Elective-III	3	0	0	3	3	40	60	100	3
Skill Enhancement Course (SEC)										
BBA-318A	Entrepreneurship and Startup Skills	2	0	0	2	2	40	60	100	3
Practicum Course (PC)										
BCA-386A	Software Engineering Lab	0	0	4	4	2	50	50	100	3
BCA-388A	Reinforcement Learning Lab	0	0	4	4	2	50	50	100	3
BCA-376A	Minor Project	0	0	8	8	4	50	50	100	3
	Total	11	0	16	27	19	310	390	700	-
	Grand Total (Exit with 3 years Degree)	93	0	70	163	132	2400	2900	5300	-

Scheme of Studies and Examinations (w.e.f. Session 2025 - 2026)
Bachelor of Computer Applications (AIML) Semester – VII (Honours)

Course Code	Course Title	Period(s) L	T	P	Hours/ Week	Credit (s)	Continuous Internal Examination (CIE) Max	Semester End Examination (SEE) Max	Total Marks (CIE+SEE) Max	Duration of Exam (Hours)
Honour Course (HC)										
BCA-451A	Design and Analysis of Algorithm	3	0	0	3	3	40	60	100	3
	Elective-IV	3	0	0	3	3	40	60	100	3
Value Added Course (VAC)										
BT-ME-112A	Design Thinking and Innovation	2	0	0	2	2	40	60	100	3
Practicum Course (PC)										
BCA-471A	Design and Analysis of Algorithm Lab	0	0	4	4	2	50	50	100	3
BCA-473A	Major Project-1	0	0	20	20	10	50	50	100	3
Total		8	0	24	32	20	220	280	500	

Scheme of Studies and Examinations (w.e.f. Session 2025 - 2026)
Bachelor of Computer Applications (AIML) Semester – VIII (Honours)

Course Code	Course Title	Period(s) L	T	P	Hours/ Week	Credit (s)	Continuous Internal Examination (CIE) Max	Semester End Examination (SEE) Max	Total Marks (CIE+SEE) Max	Duration of Exam (Hours)
Honour Course (HC)										
BCA-466A	Artificial Intelligence for Business	3	0	0	3	3	40	60	100	3
	Elective-V	3	0	0	3	3	40	60	100	3
Practicum Course (PC)										
BCA-494A	Artificial Intelligence for Business Lab	0	0	4	4	2	50	50	100	3
BCA-474A	Major Project-2	0	0	20	20	10	50	50	100	3
Total		6	0	24	30	18	180	220	400	
Grand Total (4 years Honours Degree)		107	0	118	225	170	2800	3400	6200	

Scheme of Studies and Examinations (w.e.f. Session 2025 - 2026)											
Bachelor of Computer Applications (AIML) Semester – VII (Honours with Research)											
Course Code	Course Title	Period(s)			Hours/ Week	Credit (s)	Continuous Internal Examination (CIE) Max	Semester End Examination (SEE) Max	Total Marks (CIE+SEE) Max	Duration of Exam (Hours)
		L	T	P						
Honour Course (HC)										
BCA-455A	Research Methodology	3	0	0	3	3	40	60	100	3
	Elective-IV	3	0	0	3	3	40	60	100	3
Value Added Course (VAC)										
BT-ME-112A	Design Thinking and Innovation	2	0	0	2	2	40	60	100	3
Practicum Course (PC)										
	Elective-IV Lab	0	0	4	4	2	50	50	100	3
BCA-473A	Major Project-1	0	0	20	20	10	50	50	100	3
Total		8	0	24	32	20	220	280	500	

Scheme of Studies and Examinations (w.e.f. Session 2025 - 2026)											
Bachelor of Computer Applications (AIML) Semester – VIII (Honours with Research)											
Course Code	Course Title	Period(s)			Hours/ Week	Credit (s)	Continuous Internal Examination (CIE) Max	Semester End Examination (SEE) Max	Total Marks (CIE+SEE) Max	Duration of Exam (Hours)
		L	T	P						
Practicum Course (PC)										
BCA-476A	Dissertation	0	0	36	36	18	100	100	200	3
Total		0	0	36	36	18	100	100	200	
Grand Total (4 years Honours with Research Degree)		101	0	130	231	170	2720	3280	6000	

Abbreviations Used:

Abbreviation	Full Form	Description
CC	Core Course	Compulsory core course for the programme, CC will be a theory course of 3 credits
PC	Practicum Course	Compulsory practical course (software lab) of 2 credits
INTR	Industrial Internship	• A student can do industrial internship of 45-60 days duration after the 2nd or 4th semester. It will be of 4 credits. • If a student pursues 3 year UG Programme without taking Exit option, this internship (either done after 2nd or 4th semester) will be taken into account in 5th semester. • If a student takes Exit after 2 years in UG Programme, this internship (either done after 2nd or 4th semester) will be taken into account in 4th semester. • If a student takes Exit after 1 year in UG Programme, the mandatory internship done after 2nd semester will be taken into account in 2nd semester.
SEC	Skill Enhancement Course	These courses aim at imparting knowledge, practical skills, hands-on training and competencies, soft skills, etc. to enhance the employability of students.

AEC	**Ability Enhancement Courses**	These courses aim at enabling the students to achieve competency in the English language with special emphasis on communication skills.
VAC	**Value-Added Course**	This course aims to instil in students (i) Universal Human Values, (ii) Environmental Studies (iii) Quantitative Aptitude.
MDC	**Multi-Disciplinary Course**	These courses are based on introductory knowledge in a subject which is different from the main discipline of study to gain knowledge across the disciplines. Students are not allowed to choose or repeat courses already undergone at the Senior Secondary Level (Class XII) or disciplines of study under this category. Provided further that if a Multidisciplinary Course (MDC) across the discipline cannot be offered by a Department/ Institute, due to its constraints and available resources, then i) A subject from the same discipline can be offered as a MDC course if that subject also belongs to the list of subjects of some other discipline. ii) MDC can be opted out of Massive Open Online Courses (MOOCs) from **NPTEL, SWAYAM**. It shall be of minimum 2 credits.
DSE	**Discipline-specific Elective Course**	A discipline-specific elective course is a course aimed at imparting options for varied knowledge and skills in the specialized fields of a discipline/subject.
HC	**Honour Course**	An honour course in the 4th year of the Honours or Honours with Research Degree Programme.

List of Discipline-specific Elective Courses:

Elective–I (Semester-IV)	
BCA-264A	Generative AI
BCA-266A	Human Computer Interaction
Elective–II (Semester-V)	
BCA-363A	Data Handling and Visualization using Python
BCA-365A	Image Processing
Elective–II Lab (Semester-V)	
BCA-391A	Data Handling and Visualization using Python Lab
BCA-393A	Image Processing Lab
Elective–III (Semester-VI)	
BCA-364A	Agentic AI
BCA-366A	Time Series Analysis
Elective–IV (Semester-VII Honours/ Honours with Research)	
BCA-465A	Natural Language Processing
BCA-467A	Federated Learning
Elective–IV Lab (Semester-VII Honours with Research)	
BCA-495A	Natural Language Processing Lab
BCA-497A	Federated Learning Lab
Elective–V (Semester-VIII Honours)	
BCA-468A	Optimization Methods in Machine Learning
BCA-461A	Quantum Computing

Note 4: Relative weightage of Continuous Internal Evaluation (CIE) and Semester End Examination (SEE), criteria of passing marks, evaluation procedure, and other guidelines are as per the Ordinance of Under Graduate Degree Programmes: Bachelor of Computer Applications, Bachelor of Computer Applications (Cloud Technology and Information Security), Bachelor of Computer Applications (Data Science), Bachelor of Computer Applications (Artificial Intelligence and Machine Learning).

Bachelor of Computer Applications
(Artificial Intelligence and Machine Learning)
Semester–I

Course Code	Course Title	L	T	P	Credits
BCA-101A	**Foundations of Computer Science** (Pre-requisite: None)	3	0	0	3
		CIE	SEE	Total	
		40	60	100	

Course Outcomes (COs): At the end of this course, students will be able to

BCA-101A.1	Understand the fundamentals of computers, types of software, and memory hierarchy.
BCA-101A.2	Identify and explain the functions of I/O devices and basic components of operating systems.
BCA-101A.3	Demonstrate knowledge of internet concepts, email systems, and web browsing tools.
BCA-101A.4	Understand various computer threats and apply basic security and protection mechanisms.

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
BCA-101A.1	3	2	-	2	-	-	-	2	-	-
BCA-101A.2	2	-	-	2	2	-	-	2	-	-
BCA-101A.3	2	2	2	3	2	-	-	3	-	1
BCA-101A.4	3	2	2	3	-	-	2	3	1	1

Course Contents:

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UNIT-I　　　　　　　　　　　　　　　**Contact Hours: 12**

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Basics of Computer, Software and Memory

Computer Fundamentals: Computer Evolution through Generations, Computer Characteristics, Computer Strengths and Limitations, Computer Classification, Computer System Components, Computer Applications in Various Fields.
Types of Software: System Software, Application Software, Utility Software, Shareware, Freeware, Firmware, Open Source Software.
Memory Systems: Bits, Bytes, Words, and Nibbles; Storage Locations and Addresses; Storage Capacity Measurement Units; Access Time; Memory Hierarchy. Primary Memory: RAM, ROM, PROM, EPROM. Secondary Memory: Storage Devices; Magnetic Tape, Hard Disk, Optical Disk, Flash Memory

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UNIT-II　　　　　　　　　　　　　　　**Contact Hours: 12**

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Input/ Output Devices and Operating System basics

I/O Devices: Desktop Computer I/O Ports, Device Controllers, Device Drivers. Input Devices: Types and Uses; Keyboard, Pointing Devices—Mouse, Touchpad, Trackball, Joystick, Magnetic Stripes, Scanner, Digital Camera, microphone. Output Devices: Speakers, Monitors, Printers—Types, Laser, Inkjet, Dot-Matrix, Plotters.
Introduction to Operating Systems: Definition, Functions, Features; Icons, Folders, Files; Start Button, Taskbar, Status Buttons, Shortcuts, Recycle Bin, Desktop, My Computer, My Documents, Windows Explorer, Control Panel.

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UNIT-III　　　　　　　　　　　　　　　**Contact Hours: 10**

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Internet and Electronic mail concepts

The Internet: Network and Internet Basics, History, Internet vs. Intranet vs. Extranet, How the Internet Works, Internet Connection Methods.

Electronic Mail: Overview, Pros and Cons, User IDs, Passwords, Email Addresses, Message Components, Composition, Mailer Features. Web Browsing: Browsers and Search Engines.

UNIT-IV   Contact Hours: 11

Threats and Security fundamentals

Threats: Physical and Non-Physical Threats, Viruses, Worms, Trojans, Spyware, Keyloggers, Rootkits, Adware, Cookies, Phishing, Hacking, Cracking.

Computer Security Fundamentals: Confidentiality, Integrity, Authentication, Non-Repudiation, Security Mechanisms, Security Awareness, Security Policies, Anti-Virus Software and Firewalls, Backup and Recovery.

Text Books:
 1. Sinha, P. K. & Sinha, Priti, *Computer Fundamentals*, BPB
 2. Dromey, R.G., *How to Solve it By Computer*, PHI

Other References:

1. Balagurusamy E, *Computing Fundamentals and C Programming*, Tata McGraw Hill.
2. Norton, Peter, *Introduction to Computer*, McGraw-Hill

NOTE:
1. For the semester examination, nine questions are to be set by the examiner. Question no. 1, containing 5-7 short answer type questions, will be compulsory and based on the entire syllabus. Rest of the eight questions is to be set by setting two questions from each of the four units of the syllabus. The candidates will be required to attempt five questions in all, selecting one from each unit AND Question no. 1. All questions will carry equal marks.

2. The students will be allowed to use non-programmable scientific calculator. However, sharing / ex-change of calculator or any other items are prohibited in the examinations. No programmable calculators, mobile phones or other electrical/ electronic items are allowed in the examination.

Course Code	Course Title	L	T	P	Credits
BCA-121A	**Office Automation Tools** (Pre-requisite: None)	3	0	0	3
		CIE	**SEE**	**Total**	
		40	60	100	

Course Outcomes (COs): At the end of this course, students will be able to

BCA-121A.1	Understand the basic functions and features of operating systems and common system software.
BCA-121A.2	Create and format documents using various features of MS Word, including text, layout, and macros.
BCA-121A.3	Work with MS Excel to organize data, apply functions, and create charts for data analysis
BCA-121A.4	Design and present slide shows in MS PowerPoint using templates, transitions, and multimedia elements.

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
BCA-121A.1	3	2	1	3	1	-	-	2	1	1
BCA-121A.2	3	2	2	3	2	-	-	2	2	2
BCA-121A.3	3	3	3	3	2	2	1	3	3	3
BCA-121A.4	3	2	2	3	3	2	2	3	2	2

Course Contents:

UNIT-I   Contact Hours: 10

Fundamentals of Windows Operating System

Definition, types of operating system, the user interface, exploring computer, icons, taskbar, desktop, using menu and menu selection, managing files and folders; types of software - system software, application software. Control panel - display properties, add/remove software and hardware, common utilities.

UNIT-II   Contact Hours: 12

Working with MS-Word

MS-Word: Overview of MS Word features and interface components. Working with formatted text and using shortcut keys. Document formatting includes selecting, copying, and moving text; formatting characters and changing text cases. Paragraph formatting involves setting indents, applying drop caps, and using the format painter. Page layout tasks include setting headers and footers, adding bullets and numbering, using tabs, and creating tables. Additional tools include finding and replacing text, and text proofing features like spell check and auto-correct. Introduction to macros: their purpose, how to create, use, and store them.

UNIT-III   Contact Hours: 12

Working with Spreadsheet

Introduction to MS Excel and its key features: Understanding spreadsheets and workbooks, creating, saving, and editing workbooks. Tasks include renaming sheets, entering data into cells (numbers, text labels, and formulas), using spell check, and the find and replace tool. Managing rows and columns by adding or deleting them, using fill series and drag-fill options, and sorting data. Formatting the worksheet and understanding functions and their components. Commonly used Excel functions include SUM, AVERAGE, COUNT, MAX, MIN, and IF. Introduction to charts and how to create various types such as column, bar, pie, line, and area charts.

UNIT-IV   Contact Hours: 11

Working with MS-Power Point

Key features and uses of PowerPoint; understanding slide components, templates, and wizards. Working with templates, selecting auto layouts, and using outlines to organize content. Adding subheadings, editing and formatting text, and utilizing the master slide. Creating new slides, modifying color schemes, backgrounds, and shading. Inserting headers, footers, clipart, and auto shapes. Creating different types of presentations, managing slides in Slide Sorter view (including deleting, duplicating, and rearranging slides). Applying transitions and animations, adding sound or music to slides, viewing the slide show, and printing slides.

Text Books:
1. David W. Beskeen, *Microsoft Office 365 & Office 2019: Introductory*, Cengage Learning, 2019
2. Sinha, P.K. and Sinha, Priti, *Computer Fundamentals*, BPB, 2004.
3. Sagman S, *MS Office for Windows XP*, Pearson Education, 2007
4. R. K.Taxali, *PC Software for Windows*, Made Simple, 2017.

Reference Books:
1. Norton, Peter, *Introduction to Computer*, McGrawHill, 2002.
2. Peter Waverka, *Microsoft Office 365 All-in-one for Dummies*, 2023.
3. Mansfield Ron,*Working in Microsoft Office*, Tata McGrawHill.
4. Balagurusamy E, *Fundamentals of Computers*, Tata McGrawHill.
5. Mavis Beacon, *All-in-one MS Office CD based views for self-learning*, BPB Publication.

NOTE:
1. For the semester examination, nine questions are to be set by the examiner. Question no. 1, containing 5-7 short answer type questions, will be compulsory and based on the entire syllabus. Rest of the eight questions is to be set by setting two questions from each of the four units of the syllabus. The candidates will be required to attempt five questions in all, selecting one from each unit AND Question no. 1. All questions will carry equal marks.

2. The students will be allowed to use non-programmable scientific calculator. However, sharing / ex-change of calculator or any other items are prohibited in the examinations. No programmable calculators, mobile phones or other electrical/ electronic items are allowed in the examination.

Course Code	Course Title	L	T	P	Credits
BCA-191A	**Office Automation Tools Lab** (Pre-requisite: MS Office)	0	0	4	2
		CIE	**SEE**	**Total**	
		50	50	100	

Course Outcomes (COs): At the end of this course, students will be able to

BCA-191A.1	Understand basic interface and file management features of Windows operating system
BCA-191A.2	Create and format professional documents in MS Word using advanced tools and macros.
BCA-191A.3	Perform data entry, calculations, analysis, and chart creation using MS Excel.
BCA-191A.4	Design and deliver effective PowerPoint presentations with multimedia, transitions, and animations.

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
BCA-191A.1	3	2	1	2	2	-	-	2	1	1
BCA-191A.2	3	2	2	3	2	-	2	2	2	2
BCA-191A.3	3	3	2	3	2	2	-	2	2	2
BCA-191A.4	2	2	2	3	3	2	2	3	2	2

List of Experiments	
No.	**Experiment Detail**
1.	Identify and describe the function of icons, taskbar, and desktop.
2.	Navigate the Start menu and create, delete and move the files & folders.
3.	Install a new application via the Control Panel and also navigate through the control panel.
4.	Create a multi-page report in MS-Word with a table of contents, headers and footers, section breaks, and advanced formatting styles (e.g., columns, drop caps).
5.	Use mail merge in MS-Word to create personalized letters or emails using a data source (e.g., Excel spreadsheet) with fields for recipient names and addresses.
6.	Collaborate on a document with a partner using MS-Word's track changes, comments, and version history features to suggest edits and revisions.
7.	Write a macro format documents below o Linespacing "2" (double) • Paragraph indent of 0.1 • Justification formatting style • Arial font and Bold of 14pt-size
8.	Calculate the net pay of the employees following the conditions below. DA: -56% of the basic pay if Basic pay is greater than 20000 or else 44%. HRA: -15%oftheBasicpaysubjecttomaximumofRs.4000. GPF: -10% of the basic pay. Find who is getting highest salary & who is get lowest salary?

9.	Use advanced Excel functions such as SUMIF, COUNTIF, and PivotTables to analyze and summarize data effectively.
10.	Analyze a dataset in Excel by calculating totals and averages.
11.	Create and customize different types of charts (e.g., bar chart, pie chart, line graph) in Excel based on a dataset, and interpret the data visually.
12.	Develop a professional PowerPoint presentation with slides containing multimedia elements (e.g., images, audio/video), animations, and transitions between slides.

Text Books:
1. David W. Beskeen, *Microsoft Office 365 & Office 2019: Introductory*, Cengage Learning, 2019
2. Sinha, P.K. and Sinha, Priti, *Computer Fundamentals*, BPB, 2004.
3. Sagman S, *MS Office for Windows XP*, Pearson Education, 2007
4. R. K.Taxali, *PC Software for Windows*, Made Simple, 2017.

Reference Books:
1. Norton, Peter, *Introduction to Computer*, McGrawHill, 2002.
2. Peter Waverka, *Microsoft Office 365 All-in-one for Dummies*, 2023.
3. Mansfield Ron, *Working in Microsoft Office*, Tata McGrawHill.
4. Balagurusamy E., *Fundamentals of Computers*, Tata McGrawHill.
5. Mavis Beacon, *All-in-one MS Office CD based views for self-learning*, BPB Publication.

Course Code	Course Title	L	T	P	Credits
BCA-105A	**Problem Solving through C** (Pre-requisite: None)	3	0	0	3
		CIE	**SEE**	**Total**	
		40	60	100	

Course Outcomes (COs): At the end of this course, students will be able to

BCA-105A.1	Understand the basic structure of a C programming
BCA-105A.2	Apply operators, expressions, and various control structures.
BCA-105A.3	Analyze the implement arrays, strings, and user-defined functions
BCA-105A.4	Apply advanced concepts like structure, union and pointers.

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
BCA-105A.1	3	2	2	2	-	-	-	-	-	-
BCA-105A.2	3	2	2	2	2	2	-	2	-	-
BCA-105A.3	3	2	2	2	2	2	-	2	1	1
BCA-105A.4	3	2	3	2	3	2	-	2	2	2

Course Contents:

<div align="center">

UNIT-I   **Contact Hours: 12**

</div>

Fundamentals of C language

Overview of C: History, Importance, Structure of C Program, Character Set, Constants and Variables, Identifiers and Keywords, Data Types, Assignment Statement, Symbolic Constant.

Input/output: Formatted and unformatted I/O Functions-, Input Functions viz. scanf(), getch(), getche(), getchar(), gets(), sscanf(), output functions viz. printf(), putchar(), puts(), sprintf()

<div align="center">

UNIT-II   **Contact Hours: 10**

</div>

Operators and Control Structures

Operators & Expression: Arithmetic, Relational, Logical, Bitwise, Unary, Assignment, Conditional Operators and Special Operators, Operator Hierarchy; Arithmetic Expressions, Evaluation of Arithmetic Expression, Type Casting and Conversion.

Control Structures: Decision making Statements- simple if, if else, nested if, else if ladder, switch and break statement, goto statement, Looping Statements: for, while, and do while loop, nested loops, jumps in loops..

<div align="center">

UNIT-III   **Contact Hours: 11**

</div>

Arrays, Strings, and Functions

Arrays: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays -Declaration, Initialization and Memory representation, Advantages and disadvantages of arrays

Strings: Declaration and Initialization, String I/O, Array of Strings, String Manipulation Functions: String Length, Copy, Compare, Concatenate, Reverse etc.

Functions: Definition, Advantages, prototype, function call, function classification, passing arguments to a function: call by value; call by reference, recursive functions.

<div align="center">

UNIT-IV   **Contact Hours: 12**

</div>

User defined data types, pointers and storage class concepts

User defined data types: Structures Definition, Advantages of Structure, declaring structure variables, accessing structure members, Structure members initialization, Array of Structures; Unions - Union definition; difference between Structure and Union.

Pointers in C: Definition, Advantages, Declaring and initializing pointers, accessing address and value of variables using pointers; Pointers and Arrays, Pointers and Character Strings.

Storage classes in C: Auto, Static, Register, Extern

Text Books:
1. Balagurusamy, E., *Programming in ANSI C*, Tata McGraw-Hill
2. Yashwant Kanetkar, *Let us C*, BPB

Other References:
1. Gottfried, Byron S., *Programming with C*, Tata McGraw Hill
2. Rajaraman, V., *Computer Programming in C*, PHI
3. Jeri R. Hanly & Elliot P. Koffman, *Problem Solving and Program Design in C*, Addison Wesley
4. Brian W. Kernighan, Dennis Ritchie, *The C Programming Language*, Pearson

NOTE:
1. For the semester examination, nine questions are to be set by the examiner. Question no. 1, containing 5-7 short answer type questions, will be compulsory and based on the entire syllabus. Rest of the eight questions is to be set by setting two questions from each of the four units of the syllabus. The candidates will be required to attempt five questions in all, selecting one from each unit AND Question no. 1. All questions will carry equal marks.

2. The students will be allowed to use non-programmable scientific calculator. However, sharing / ex-change of calculator or any other items are prohibited in the examinations. No programmable calculators, mobile phones or other electrical/ electronic items are allowed in the examination.

Course Code	Course Title	L	T	P	Credits
BCA-173A	**Problem Solving through C Lab** (Pre-requisite: C Programming)	0	0	4	2
		CIE	SEE	Total	
		50	50	100	

Course Outcomes (COs): At the end of this course, students will be able to

BCA-173A.1	Apply basic input/output operations, operators, and expressions in C
BCA-173A.2	Develop C programs using decision-making and looping constructs
BCA-173A.3	Apply and manipulate arrays, strings, and matrices in C
BCA-173A.4	Construct modular C programs using functions, structures, and pointers.

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
BCA-173A.1	3	2	2	2	-	–	–	2	-	-
BCA-173A.2	3	3	2	2	1	–	–	2	-	-
BCA-173A.3	3	2	2	2	–	–	–	2	1	1
BCA-173A.4	3	3	2	2	2	–	–	2	2	2

List of Experiments	
No.	**Experiment Detail**
1.	An engineer designing circular rides in an amusement park needs to calculate the area and circumference of each ride. Develop a C program that reads radius as input, computes the area and circumference and outputs the results to ensure efficient design.
2.	Develop a C program that implements nested if to find the largest of three numbers.
3.	Develop a C program to read the percentage of marks and display appropriate grades to demonstrate the use of the else-if ladder.
4.	Develop a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
5.	Design a C program to find the roots of a quadratic equation.
6.	Design a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
7.	Design a C program to read a number, find the sum of the digits, reverse the number and check it for palindrome.
8.	A teacher uses a C program to read marks scored by n students. The program stores marks in a single-dimensional array and calculates the average marks of a class.
9.	Implement a C program that finds both the largest and smallest number in a list of integers.
10.	Implement a C program that sorts elements of an array in ascending order.
11.	Create a C program to perform addition and subtraction of matrices.
12.	Create a C program to perform multiplication of two matrices
13.	Create a C program to demonstrate string library functions
14.	Create a C program to find the length of a string and to copy string without using built-in function.

15.	Create a C program to read, display and add two m x n matrices using functions.
16.	Create a C program that use both recursive and non-recursive functions to find factorial of a given number.
17.	Create a C program that use both recursive and non-recursive functions to generate first n terms of Fibonacci series.
18.	A school administrator uses a C program to manage student records. The program utilizes a student structure to read and display records of n students, ensuring organized and efficient data handling.
19.	Create a C program to swap two numbers using pointers to demonstrate call by reference method for passing arguments in function.
20.	A linguistics researcher uses a C program to analyze text data. The program employs pointers to count vowels and consonants in a given string, ensuring accurate linguistic analysis and data processing.

Text Books:
1. Balagurusamy, E., *Programming in ANSI C*, Tata McGraw-Hill
2. Yashwant Kanetkar, *Let us C*, BPB

Other References:
1. Gottfried, Byron S., *Programming with C*, Tata McGraw Hill
2. Rajaraman, V., *Computer Programming in C*, PHI
3. Jeri R. Hanly & Elliot P. Koffman, *Problem Solving and Program Design in C*, Addison Wesley
4. Brian W. Kernighan, Dennis Ritchie, *The C Programming Language*, Pearson

Syllabus of the Courses offered by other Departments for
for
Bachelor of Computer Applications (AIML)
Semester –I

Course Code	Course Title	L	T	P	Credits
ASH-MAT-121A	**Mathematics for Computing - I** (Pre-requisite: None)	2	0	0	2
		CIE	SEE	Total	
		40	60	100	

Course Outcomes (COs): At the end of this course, students will be able to

ASH-MAT-121A.1	Understand the basic concepts of sets, types, various operations and their applications
ASH-MAT-121A.2	Analyze the properties of relation and understand the concept of functions and their types
ASH-MAT-121A.3	Understand the basic concepts of differentiation.
ASH-MAT-121A.4	Evaluate the Integration of algebraic and transcendental functions.

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
ASH-MAT-121A.1	3	2	1	1	-	-	-	1	2	1
ASH-MAT-121A.2	3	3	2	2	-	-	-	1	3	2
ASH-MAT-121A.3	3	3	2	2	-	-	-	2	3	2
ASH-MAT-121A.4	3	3	2	2	-	-	-	2	3	2

Instructions for Paper Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

UNIT-I   Contact Hours: 7

Unit-I Set Theory

Sets and their representations, Empty set, Finite and infinite sets, Subsets, Equal sets, Power sets, Universal set, Union and intersection of sets, Difference of two sets, Complement of a set, Venn diagram, De-Morgan's laws and their applications

UNIT-II   Contact Hours: 6

Unit-II Relation and Function

Properties of relations, equivalence relation, Functions: Definition, domain and range of function, Injective function, Surjective function, Bijective function, composite and inverse function

UNIT-III   Contact Hours: 9

Unit-III Differentiation

Concept of Differentiation, Differentiation of simple, algebraic, trigonometric, logarithmic, and exponential functions, Differentiation of sum, difference, product and quotient of functions.

UNIT-IV   Contact Hours: 8

Unit-IV Indefinite integrals

Indefinite integrals: Integration of algebraic, trigonometric, exponential and logarithmic functions, Methods of integration: by substitution and by parts.

Text Books:

1. S. C. Malik and Savita Arora, *Mathematical Analysis*, New Age Publication.
2. J. K. Thukral, *Business Mathematics*, the World Book Depot.
3. Murray Spiegel, Seymour Lipschutz, Dennis Spellman, *Schaum's Outlines Vector Analysis*
4. C. L. Liu and D. P. Mohapatra, *Elements of Discrete Mathematics-A Computer Oriented Approach,* Tata McGraw Hill.

Other References:

1. A. Tussy, R. Gustafson and D. Koenig, Basic Mathematics for College Students, Brooks Cole
2. Shanti Narayan and P K Mittal, Differential Calculus, Sultan Chand & Co.
3. J. V. Dyke, J. Rogers and H. Adams, Fundamentals of Mathematics, Cengage Learning
4. K. H. Rosen, *Discrete Mathematics and its Applications*, 7th ed., McGraw – Hill

Course Code	Course Title	L	T	P	Credits
BT-CE-104A	**Environmental Studies** (Pre-requisite: None)	2	0	0	2
		CIE	SEE	Total	
		40	60	100	

Course Outcomes (COs): At the end of this course, students will be able to

BT-CE-104A.1	Understand the importance of environmental studies and natural resource.
BT-CE-104A.2	Illustrate the structure and functions of ecosystems, analyze biodiversity threats, and evaluate conservations.
BT-CE-104A.2	Evaluate the causes, effects, and control measures of environmental pollution, solid waste management and disaster management.
BT-CE-104A.3	Discuss the emerging environmental issues and environmental pollution act.

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
BT-CE-104A.1	-	2	-	1	-	-	2	2	-	-
BT-CE-104A.2	2	3	2	2	2	2	3	2	2	2
BT-CE-104A.2	2	3	3	2	2	2	3	2	3	3
BT-CE-104A.3	-	2	3	2	2	-	2	3	-	-

Instructions for Paper Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

UNIT-I   Contact Hours: 8

Introduction to environmental studies and Natural resources

Multidisciplinary nature of environmental studies: Definition, Scope and Importance. Need for public awareness.
Natural Resources: Renewable and Non-Renewable Resources: Natural resources and associated problems. (a) Forest Resources: Use and over-exploitation, deforestation, case studies. (b) Energy Resources- Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies. (c) Land Resources- Land as a resource, land, degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyle.

UNIT-II   Contact Hours: 8

Ecosystem, Biodiversity and Conservation

Ecosystem: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem. Food Chains, food webs.
Biodiversity and its conservation: Introduction, Definition: genetic, species and ecosystem diversity. Biogeographical classification of India, Value of biodiversity, Hot spots of Biodiversity. Threats to biodiversity: Habitat loss, poaching of wild life, man-wildlife conflicts. Endangered and endemic species of India, Conservation of Biodiversity- In situ and Ex-Situ conservation of biodiversity.

UNIT-III   Contact Hours: 8

Environmental pollution, Solid waste management, and Disaster management

Environmental Pollution: Definition, Cause, effects and control measures of- (a) Air Pollution (b) Water Pollution (c) Soil Pollution (d) Marine Pollution. Visit to a local polluted site- Urban /Rural/Industrial/Agricultural. (Field work equal to 5 lecture hours).
Solid waste management: cause, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution, E- waste management, plastic waste.
Disaster management: Natural: floods, earthquake, cyclone and landslides etc. Man-made Disaster: Fire, industrial pollution, nuclear disaster, biological Disaster, Disaster preparedness plans.

UNIT-IV   Contact Hours: 6

Emerging Issues and Environment Protection Act

Social Issues and the Environment: From unsustainable to sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people: Its problems and concerns.

Environmental ethics-issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, Case studies, Concept of green building, carbon foot printing.

Environment Protection Act (Air,water, wildlife, forest), Environment and human health, Role of Information Technology in Environment and Human Health, Case Studies. Emerging technologies for Environmental management.

Text Books:
1. Deswal and Deswal, *Environmental Studies*, Dhanpat Rai & Co.
2. Anandan, P. and Kumaravelan, R., *Environmental Science & Engineering*, Scitech Publications (India) Pvt. Ltd.
3. Bharucha, E., *A Textbook of Environmental Studies for Undergraduate Courses*, Orient Blackswan Pvt. Ltd.

Reference Books:
1. Daniels Ranjit R. J. and Krishnaswamy, Environmental Studies, Wiley India
2. Botkin and Keller, *Environmental Science*, Wiley
3. Joshi, P.C. and Joshi, N., *A Text Book of Environmental Science*, APH Publishing Corporation.
4. Basu, M. and Xavier Savarimuthu, S.J., *Fundamentals of Environmental Studies*, Cambridge University Press.

Course Code	Course Title	L	T	P	Credits
ASH-HUM-117A	**English Language and Communication-1** (Pre-requisite: None)	2	0	0	2
		CIE	SEE	Total	
		40	60	100	

Course Outcomes (COs): At the end of this course, students will be able to

ASH-HUM-117A.1	Understand and remember the basic concepts of communication skills and its usage in day to day life.
ASH-HUM-117A.2	Classify, interpret, differentiate, and organize the learned knowledge.
ASH-HUM-117A.3	Develop and execute listening and writing skills.
ASH-HUM-117A.4	Learn group discussion skills.

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
ASH-HUM-117A.1	2	2	2	-	2	-	-	2	-	-
ASH-HUM-117A.2	2	2	2	-	2	2	2	2	2	2
ASH-HUM-117A.3	2	3	2	2	3	2	2	2	-	-
ASH-HUM-117A.4	2	3	2	2	3	-	3	3	-	-

Instructions for Paper Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

UNIT-I   **Contact Hours: 8**

Communication Skills and Barriers

Communication Skills: Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context
Barriers to communication: Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers
.

UNIT-II   **Contact Hours: 8**

Elements of Communication and Perspectives

Elements of Communication: Introduction, Face to Face Communication – Tone of voice, Body Language (Non-Verbal Communication), Verbal Communication Physical Communication.
Perspectives in Communication: Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment

UNIT-III   **Contact Hours: 8**

Listening and Written Communication skills

Basic Listening Skills: Introduction, Self-Awareness, Active Listening, Becoming an Active Listener, Listening in Difficult Situations.
Effective Written Communication: Introduction, When and When Not to Use Written Communication - Complexity of the Topic, Amount of Discussion' Required, Shades of Meaning, Formal Communication.

UNIT-IV   **Contact Hours: 6**

Group Discussion

Introduction to Group Discussion**,** Communication skills in group discussion, Do's and Don'ts of group discussion

Textbooks:
1. Andreja. J. Ruther Ford, *Basic communication skills for Technology,* 2nd Edition, Pearson Education
2. Sanjay Kumar, Pushpalata, *Communication skills*, Oxford Press
3. Stephen. P. Robbins, *Organizational Behavior,* Pearson
4. Gill Hasson, *Brilliant- Communication skills*, Pearson Life
5. GopalaSwamy Ramesh, *The Ace of Soft Skills: Attitude, Communication and Etiquette for success*, Pearson

Other references:
1. Deborah Dalley, Lois Burton, Margaret, Greenhall, *Developing your influencing skills*, Universe of Learning LTD
2. Konar nira, 2nd Edition, *Communication skills for professionals,* New arrivals –PHI
3. Barun K Mitra, *Personality development and soft skills*, Oxford Press
4. Butter Field, *Soft skill for everyone,* 1st Edition, Cengage Learning India pvt.ltd
5. Francis Peters SJ, *Soft skills and professional communication*, McGraw Hill Education
6. John Adair, *Effective communication*, Pan Mac Millan
7. Aubrey Daniels, *Bringing out the best in people,* Mc Graw Hill.

Course Code	Course Title	L	T	P	Credits
BBA-215A	**Digital Marketing**	2	0	0	2
		CIE	**SEE**		**Total**
		40	60		100

Course Outcomes

CO1	Discuss the historical perspective and key milestones in the evolution of digital marketing.
CO2	Apply strategies for effective social media marketing, email marketing, and affiliate marketing.
CO3	Analyze data to inform digital marketing strategies and decisions.
CO4	Evaluate the impact of digital wellbeing and ethical considerations in digital marketing practices.

Course Outcomes (CO) to Programme Outcomes (PO) mapping (scale 1: low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	2	3	2	2	-	-	-	1	-	-
CO2	2	2	3	3	2	1	-	2	2	2
CO3	1	3	2	3	1	-	-	2	3	3
CO4	2	2	1	-	-	-	3	3	2	2

Course Outline

Unit Number: 1	**Digital Marketing and Search Engine Marketing**	Contact Hours: 8
Foundations and Evolution of Digital Marketing: Historical Perspective and Key Milestones: Transition from traditional to digital marketing channels Search Engine Marketing (SEM): Fundamentals of search engine optimization (SEO) and its role in digital marketing, pay-per-click (PPC) advertising strategies and best practices, importance of keyword research and targeting in SEM campaigns			

Unit Number: 2	**Social Media and Email marketing**	Contact Hours: 6
Social Media Marketing: Strategies for leveraging social media platforms, creating engaging content, understanding social media metrics, and building brand presence. Email Marketing: Role of email marketing in the digital marketing mix, strategies for building and maintaining email lists, personalization, segmentation, and automation in email campaigns			

Unit Number: 3	**Data Analytics in Digital marketing**	Contact Hours: 8
Digital Marketing, Data, and Analytics: Role of data in informing digital marketing strategies and decisions. Social Media Advertising and Analytics: Tools for social media Advertising; Planning and executing social media campaigns; An Overview of social media analytics tools.			

Unit Number: 4	**Digital Wellbeing and Ethics**	Contact Hours: 8
Digital Wellbeing: Understanding digital stress and its impact on mental health, strategies for promoting digital detox and mindfulness in the digital age, incorporating principles of digital wellbeing into digital marketing practices. Ethical Issues in Digital Marketing: Ethical considerations, privacy concerns, and legal aspects of digital marketing			

Textbooks:
   1. Chaffey, Dave and Fiona Ellis Chadwick, *Digital Marketing- Strategy, Implementation and Practice*, Pearson Education Inc.
   2. Ahuja, Vandana, *Digital Marketing*, Oxford University Press

Other references:
   1. Hanson, W and Kirthi Kalyanam, *Internet Marketing and E-Commerce*, Cengage Learning
   2. Mullen, J and D Daniels, *E-Marketing- An Hour a Day*, Sybex Publisher
   3. Kotler et. Al, *Principles of Marketing*, Pearson Education Inc., New Delhi
   4. Kaufman, Era and Chris Hortan, *Digital Marketing- Integrating Strategies and Tactics with Values*, Routledge

Bachelor of Computer Applications
(Artificial Intelligence and Machine Learning)
Semester–II

Course Code	Course Title	L	T	P	Credits
BCA-126A	**Artificial Intelligence and Applications** (Pre-requisite: None)	3	0	0	3
		CIE	SEE	Total	
		40	60	100	

Course Outcomes (COs): At the end of this course, students will be able to	
BCA-126A.1	Understand the fundamental concepts and problem representation techniques in AI.
BCA-126A.2	Apply knowledge representation and inferencing techniques to model intelligent behaviour.
BCA-126A.3	Implement search algorithms and game playing strategies to solve complex decision problems.
BCA-126A.4	Explore architecture and components of Expert systems

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
BCA-126A.1	3	3	2	2	-	-	1	3	3	2
BCA-126A.2	3	3	2	2	1	-	-	2	3	2
BCA-126A.3	3	3	3	3	2	-	-	2	3	3
BCA-126A.4	3	3	2	3	2	-	2	2	3	3

Course Contents:

UNIT-I   **Contact Hours: 12**

Overview and Types of AI

Overview of AI: Introduction to AI, Definition, Historical Evaluation of AI, AI and its related fields, Turing Test and Revised Turing Test.

Types of AI: Narrow, General, Super AI

Problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem

UNIT-II   **Contact Hours: 11**

Knowledge Representation, Propositional and Predicate Logic

Knowledge Representation: Various Approaches of Knowledge representation (Logical, Procedural, Declarative, Frames, Semantic Nets, Scripts)

Propositional and Predicate Logic: Propositions, FOPL, Unification, resolution, most general unifier, Inference Rules

UNIT-III   **Contact Hours: 12**

Search and Game Playing Strategies

Search strategies: - data driven search, goal driven search, uninformed search strategies (BFS, DFS, IDDFS), Informed Search strategies (Hill Climbing, Best First Search, A*, AO*), Properties of Search Algorithms

Game Playing Strategies: - Components of Game Playing, Min-max strategy, Min-Max strategy with alpha-beta pruning

UNIT-IV   **Contact Hours: 10**

Expert System concepts

Expert System: Components of Expert System: Knowledge Base, Inference Engine, User Interface, Features of Expert System, Expert System Life Cycle, Categories of Expert System, Rule Based vs. Model Based Expert Systems, Advantages/Limitations of Expert System, Developing an Expert System: Identification, Conceptualization, Formalization, Implementation, Testing, Using an Expert System, Application Areas of Expert System

Text Books:
1. George F. Luger, *Artificial Intelligence*, Pearson Education.
2. Dan W. Patterson, *Introduction to Artificial Intelligence and Expert system*, PHI.
3. David W. Rolston: *Principles of Artificial Intelligence and Expert System Development*, McGraw Hill Book Company.

Reference Books:
1. Elaine Rich, Kevin Knight: *Artificial Intelligence*, Tata McGraw Hill.
2. Nils J Nilsson, *Artificial Intelligence- A new Synthesis*, Harcourt Asia Pvt. Ltd.
3. Ben Coppin*, Artificial Intelligence Illuminated*, Narosa Publishing House.
4. Jackson Peter*, Introduction to Expert systems*, Pearson-Education.

NOTE:
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2. The students will be allowed to use non-programmable scientific calculator. However, sharing / ex-change of calculator or any other items are prohibited in the examinations. No programmable calculators, mobile phones or other electrical/ electronic items are allowed in the examination.

Course Code	Course Title	L	T	P	Credits
BCA-128A	**Database Systems** (Pre-requisite: None)	3	0	0	3
		CIE	SEE	Total
		40	60	100

Course Outcomes (COs): At the end of this course, students will be able to

BCA-128A.1	Understand the fundamentals of DBMS, data models, schema architecture, and ER/EER design.
BCA-128A.2	Apply SQL and PL/SQL concepts to create, query, and manage relational databases.
BCA-128A.3	Understand normal forms and functional dependencies and apply normalization to database schemas.
BCA-128A.4	Analyze transaction processing, concurrency control, and data warehousing concepts.

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
BCA-128A.1	3	3	3	2	2	-	-	1	-	-
BCA-128A.2	3	2	2	3	2	2	-	2	2	2
BCA-128A.3	3	2	2	2	2	2	-	2	2	2
BCA-128A.4	3	3	2	3	2	-	-	2	2	3

Course Contents:

<div align="center">

UNIT-I   **Contact Hours: 11**
</div>

Database and Database Management System

Introduction and need of Database and Database Management System (DBMS). Characteristics of DBMS, Database Users, Data Models, Schema, and Instances. Three-Schema architecture and data Independence.

Database Design using ER model: Entity types, Entity set, attributes and Keys. Relationship types. Expressing M:N relation. Enhanced Entity Relationship Model (EER): Specialization, Generalization, Attribute inheritance and Aggregation

<div align="center">

UNIT-II   **Contact Hours: 12**
</div>

Relational model and Relational Algebra

Relational model concepts. Introduction to SQL, Types of SQL commands (DDL, DML, and DCL etc),SQL operators and their procedure, views and indexes. Queries and sub queries, Group by and Having clause, Aggregate functions and Constraints. PL/SQL: Architecture of PL/SQL, Basic Elements of PL/SQL.

Relational Algebra: Introduction of Relational Algebra, Selection and projection. Renaming, Joins, Unions, Intersection, Cartesian product and Division.

<div align="center">

UNIT-III   **Contact Hours: 10**
</div>

Normalization

Need for Normalization, anomalies (insert, delete and update), Functional Dependencies, Minimal set of Functional Dependencies, Normal Forms: 1NF, 2NF, 3NF. Higher Level Normal Forms: Boyce/ Codd Normal Form, multi-valued dependency (MVD), Fourth Normal Form, Join dependencies and Fifth Normal Form.

<div align="center">

UNIT-IV   **Contact Hours: 12**
</div>

Transaction processing, Overview of data mining and warehousing

Transaction Processing Concepts: Transaction and Schedules, transaction properties, concurrent execution of transaction, Conflict and View serializability, testing for serializability, concepts in Recoverable and Cascadeless schedules.Concurrency Control Techniques: Lock based protocols, Two phase locking technique, time stamp based protocols, validation based protocols.

Overview of data mining technology, Introduction of data warehousing, Characteristics of data warehouses.

Text Books:
1. Ramez Elmasri and Shamkant B. Navathe, *Fundamentals of Database Systems*, Pearson
2. Ivan Bayross, *SQL, PL/SQL the Programming Language of Oracle,* BPB

Reference Books:

1. Raghu Ramakrishnan and Johannes Gehrke, *Database Management Systems,* McGraw Hill
2. Markus Winand, *SQL Performance Explained,* Self Publishing
3. Abraham Silberschatz, Henry F. Korth, and S. Sudarshan, *Database System Concepts,* McGraw Hill

NOTE:
1. For the semester examination, nine questions are to be set by the examiner. Question no. 1, containing 5-7 short answer type questions, will be compulsory and based on the entire syllabus. Rest of the eight questions is to be set by setting two questions from each of the four units of the syllabus. The candidates will be required to attempt five questions in all, selecting one from each unit AND Question no. 1. All questions will carry equal marks.

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Course Code	Course Title	L	T	P	Credits
BCA-196A	**Database Systems Lab** (Pre-requisite: PL/SQL)	0	0	4	2
		CIE	**SEE**	**Total**	
		50	50	100	

Course Outcomes (COs): At the end of this course, students will be able to

BCA-196A.1	Understand the fundamentals of ER design and map to relational model.
BCA-196A.2	Apply SQL and PL/SQL concepts to create, query, and manage relational databases.
BCA-196A.3	Perform pattern matching and other operations
BCA-196A.4	Implement selection, loop, exception, normalization and transaction processing concept in database using PL/SQL.

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
BCA-196A.1	3	3	3	2	2	-	1	-	-	-
BCA-196A.2	3	2	2	2	2	2	-	-	2	2
BCA-196A.3	3	2	3	2	2	-	1	2	2	2
BCA-196A.4	2	3	2	3	3	2	-	2	2	3

List of Experiments	
No.	**Experiment Detail**
1.	Design an ER diagram for a college database with students, departments, and courses.
2.	Convert the ER diagram into relational schema and identify primary, foreign keys.
3.	Create tables in a relational DBMS using SQL based on the ER schema.
4.	Execute basic SQL commands: DDL, DML, DCL on a sample database
5.	Demonstrate the use of Data Constraints.
6.	Write SQL queries using WHERE, BETWEEN, LIKE, IN, and ORDER BY.
7.	Use aggregate functions with GROUP BY and HAVING clauses.
8.	Demonstrate pattern matching and range searching functions.
9.	Demonstrate the use of ORACLE operators • Arithmetic operators • Comparison operators • Logical operators
10.	Demonstrate the use of DUAL table
11.	Demonstrate the use of INDEX in DBMS
12.	Perform different types of joins (INNER, OUTER).
13.	Write PL/SQL programs using variables, IF-THEN, loops, and exceptions.
14.	Identify anomalies and perform step-by-step normalization (1NF to 3NF) on a sample unnormalized relation.
15.	Demonstrate the concept of locking using a small transaction simulation.

Text Books:
1. Ramez Elmasri and Shamkant B. Navathe, *Fundamentals of Database Systems*, Pearson
2. Ivan Bayross, *SQL, PL/SQL the Programming Language of Oracle,* BPB

Reference Books:

1. Raghu Ramakrishnan and Johannes Gehrke, *Database Management Systems,* McGraw Hill
2. Markus Winand, *SQL Performance Explained,* Self Publishing
3. Abraham Silberschatz, Henry F. Korth, and S. Sudarshan, *Database System Concepts,* McGraw Hill

Course Code	Course Title	L	T	P	Credits
BCA-130A	**Computer System Architecture** (Pre-requisite: None)	3	0	0	3
		CIE	**SEE**	**Total**	
		40	60	100	

Course Outcomes (COs): At the end of this course, students will be able to	
BCA-130A.1	Understand the fundamental principles of Number System and optimization of logic functions
BCA-130A.2	Design the various combinational logic circuits and Sequential logic circuits.
BCA-130A.3	Analyze basic Computer Organization including Instruction cycle.
BCA-130A.4	Understand and analyze the internal structure and operation of computer systems

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
BCA-130A.1	3	2	2	-	-	-	-	2	2	2
BCA-130A.2	3	2	2	2	-	-	-	2	1	-
BCA-130A.3	2	2	2	2	-	-	-	3	2	1
BCA-130A.4	3	3	2	2	-	-	-	3	2	2

Course Contents:

UNIT-I   Contact Hours: 12

Number System and Boolean Algebra

Introduction to Number System (Binary, Decimal, Octal, Hexadecimal) and Conversion from one number system to another, binary arithmetic (addition and subtraction).

Boolean Algebra Postulates, Boolean laws and theorems, Boolean expressions and functions, truth table, canonical representation (SOP, POS), simplification of Boolean function by Boolean algebra, K-Map (up to 4 variables), handling don't care conditions.

UNIT-II   Contact Hours: 12

Digital Components (Fundamental building blocks)

Digital Logic Gates: AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR, symbols, expressions and truth tables.

Combinational Circuit-Introduction, half adder, full adder, half subtractor, full subtractor, multiplexer (2:1,4:1,8:1), de-multiplexer (1:2,1:4,1:8)

Sequential Circuit- Introduction, Flip Flops (SR, JK, D, T, Master Slave Flip Flop) and their applications, characteristic table, excitation table.

UNIT-III   Contact Hours: 10

Registers and Computer Organization

Register – Designing Registers-Serial in Serial Out Register (SISO), Serial in Parallel Out Register (SIPO), Parallel in Parallel Out Register (PIPO), Parallel in Serial Out Register (PISO), Shift Register.

Basic Computer Organization and Design - Instruction codes, Types of Instructions (Register, Memory and Input-Output reference), addressing modes, instruction cycle.

UNIT-IV   Contact Hours: 11

Processor and Memory Organization

General register organization, Stack organization, Overview of Reduced Instruction Set Computer (RISC), Complex Instruction Set Computer (CISC), Multicore processor and Graphics Processing Unit (GPU)

Memory and Input-Output Organization: Memory hierarchy, Input-Output Interface,

Modes of Transfer: Programmed I/O, Interrupt initiated I/O, Direct memory access.

Text Books:
1. M. Moris Mano (2006), *Computer System Architecture*, 3rd edition, Pearson/PHI, India.
2. Pratima Manhas and Shaveta Thakral, *Digital Electronics*, S.K. Kataria & sons, India

3. P. K. Sinha , *Computer Fundamentals*, 8th edition , BPB Publications, India

Other References:

1. William Stallings (2010), *Computer Organization and Architecture- designing for performance*, 8th edition, Prentice Hall, New Jersy.
2. Anrew S. Tanenbaum (2006), *Structured Computer Organization*, 5th edition, Pearson Education Inc,
3. John P. Hayes (1998), *Computer Architecture and Organization*, 3rd edition, Tata McGrawHill
4. Carl Hamacher, Zvonks Vranesic, SafeaZaky (2002), *Computer Organization*, 5th edition, McGraw Hill, New Delhi, India.

NOTE:

1. For the semester examination, nine questions are to be set by the examiner. Question no. 1, containing 5-7 short answer type questions, will be compulsory and based on the entire syllabus. Rest of the eight questions is to be set by setting two questions from each of the four units of the syllabus. The candidates will be required to attempt five questions in all, selecting one from each unit AND Question no. 1. All questions will carry equal marks.

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Course Code	Course Title	L	T	P	Credits
BCA-198A	**Computer System Architecture Lab** (Pre-requisite: Digital Logic fundamentals)	0	0	4	2
		CIE	SEE	Total
		50	50	100

Course Outcomes (COs): At the end of this course, students will be able to

BCA-198A.1	Understand the fundamental principles of Number System
BCA-198A.2	Optimize the logic functions using Boolean principles and K-map
BCA-198A.3	Design the various combinational logic circuits and Sequential logic circuits using data path circuits.
BCA-198A.4	Analyze basic Computer Organization including Instruction cycle.

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
BCA-198A.1	3	3	3	2	-	-	-	3	2	2
BCA-198A.2	3	3	3	2	-	-	-	3	-	1
BCA-198A.3	3	3	3	2	-	-	-	3	2	-
BCA-198A.4	3	3	3	2	-	-	-	3	2	2

List of Experiments
No.	**Experiment Detail**
1.	Draw and realize Trainer Kit and its other components.
2.	Draw and study of different Digital IC's and its specification and Verification of the Truth Table of logic gates using TTL IC's.
3.	Evaluation of a given Boolean function using logic gates in both SOP and POS form.
4.	Design and Implement 4 bit Half Adder using 7483 IC.
5.	Design and Implement 4-bit Full Adder using 7483 IC.
6.	Design and Implement 4:1 Multiplexer using 4153 IC.
7.	Design and Implement 1:4 Demultiplexer using 74155 IC.
8.	Verification of state table of RS, JK, T and D flip flop using logic gates.
9.	Verify the operations of 4-bit shift register for different modes of operations.
10.	Write a program in C for Decimal to Binary conversion.
11.	Write a function in C to compute (i) 1's complement (ii) 2's complement
12.	Write a program in C to perform binary addition and subtraction (using complement operations)
13.	To demonstrate the three I/O transfer modes: Programmed I/O, Interrupt-driven I/O, and DMA.

Text Books:

1. M. Moris Mano (2006), *Computer System Architecture*, 3rd edition, Pearson/PHI, India.
2. Pratima Manhas and Shaveta Thakral, *Digital Electronics*, S.K. Kataria & sons, India
3. P. K. Sinha , *Computer Fundamentals*, 8th edition , BPB Publications, India

Other References:

1. William Stallings (2010), *Computer Organization and Architecture- designing for performance*, 8th edition, Prentice Hall, New Jersy.
2. Anrew S. Tanenbaum (2006), *Structured Computer Organization*, 5th edition, Pearson Education Inc,
3. John P. Hayes (1998), *Computer Architecture and Organization*, 3rd edition, Tata McGrawHill
4. Carl Hamacher, Zvonks Vranesic, SafeaZaky (2002), *Computer Organization*, 5th edition, McGraw Hill, New Delhi, India.

Course Code	Course Title	L	T	P	Credits
BCA-122A	**Programming with Python** (Pre-requisite: None)	3	0	0	3
		CIE	SEE	Total	
		40	60	100	

Course Outcomes (COs): At the end of this course, students will be able to

BCA-122A.1	Understand the fundamentals of Python programming.
BCA-122A.2	Analyze and implement operators and control structures in Python.
BCA-122A.3	Utilize ordered data objects including string, list and tuple.
BCA-122A.4	Utilize unordered data objects including set and dictionary and design functions.

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
BCA-122A.1	3	2	2	-	-	-	-	2	1	1
BCA-122A.2	3	3	3	3	2	2	-	-	1	1
BCA-122A.3	3	3	3	3	2	2	-	2	2	3
BCA-122A.4	3	3	3	3	2	2	-	2	2	3

Course Contents:

| **UNIT-I**   **Contact Hours: 9**

Basics of Python

Overview and applications areas of Python, Python installation, Comments, Keywords, Identifiers, Variables declaration, Standard Data types, id(), type(), quotations for string literals, data type conversion methods, Input/Output statements, escape characters, round( ), importing 'math' package

| **UNIT-II**   **Contact Hours: 11**

Operators and Control statements in Python

Operators: Arithmetic, Assignment, Comparison, Logical, Bitwise, Reference or identity (is/ is not), Membership (in /not in)

Control Statements: conditional statements (if, else, elif), loop statements (for, while), break, continue, pass statement.

| **UNIT-III**   **Contact Hours: 13**

Ordered Data Objects

Ordered Data Objects: String: declaration, indexing, len(), concatenation, repetition, 'in'/'not in' operator, slice, Traversal, Built-in functions; List: declaration, indexing, len(), creating list using range(), list with initial values, converting string to list, concatenation, repetition, 'in'/'not in' operator, slice, traversal, built-in functions; Tuple: declaration, indexing, len( ), creating tuple using range(), tuple with initial values, converting string to tuple, converting list to tuple, concatenation, repetition, 'in'/'not in' operator, slice, traversal, built-in functions.

| **UNIT-IV**   **Contact Hours: 12**

Unordered Data Objects and Functions

Unordered Data Objects: Set: Roster and Rule form, len(), converting list to set and set to list, Built-in functions, Set operations;   Dictionary: declaration, len(), inserting and accessing a value, keys(), values(), items(), Built-in functions

Functions: defining a function, calling a function, keyword arguments, default arguments, variable length arguments, scope of variables, Recursive function, map(), Lambda function

Text Books:
1. E. Balagurusamy, *Introduction to Computing and Problem Solving Using Python*, McGrawHill Education
2. Yashavant Kanetkar, Aditya Kanetkar, *Let us Python*, BPB Publications
3. Bob Dowling, *An introduction to Python for absolute beginners*, Cambridge University Press.
4. Vamsi Kurama, *Python Programming: A Modern Approach*, Pearson Education
5. Sheetal Taneja, Naveen Kumar, *Python Programming A Modular Approach*, Pearson
6. Rao R. Nageswara , *Core Python Programming*, Dream Tech, New Delhi

Reference Books:
1. Mark Lutz, *Learning Python*, 5th edition, O'Reilly.
2. Martin C. Brown, *Python: The Complete Reference*, McGraw-Hill

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Course Code	Course Title	L	T	P	Credits
BCA-192A	**Programming with Python Lab** (Pre-requisite: Python)	0	0	4	2
		CIE	SEE	Total	
		50	50	100	

Course Outcomes (COs): At the end of this course, students will be able to

BCA-192A.1	Implement basic Python programs.
BCA-192A.2	Apply operators and control structures in Python.
BCA-192A.3	Design Python programs utilizing ordered data objects.
BCA-192A.4	Design Python programs using unordered data objects and functions.

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
BCA-192A.1	3	2	3	-	-	-	-	2	1	1
BCA-192A.2	3	3	3	3	2	2	-	2	1	1
BCA-192A.3	3	3	3	3	2	2	-	2	2	3
BCA-192A.4	3	3	2	3	2	2	-	2	2	3

List of Experiments	
No.	**Experiment Detail**
1.	Assume you travel 80 km to and fro in a day. Fuel Cost is INR 80 per liter and your vehicle's Fuel Average is 18 km/litre. Write a Python program to calculate the Driving Cost per day.
2.	Write a program to calculate the area and circumference of a circle for the given radius as input.
3.	Write a program to make use of various Data conversion methods in Python.
4.	Write a Python program which iterates the integers from 1 to 30 (included). if number is divisible by 3 print "PIET", if number is divisible by 5 print "DCA". if number is divisible by both 3 and 5 print "PIET & DCA" and otherwise print the number itself.

5.	Write a Python program to display the following pattern for the given input of no. of lines.
	  1
	  121
	  12321
	 1234321

6.	Write a program to check whether the given integer number is Palindrome or not.
7.	Assuming your weight in kilogram and height in meters, calculate your Body Mass Index (BMI) value using the formula BMI=weight/(height*height) Height is given in (feet.inches) form and weight is given in kgs and to convert total height in meters consider 1 Feet = 0.3048 meter and 1 Inch = 0.0254 meter
8.	Create a list of city names from the given list where city name contains substring 'pur' cities=['Jaipur','Ambala','Nagpur','Kanpur','Karnal','Sholapur']
9.	Wrtie a program to remove leading and trailing blank spaces from string items in the list animals = [' monkey ', ' pitbull dog ', ' rabbit ']
10.	Book order is given as list of sublists with the following items Order Number Book Title Author Quantity Unit Price 34587 Learning Python Mark Lutz 4 40.95 98762 Programming Python Mark Lutz 5 56.80 77226 Head First Python Paul Barry 3 32.95 Write a Python program to generate the Order summary in this List of tuple form

	[('34587', 163.8), ('98762', 284.0), ('77226', 108.85)] Where first item in the tuple is Order Number, second item is Net Price i.e. Quantity*Unit Price if Net Price < 100.00 it should be increased by Rs. 10.
11.	employees=['Gurpreet','Manjot','Shabadpreet','Gurleen','Vishal','Noor','Navjeet'] gym_members=['Shabadpreet','Vishal','Navjeet'] developers=['Shabadpreet','Gurpreet','Gurleen','Manjot','Navjeet'] From the above given lists write Python program to answer the following queries: i) List all employees who have gym membership and also developers ii) List all the employees who are not either gym members or developers
12.	A string is given to you e.g. "aabaacdaadd". Create a dictionary of each character in the given string and its frequency, i.e. output={'a': 6, 'b': 1, 'c': 1, 'd': 3}
13.	In a shop store, data operator enters Item Name, Quantity sold and its Unit Price one by one till 'CLOSE' is entered. Create Python dictionary of Item Name and its Net Price. **Sample Input**: BANANA FRIES 2 20.60 POTATO CHIPS 3 15.50 APPLE JUICE 10 100.75 CANDY 5 2.50 APPLE JUICE 6 100.75 CANDY 5 2.50 CANDY 5 2.50 BANANA FRIES 3 20.60 CANDY 5 2.50 POTATO CHIPS 5 15.50 CLOSE **Sample Output:** {'BANANA FRIES': 103.0, 'POTATO CHIPS': 124.0, 'APPLE JUICE': 1612.0, 'CAND Y': 50.0}
14.	Write a function to make use of variable length arguments.
15.	Write a Recursive function to generate ith term of a Fibonacci Series 0,1,1,2,3,5,8,13,... Generate n terms of Fibonacci Series using this recursive function.

Text Books:
1. E. Balagurusamy, *Introduction to Computing and Problem Solving Using Python*, McGrawHill Education
2. Yashavant Kanetkar, Aditya Kanetkar, *Let us Python*, BPB Publications
3. Bob Dowling, *An introduction to Python for absolute beginners*, Cambridge University Press.
4. Vamsi Kurama, *Python Programming: A Modern Approach*, Pearson Education
5. Sheetal Taneja, Naveen Kumar, *Python Programming A Modular Approach*, Pearson
6. Rao R. Nageswara , *Core Python Programming*, Dream Tech, New Delhi

Reference Books:
1. Mark Lutz, *Learning Python*, 5th edition, O'Reilly.
2. Martin C. Brown, *Python: The Complete Reference*, McGraw-Hill

Course Code	Course Title	L	T	P	Credits
BCA-377A	**Industrial Internship** (Pre-requisite: None)	0	0	0	4
		CIE	**SEE**	**Total**	
		100	-	100	

Course Outcomes (COs): At the end of this course, students will be able to

BCA-377A.1	Examine and evaluate problems given by industry.
BCA-377A.2	Learn professional skills such as teamwork, communication, and project management in an industry setting.
BCA-377A.3	Employ industry-standard tools and technologies to successfully complete assigned tasks and projects.
BCA-377A.4	Develop comprehensive documentation summarizing project outcomes, and detailing the skills acquired during the internship.

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
BCA-377A.1	2	3	-	–	–	-	–	–	2	2
BCA-377A.2	2	–	–	3	3	3	2	3	2	2
BCA-377A.3	3	3	3	3	3	2	-	2	3	3
BCA-277A.4	2	–	3	3	3	-	2	3	-	-

Guidelines for Industrial Training/ Internship: This course requires students to participate in professional employment-related activity or work experience or co-operative education activity with an entity external to the educational institution, normally under the supervision of an employee of an organization or an individual professional. A key aspect of the internship is induction into actual, formal, and organized work situation. Internship involves working with government or private industry, training or high-end educational organizations (such as IITs, etc.), business establishments, etc. to provide opportunities for students to actively engage in on-site experiential learning.

a) The candidate shall be required to undergo industrial trainings /internships of the specified duration, provided in the Scheme of Studies and Examinations, in an industry/ business enterprise/ organization approved by the Head of the Department.

b) If the concerned Department perceives any limitations from the industry to accommodate all the enrolled students, a student may be permitted to complete a skill-oriented e-content course (of sufficient duration) relevant to the industry or undertake a project-based / research project under the supervision of a faculty of a premier Institute (such as I.I.T., I.I.Sc.) with prior approval from the competent authority.

c) The Training will be completed under the supervision of the officer (herein called Co. Training Supervisor) of the Company/ Organization under whose guidance and supervision the training was allotted to the candidate.

d) A student can do industrial training/internship of 45-60 days duration during summer vacation after the 2nd or 4th semester before taking an exit or completing the degree programme in the respective discipline. It will be of 4 credits.

e) If a student pursues 3 years UG Programme in respective discipline without taking Exit option, this internship (either done after 2nd or 4th semester) will be taken into account in 5th semester.

f) If a student takes Exit after 2 years in UG Programme, this internship (either done after 2nd or 4th semester) will be taken into account in 4th semester.

g) If a student takes Exit after 1 year in UG Programme, the mandatory internship done after 2nd semester will be taken into account in 2nd semester.

h) However, for those students who have taken lateral entry into the 3rd semester and have completed internship of 45-60 days duration during first year, the internship is not required after the 4th semester.

i) The candidates are required to submit a comprehensive report Training Supervisor within two weeks of completion of the training along with Co. Training Supervisor's Certificate in the beginning of the report stating that the report is an outcome of the work done by the candidate during his/her training.

j) The viva-voce shall be held by Internal Examiner within two weeks after submission of the report.

k) The Industrial Training/ Internship has only CIE component of 100 marks that shall be conducted as given in Table-1.

Table-1: Relative Weightages of Industrial Training/ Internship

Component	Description of the Component		Relative Weightage (Out of 100)
CIE	i)	Internship Synopsis Evaluation within 10 days of start of Internship	20
	ii)	Mid-Term Internship Evaluation	30
	iii)	Final Presentation and Internship Evaluation	50
		CIE Total	**100**
SEE	NIL		NIL
		Grand Total	**100**

Syllabus of the Courses offered by other Departments for
Bachelor of Computer Applications (AIML)
Semester –II

Course Code	Course Title	L	T	P	Credits
ASH-MAT-122A	**Mathematics for Computing - II** (Pre-requisite: None)	2	0	0	2
		CIE	SEE	Total	
		40	60	100	

Course Outcomes (COs): At the end of this course, students will be able to

ASH-MAT-122A.1	Understand and apply the basic concepts and operations of matrices, including determinants, adjoints, inverses, and solving systems of linear equations.
ASH-MAT-122A.2	Analyze matrix methods using rank, echelon form, eigenvalues, eigenvectors, to solve linear systems.
ASH-MAT-122A.3	Understand and analyze vector spaces and subspaces; determine linear dependence or independence, basis, and dimension for given vectors.
ASH-MAT-122A.4	Apply fundamental operations of vector calculus to compute dot and cross products, and evaluate gradient, divergence, and curl.

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
ASH-MAT-122A.1	3	2	-	2	-	-	-	2	2	2
ASH-MAT-122A.2	3	3	2	2	-	-	-	2	2	2
ASH-MAT-122A.3	3	2	2	2	-	-	-	2	2	2
ASH-MAT-122A.4	3	2	-	2	-	-	-	2	2	2

Instructions for Paper Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

<div align="center">

UNIT-I   **Contact Hours: 7**

</div>

Unit-I Matrices-I

An introduction to matrices and their types (except complex matrices), Operations on matrices, Symmetric and skew-symmetric matrices, Minors, Co-factors. Determinant of a square matrix, Adjoint and inverse of a square matrix, Solutions of system of Linear equations of three variables

<div align="center">

UNIT-II   **Contact Hours:8**

</div>

Unit-II Matrices-II

Elementary Row and Column operations, Echelon form of a matrix, Rank of a matrix, Normal form, Eigen values and Eigen vectors, Solutions of systems of homogeneous and non-homogeneous equations by the Gauss elimination method with consistent and inconsistent solutions, Cayley Hamilton Theorem.

<div align="center">

UNIT-III   **Contact Hours: 7**

</div>

Unit-III Vector Space

Definition of Vector Space and Subspace with example, Linear Combination of Vectors, linear dependence and Independence of vectors, Basis, dimension; Finding a basis of a vector space (2D and 3D vectors).

<div align="center">

UNIT-IV   **Contact Hours: 8**

</div>

Unit-IV Vector Calculus

Vector Calculus: Scalars, vectors, dot product and cross product of vectors, partial differentiation of scalar and vector point function, basic concepts of - gradient of scalar, divergence and curl of a vector.

Text Books:
1. Shanti Narayan , P.K. Mittal, *A Text book of Matrices*, S. Chand Publications
2. Murray Spiegel, Seymour Lipschutz, Dennis Spellman, *Schaum's Outlines Vector Analysis,* McGraw-Hill Education
3. David C. Lay, *Linear Algebra and Its Applications*, Pearson

Other References:
1. Gilbert Strang, *Introduction to Linear Algebra*, Wellesley-Cambridge Press
2. Gene H. Golub and Charles F. Van Loan, *Matrix Computations*, Hindustan Book Agency

Course Code	Course Title	L	T	P	Credits
ASH-HUM-107A	**Universal Human Values** (Pre-requisite: None)	2	0	0	2
		CIE	SEE	Total	
		40	60	100	

Course Outcomes (COs): At the end of this course, students will be able to

ASH-HUM-107A.1	Understand the importance of value, types and roles of values in personal and societal development.
ASH-HUM-107A.2	Understand and apply principles of inner harmony to enhance overall well-being and foster balanced personal development
ASH-HUM-107A.3	Understand principles of harmonious relationships to promote unity and cooperation within families, society and nature.
ASH-HUM-107A.4	Understand the difference between ethical and unethical practices

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
ASH-HUM-107A.1	2	-	2	-	2	-	-	2	-	-
ASH-HUM-107A.2	-	-	-	-	2	-	-	2	2	2
ASH-HUM-107A.3	-	-	2	-	3	2	3	2	-	-
ASH-HUM-107A.4	-	-	2	-	-	-	3	2	-	2

Instructions for Paper Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

UNIT-I   **Contact Hours: 7**

Introduction to Value Education

Value Education - Definition, concept and need, the content and process of value education, basic guidelines for value education, self-exploration as a means of value education, happiness and prosperity as parts of value education.

UNIT-II   **Contact Hours: 8**

Harmony in the Human Being

Human being is more than just the body, harmony of the self ('I') with the body, understanding myself as co-existence of the self and the body, understanding needs of the self and the needs of the body, understanding the activities in the self and the activities in the body.

UNIT-III   **Contact Hours: 8**

Harmony in the Family and Nature

Harmony in the Family: Family as a basic unit of human interaction and values in relationships; The basics for respect and today's crisis: affection, guidance, reverence, glory, gratitude and love; Comprehensive human goal: the five dimensions of human endeavor;
Harmony in Nature: the four orders in nature, the holistic perception of harmony in existence.

UNIT-IV   **Contact Hours: 7**

Social and Professional Ethics

Social and Professional Ethics: The basics for ethical human conduct, defects in ethical human conduct, holistic alternative and universal order, universal human order and ethical conduct. Value based life and profession, professional ethics and right understanding, competence in professional ethics; Issues in professional ethics – the current scenario.

Practice Sessions:
Unit-1

- To discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

Unit-2
- To discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation.

Unit-3
- To reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives. To discuss human being as cause of imbalance in nature.

Unit-4
- To explore ethical human conduct and steps of transition towards universal human order.

Text Books:
1. A. N. Triparty, *Human Values,* New Age International Publishers
2. Bajpai, B. L., *Human Values and Professional Ethics*, New Royal Book Co, Lucknow, Reprinted

Other References:
1. Gaur. R. R., Sangal R., Bagaria. G. P., *A Foundation Course in Value Education*, Excel Books
2. I. C. Sharma. *Ethical Philosophy of India*, Nagin & Co., Jalandhar

Course Code	Course Title	L	T	P	Credits
ASH-HUM-118A	**English Language and Communication-2** (Pre-requisite: English Language and Communication-1)	2	0	0	2
		CIE	SEE	Total	
		40	60	100	

Course Outcomes (COs): At the end of this course, students will be able to

ASH-HUM-118A.1	Understand the basic concepts of English Grammar.
ASH-HUM-118A.2	Use appropriate reading skills in professional communication.
ASH-HUM-118A.3	Use appropriate writing styles in professional communication.
ASH-HUM-118A.4	Apply interview and presentation skills.

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
ASH-HUM-118A.1	2	2	-	-	2	2	2	2	-	-
ASH-HUM-118A.2	2	3	2	2	2	-	2	2	-	-
ASH-HUM-118A.3	2	2	2	2	3	2	2	3	2	2
ASH-HUM-118A.4	2	3	2	2	3	2	3	2	-	-

Instructions for Paper Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

UNIT-I   Contact Hours: 8

Basic Language Skills:

Basic Language Skills: Parts of Speech, Subject-Verb agreement, Articles, Transformation of Sentences (Simple, Compound, Complex) and Tenses..

UNIT-II   Contact Hours: 7

Reading Skills

Reading Skills: Reading with fluency and speed, Skimming and scanning, Identifying relevant information, Isolating fact from opinion, Understanding concepts and arguments, Identifying distinctive features of language (Passage should be of 250-350 words of Level I. The passage may be taken from literary/scientific/technical writing as well as from the fields of journalism, management and commerce.)

UNIT-III   Contact Hours: 8

Writing Skills

Writing Skills (Formal Correspondence): Letters, Job Application Letter, Statement of Purpose, Request for Recommendation Letter, Request for information under Right to Information Act (RTI)
Writing Skills: Essay, Expository, Persuasive, Analytical and Reflective/Descriptive

UNIT-IV   Contact Hours: 7

Interview and Presentation skills

Interview Skills: Purpose of an interview, Do's and Don'ts of an interview
Giving Presentations: Dealing with Fears, Planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery

Text Books:
1. Bellare, Nirmala. *Reading Strategies. Vols. 1 and 2.* New Delhi. Oxford University Press.
2. Brown, Ralph, *Making Business Writing Happen: A Simple and Effective Guide to Writing Well,* Allen and Unwin, Sydney.

3. Hamp-Lyons, Liz and Ben Heasiey, *Study Writing: A Course in Writing Skills for Academic Purposes*, Cambridge University Presss

Reference Books:
1. Jakeman, Vanessa and Clare McDowell. *Cambridge Practice Test for IELTS 1*, Cambridge University Presss.
2. Mohan Krishna and Banerji, Meera, *Developing Communication Skills,* Macmillan India, New Delhi
3. Mohan Krishna and Singh, N. P., *Speaking English Effectively*, Macmillan India, New Delhi.
4. Savage, Alice, *Effective Academic Writing,* Oxford University Press.

Webliography:
1. https://www.onestopenglish.com/
2. https://www.britishcouncil.org/learning-learn-english.htm
3. http://www.teachingeng1ish.org.uk
4. https://www.usingenglish.com?
5. https://www.bbc.co.uk/
6. https://www.pearsoned.co.uk/AboutUs/ELT/
7. https://www.howisay.com/
8. https://www.thefreedictionary.com/
9. Online English Grammar Book | ENGLISH PAGE

Course Code	Course Title	L	T	P	Credits
ASH-HUM-119A	Indian Knowledge System (Pre-requisite: None)	2	0	0	2
		CIE	SEE	Total	
		40	60	100	

Course Outcomes (COs): At the end of this course, students will be able to

ASH-HUM-119A.1	Identify the concept and importance of Traditional knowledge.
ASH-HUM-119A.2	Illustrate the various enactments related to the protection of traditional knowledge.
ASH-HUM-119A.3	Interpret the concepts of Intellectual property to protect the traditional knowledge.
ASH-HUM-119A.4	Explain the importance of Traditional knowledge in Agriculture and Medicine.

Course Outcomes (CO) to Program Outcomes (PO) mapping (scale 1: Low, 2: Medium, 3: High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
ASH-HUM-119A.1	-	2	2	-	-	1	3	2	-	-
ASH-HUM-119A.2	-	2	2	-	-	1	3	2	-	-
ASH-HUM-119A.3	-	2	2	-	2	2	3	2	-	-
ASH-HUM-119A.4	-	2	3	-	2	2	3	2	-	-

Instructions for Paper Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

UNIT-I   **Contact Hours: 8**

Introduction and Protection to Traditional Knowledge

Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, Indigenous Knowledge (IK), characteristics, traditional knowledge vis-a-vis indigenous knowledge, traditional knowledge versus western knowledge traditional knowledge.
The need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

UNIT-II   **Contact Hours: 7**

Legal framework and Traditional Knowledge

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill.

UNIT-III   **Contact Hours: 8**

Traditional knowledge and intellectual property

Traditional knowledge and intellectual property**:** Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge

UNIT-IV   **Contact Hours: 7**

Traditional Knowledge in Different Sectors

Traditional Knowledge in Different Sectors**:** Traditional knowledge and engineering, Traditional medicine system, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK

Text Books:
1. Amit Jha, *Traditional Knowledge System in India*, Atlantic publishers, 2002.
2. Kapil Kapoor, Michel Danino, *Knowledge Traditions and Practices of India,* Central Board of

Secondary Education, Delhi

3. Dr. Rohidas Nitonde, *Introduction to Indian Knowledge System: A Textbook for UG Students as per NEP 2020,* Notion Press

Reference Books:
1. B. Mahadevan, Vinayak Rajat Bhat, and Nagendra Pavana R.N., *Introduction to Indian Knowledge System: Concepts and Applications*, PHI Learning

Online Videos Tutorials:
1. https://www.youtube.com/watch?v=LZP1StpYEPM

2. http://nptel.ac.in/courses/121106003/