Department of Computer Applications
4 Years BCA Structure
Pattern: 2024-25

RSCOE

Dr. Rinku Dulloo	Dr. Ram Joshi	Dr. Rakesh Jain
Chairman BOS	Dean Academics	Director

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Chairman BOS

Dr. Ram Joshi
Dean Academics

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Tathawade, Pune-411 033

Dr. Rakesh Jain
Director

Department of Computer Applications

Vision

"To progress as a center of brilliance in computing education producing globally proficient professionals contributing to the betterment of the society."

Mission

1. To educate students in the basic standards of Software Engineering
2. To educate students to become successful professionals
3. To propel students for research and entrepreneurship

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Dr. Rinku Dulloo Chairman BOS	Dr. Ram Joshi Dean Academics	Dr. Rakesh Jain Director

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Program Outcomes (POs)

PO1: Computational Knowledge: Apply knowledge of computing fundamentals and domain knowledge.
PO2: Problem Analysis: Identify, formulate and solve complex computing problems reaching substantiated conclusions.
PO3: Development of Solutions: Design and evaluate solutions for complex computing problems with appropriate consideration.
PO4: Investigations of complex Computing problems: Use research-based knowledge and research methods for analysis and interpretation of data, and synthesis of the information to provide valid conclusions
PO5: Modern Tool Usage: Create, identify and apply appropriate techniques, resources, and modern computing tools to complex computing activities.
PO6: Professional Ethics: Understand and commit to professional ethics and cyber regulations for professional computing practices.
PO7: Life-long Learning: Identify the need and have the ability, to engage in independent learning as a computing professional.
PO8: Project management and finance: Understand and apply computing, management principles to manage multidisciplinary projects
PO9: Communication Efficacy: Communicate effectively with the computing community, and with society.
PO10: Societal and Environmental Concern: Understand and assess societal, environmental, health, safety,legal, and cultural issues
PO11: Individual and Team Work: Function effectively in diverse teams and in multidisciplinary environments.
PO12: Innovation and Entrepreneurship: Identify a timely opportunity and using innovation to pursue that opportunity.

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Program Specific Outcomes (PSOs):

Upon successful completion of UG BCA Program, the students will attain following

Program Specific Outcomes:

PSO1: Professional Skills-

To provide an opportunity to work effectively with teams and group with better communication skills in written and oral form. Also, to develop an appreciation of ethics and social awareness needed and with this to develop master for successful career and leadership position

PSO2: Problem-Solving Skills-

To prepare the students for technical and managerial skills necessary to design and implement computer applications to conduct open ended problem solving and applying critical thinking

PSO3: Professional Career and Entrepreneurship-

The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and zest for the higher studies and research and entrepreneurship

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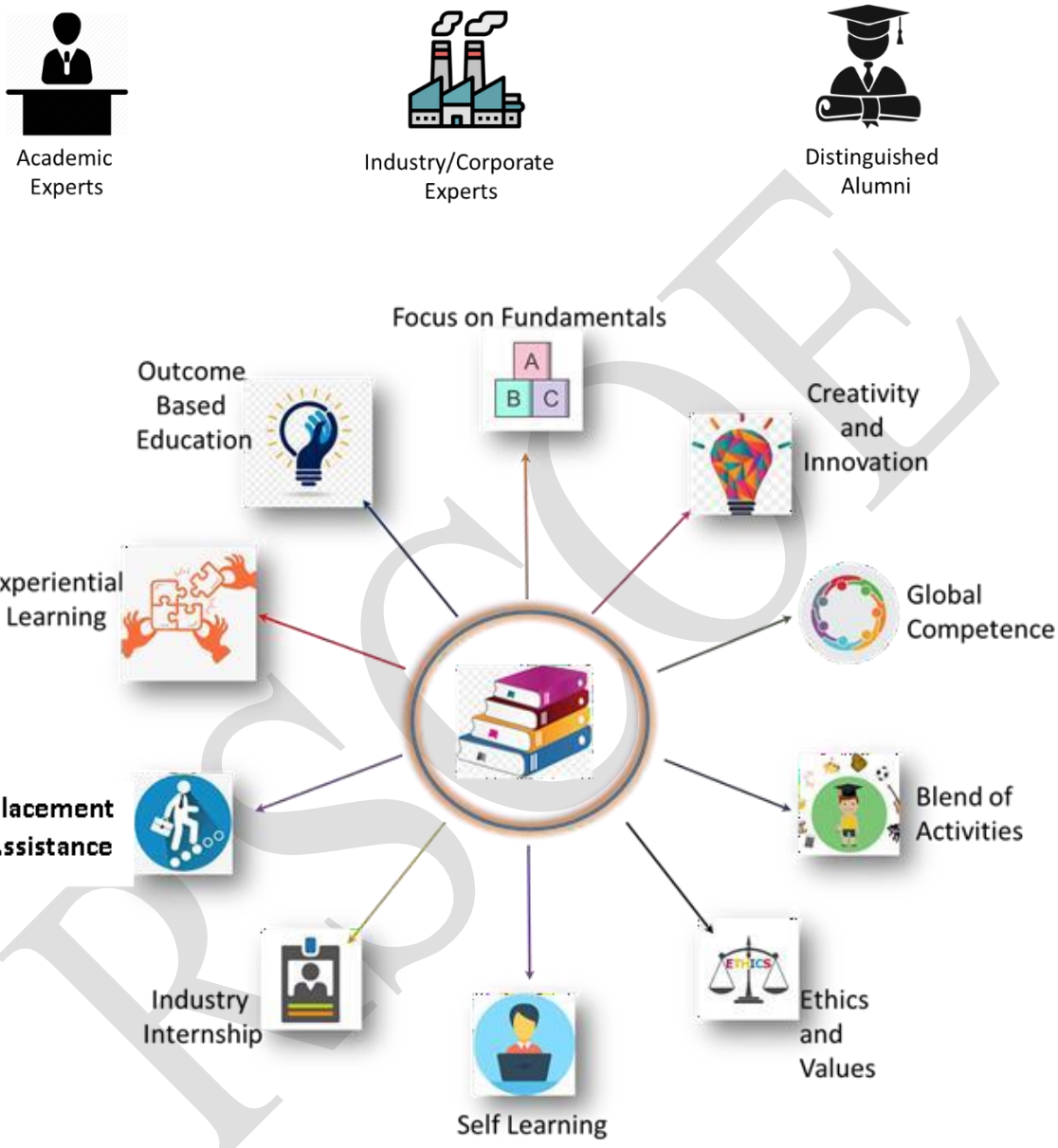
Highlights of the Syllabus

Curriculum of BCA is designed in consultation with



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Everybody knows Technology but "Application makes a Difference"

- The curriculum of BCA is designed in a way such that, students will get knowledge of most trending and "in use" industrial technologies and practices by the time they complete their post-graduation. Keeping this goal in mind updates the curriculum as and when required.
- BCA curriculum is designed to build a strong basic and clear all the fundamental concepts.
- Bridge course is introduced during the induction program for two weeks to learn basic concepts.
- Mini Projects- To understand the importance of working in teams and being part of collective success, we have incorporated Mini projects in each semester where student will work together and implement it.
- Human Values Course- RSCOE focus on the all-around development of our students. This includes refining their technical skills as well as their personal development. Human Values courses will teach them how to handle stressful situations, ethics of a professional and how to give back to the society. This will also motivate them to join the various CSR activities conducted by the company they join and help in achieving the different organizational goals of the company they join.
- Electives offered on emerging technologies. Students can opt any one as per his/her choice.
- Online Professional certification courses are enabled curriculum for all students.
- Language Proficiency – English and softt skills are included in curriculum.
- In order to make students ready for placement, gateway to industry course is given where basic aptitude and technical concepts are introduced.
- Professional communication skills course help students to develop over all personality and groom them.

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Department of Computer Applications

Semester-I

Course Code	Course Type as per NEP	Course Name	Teaching Scheme		Semester Examination Scheme of Marks				Total	Credits
					Theory					
			TH	Lab	ISE (20)	MSE (30)	ESE (50)	Laboratory		Total
BCA241101T	SEC-Skill Enhancement Course	C Programming	3	-	20	30	50	-	100	3
BCA241101L		C Programming	-	4	ISCE:60		40	100	100	2
BCA241102T	CC	Database Management SSystem	3	-	20	30	50	-	100	3
BCA241102L	CC	Database Management System	-	4	ISCE:60		40	100	100	2
BCA241103T	CC	Software Engineering	3	-	20	30	50	-	100	3
BCA241104T	CC	Fundamentals of Computer	3	-	20	30	50	-	100	3
BCAVA241105T	VA-Value Added Course	Organization Behaviour	3	-	20	30	50	-	100	3
BCAAE241106L	AEC-Ability/ Skill Enhancement Course	English Essentials	-	2	ISCE:50			50	50	1
BCAMD241107T	MDC	Generic IKS	2	-	20	30	50	-	100	2
		Total	17	10				250	850	22

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Bachelor of Computer Applications (BCA)

Semester-II

Course Code	Course Type	Course	Teaching Scheme		Semester Examination Scheme of Marks				Total	Credits
			TH	Lab	Theory			Laboratory		TOTAL
					ISE (20)	MSE (30)	ESE (50)			
BCA241201T	SEC- Skill Enhancement Course	C++ Programming	3	-	20	30	50	-	100	3
BCA241201L		C++ Programming	-	4	ISCE:60		40	100	100	2
BCA241202T	CC- Core Course	Advance Database Management System	3	-	20	30	50	-	100	3
BCA241202L		Advance Database Management System	-	4	ISCE:60		40	100	100	2
BCA241203T		Mathematics I	3	-	20	30	50	-	100	3
BCA241204T		Computer Network	3	-	20	30	50	-	100	3
BCA241205T		Operating System	3	-	20	30	50	-	100	3
BCAVA241206L	VA- Value Added Course	Environmental Studies	-	2	ISCE:50			50	50	1
BCACoC241207L	CoC- Co-curricular	Co-curricular - I	-	2	ISCE:50			50	50	1
		Total	15	12				300	800	21

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List of Exit Courses after completion of Semester I and II

1. Exit option is available for students those who have earned the total 42 credits at the End of Second Semester.

2. Student who wants to avail the exit option after second year have to earn additional 4 credits from the list of courses shown below.

3. These courses student have to complete within summer vacation after 1st Year.

4. After fulfilment as mentioned in 1 to 3 above, Students can earn **UNDER GRADUATE CERTIFICATE IN COMPUTER APPLICATION** and same will be issued by the Institute.

Sr. No.	Course code	Name	Credits
1	BCA242102T	Data Structure	2
2	BCA2422101T	JAVA	2

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Bachelor of Computer Applications (BCA)

Semester-III

Course Code	Course Type	Course	Teaching Scheme		Semester Examination Scheme of Marks					Credits
					Theory				TOTAL	TOTAL
			TH	Lab	ISE (20)	MSE (30)	ESE (50)	Laboratory		
BCA242101T	SEC	Web Technology	3	-	20	30	50	-	100	3
BCA242101L		Web Technology Lab	-	4	ISCE:60		40	100	100	2
BCA242102T	CC	Data Structure	3	-	20	30	50	-	100	3
BCA242102L		Data Structure Lab	-	4	ISCE:60		40	100	100	2
BCA242103T		Mathematics II	3	-	20	30	50	-	100	3
BCA242104T		Design & Analysis of Algorithm	3	-	20	30	50	-	100	3
BCA242105T		Multimedia Applications	3	-	20	30	50	-	100	3
HSCA2201T	HSSM	Universal Values & Ethics	2	-	ISCE:60		40	-	100	2
HSCA2202T	IC	Indian Constitution	-	1	ISCE:30		20	50	50	1
		Total	17	8				200	800	22

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Bachelor of Computer Applications (BCA)

Semester-IV

Course Code	Course Type	Course	Teaching Scheme		Semester Examination Scheme of Marks				Total	Credits
			TH	Lab	Theory			Laboratory		TOTAL
					ISE (20)	MSE (30)	ESE (50)			
BCA242201T	SEC	JAVA I	3	-	20	30	50	-	100	3
BCA242201L		JAVA I Lab	-	4	ISCE:60		40	100	100	2
BCA242202T		Advance Web Technology	3	-	20	30	50	-	100	3
BCA242202L		Advance Web Technology Lab	-	4	ISCE:60		40	100	100	2
BCA242203T	CC	Software Testing	3	-	20	30	50	-	100	3
BCA242204T		Cyber Security & Cyber Law	3	-	20	30	50	-	100	3
BCA242205T		Cloud Computing	3	-	20	30	50	-	100	3
BCACoC242206L	CoC	Co-curricular-II	-	2	ISCE:50			-	50	1
	Total		15	10				200	750	20

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CoC- List of Co – curricular –I, II

1. Social development activities: Organize cultural events,Volunteering for social work
2. Educational activities: Projects in exhibitions,Extempore
3. Recreational activities:Seminars,Workshops,Industrial visits
4. Physical development focused activities:Yoga,National cadets corps (NCC),Sports competitions, Meditation
5. Culture and value-based activity: Annual day, Cultural festivals
6. Arts and craft-based activities: Photography, Poster drawing

List of Exit Courses after completion of Semester III and IV

1. Exit option is available for students those who have earned the total 81 credits at the End of fourth Semester.

2. Student who wants to avail the exit option after second year have to earn additional 4 credits from the list of courses shown below.

3. These courses student have to complete within summer vacation after 2 nd Year.

4. After fulfilment as mentioned in 1 to 3 above, Students can earn **UNDER GRADUATE DIPLOMA IN COMPUTER APPLICATION** and same will be issued by the Institute.

Sr. No.	Course code	Name	Credits
1	BCA243101T	JAVA II	3
2	BCA243103T	PYTHON	3

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Bachelor of Computer Applications (BCA)

Semester-V

Course Code	Course Type	Course	Teaching Scheme		Semester Examination Scheme of Marks				Total	Credits
			TH	Lab	Theory			Laboratory		TOTAL
					ISE (20)	MSE (30)	ESE (50)			
BCA243101T	SEC	JAVA II	3	-	20	30	50	-	100	3
BCA243101L		JAVA II Lab	-	4	ICSE:60		40	100	100	2
BCA243102T		Python Programming	3	-	20	30	50	-	100	3
BCA243102L		Python Programming Lab	-	4	ICSE:60		40	100	100	2
BCA243105T	CC	Quantitative Techniques	3	-	20	30	50	-	100	3
BCA243106T		Object Oriented Analysis Design	3	-	20	30	50	-	100	3
HSCA3201T	VA	Innovation & Entrepreneurship	3	-	20	30	50	-	100	2
BCA243107T	DSE	Elective I	3	-	20	30	50	-	100	3
		Total	18	8	-			200	800	21

Support System Elective I			
Course	**Course Name**	**Course**	**Course Name**
BCA243107T-A	**Cloud Services**	**BCA243107T-C**	**IOT**
BCA243107T-B	**Digital Forensic**	**BCA243107T-D**	**Bootstrap Basics**

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Semester-VI(Track I)

Course Code	Course Type	Course	Teaching Scheme		Semester Examination Scheme of Marks				Total	Credits
			TH	Lab	Theory			Laboratory		TOTAL
					ISE (20)	MSE (30)	ESE (50)			
BCA243201T	SEC	Project Management	3	-	20	30	50	-	100	3
BCA243202L	MP	Major Project	-	4	ISCE:60		40	100	100	2
BCA243203T	CC	Research Methodology	3	-	20	30	50	-	100	3
HS3201T		Economics	3	-	20	30	50	100	100	2
BCA243204T	DSE	Elective II	3	-	20	30	50	-	100	3
HSCA3202L	AEC	Soft Skills	3	-	ISCE:60		40	-	100	2
		Total	15	4	-			200	600	15

Note : Major Project can be done in Python/Java/Web technology etc.

Support System Elective II			
Course	**Course Name**	**Course**	**Course Name**
BCA253204T-A	**DevOps**	**BCA253204T-C**	**Machine Learning**
BCA253204T-B	**Cyber Security Analysis**	**BCA253204T-D**	**Essentials of ReactJS**

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Bachelor of Computer Applications (BCA)
Semester-VI(Track II)

Course Code	Course Type	Course	Teaching Scheme		Semester Examination Scheme of Marks				Total	Credits
			TH	Lab	Theory			Laboratory		TOTAL
					ISE (20)	MSE (30)	ESE (50)			
BCA3106-I		Self Learning Course	-	-	ISCE:50		50	-	100	2
BCA3107-I		Industrial Internship	-	-	ISCE:200		200	-	400	12
	Total				-				500	14

BACHELOR IN COMPUTER APPLICATION Degree will be awarded, if a student wishes to exit at the end of Third year.

Exit Criteria after Third Year of BCA Programme - The students shall have an option to exit after 3rd year of Computer Application Program and will be awarded with a Bachelor's in Computer Application.

Re-entry Criteria in to Fourth Year (Seventh Semester) The student who takes an exit after third year with an award of BCA may be allowed to re-enter in to Seventh Semester for completion of the BCA (Honours) or BCA (Honours with Research) Program as per the respective University / Admitting Body schedule after earning requisite credits in the Third year.

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Semester-VII (BCA(Honors))
Specialisation- AI and ML

Course Code	Course Type	Course	Teaching Scheme		Semester Examination Scheme of Marks				Total	Credits
			TH	Lab	Theory			Laboratory		TOTAL
					ISE (20)	MSE (30)	ESE (50)			
BCA244101T-A	Skill Enhancement Course	Basics of Artificial Intelligence	3	-	20	30	50	-	100	3
BCA244102L-A		Basics of Artificial Intelligence	-	4	ISCE:60		40	100	100	2
BCA244103T-A		Distributed Computing for AI	3	-	20	30	50	-	100	3
BCA244104L-A		Distributed Computing for AI	-	4	ISCE:60		40	100	100	2
BCA244105T-A	CC- Core Course	Cognitive computing	3	-	20	30	50	-	100	3
BCA244106T-A		Natural Language Processing (NLP)	3	-	20	30	50	-	100	3
BCA244107-A	CEP-Community Engagement Project	Community Engagement Project		8	ISCE:120		80	200	200	4
		Total	12	16	-			400	800	20

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Semester-VII (BCA(Honors))
Specialisation- Data Science

Course Code	Course Type	Course	Teaching Scheme		Semester Examination Scheme of Marks				Total	Credits
			TH	Lab	Theory			Laboratory		TOTAL
					ISE (20)	MSE (30)	ESE (50)			
BCA244101T-B	SEC- Skill Enhancement Course	Python for Data Science	3	-	20	30	50	-	100	3
BCA244102L-B		Python for Data Science	-	4	ICSE:60		40	100	100	2
BCA244103T-B		Machine Learning	3	-	20	30	50	-	100	3
BCA244104L-B		Machine Learning	-	4	ICSE:60		40	100	100	2
BCA244105T-B	CC- Core Course	Inferential Statistics	3	-	20	30	50	-	100	3
BCA244106T-B		Predictive Modelling	3	-	20	30	50	-	100	3
BCA244107-B	CEP- Community Engagement Project	Community Engagement Project		8	ICSE:120		80	200	200	4
	Total		12	16	-			400	800	20

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Semester-VII (BCA(Honors))
Specialisation- Cyber Security

Course Code	Course Type	Course	Teaching Scheme		Semester Examination Scheme of Marks				Total	Credits
			TH	Lab	Theory			Laboratory		TOTAL
					ISE (20)	MSE (30)	ESE (50)			
BCA244101T-C	SEC- Skill Enhancement Course	Digital security and Forensics	3	-	20	30	50	-	100	3
BCA244101L-C		Digital security and Forensics	-	4	ICSE:60		40	100	100	2
BCA244102T-C		Network security	3	-	20	30	50	-	100	3
BCA244102L-C		Network security	-	4	ICSE:60		40	100	100	2
BCA244103T-C	CC- Core Course	Fundamentals of cyber security	3	-	20	30	50	-	100	3
BCA244104T-C		Cyber Law and Regulations	3	-	20	30	50	-	100	3
BCA244105-C	CEP- Community Engagement Project	Community Engagement Project		8	ICSE:120		80	200	200	4
	Total		12	16	-			400	800	20

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Semester-VII (BCA(Honors))
Specialisation- Research

Course Code	Course Type	Course	Teaching Scheme		Semester Examination Scheme of Marks				Total	Credits
			TH	Lab	Theory			Laboratory		TOTAL
					ISE (20)	MSE (30)	ESE (50)			
BCA244101T-D	SEC- Skill Enhancement Course	Research Methodology	2	-	20	30	50	-	100	2
BCA244101L-D		Research Methodology		2	ICSE:60		40	100	100	2
BCA244102T-D		Advance Data Analytics	2	-	20	30	50	-	100	2
BCA244102L-D		Advance Data Analytics	-	4	ICSE:60		40	100	100	2
BCA244103-D		Mini Research Project		8	20	30	50	-	100	4
BCA244104-D		Self Learning (Research)								4
BCA244105-D		Review Paper published / presented in UGC care								2
		Total	18	8	-		380	200	800	20

Eligibility for admission to the UG Bachelor's Degree with Research: Minimum CGPA/CPI of 7.5 or minimum 75% after sixth semester for UG Bachelor's Degree

Note: In Advance Data Analytics Tools like Power BI, Tableau etc can be considered.

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Semester-VIII (BCA(Honors))
Specialisation- AI and ML/ Data Science/ Cyber Security

Course Code	Course	Teaching Scheme		Semester Examination Scheme of Marks				Total	Credits
		TH	Lab	Theory			Laboratory		TOTAL
				ISE (20)	MSE (30)	ESE (50)			
BCA244201	Self Learning Course(Swayam/ NPTEL/ Coursera)			ICSE:60		40	100	100	2
BCA244202	Dissertation			ICSE:360		240		600	18
Total								700	20

Semester-VIII (BCA(Honors))
Specialisation- Research

Course Code	Course	Teaching Scheme		Semester Examination Scheme of Marks				Total	Credits
		TH	Lab	Theory			Laboratory		TOTAL
				ISE (20)	MSE (30)	ESE (50)			
BCA244201	Self Learning Course(Swayam/ NPTEL/ Coursera)			ICSE:60		40	100	100	2
BCA244202	Dissertation			ICSE:360		240		600	18
Total								700	20

Eligibility for admission to the UG Bachelor's Degree with Research: Minimum CGPA/CPI of 7.5 or minimum 75% after sixth semester for UG Bachelor's Degree

Note: The Self Learning Course(Swayam/ NPTEL/ Coursera will be related to research only)

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Course Type Abbreviations

SEC: Skill Enhancement Course

CC : Core Course

HSSM : Humanities Social Science and Management

AEC : Ability Enhancement Course

IKS : Indian Knowledge System

VEC : Value Education Course

CoC : Co-curicullar Course

MP : Major Project

CEP : Community Engagement Project

Total Marks	6100
Total credits SEC	51
Total Credits Core Course	57
Total Credits Ability/Skill Enhancement	02
Total Credits Value Added Course	04
Total Credits Major Project	03
Total Credits Multi-Disciplinary Elective course	02
	160

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F. Y. BCA
Academic Year – 2024-2025 Semester -I
[BCA241101T]: C Programming

Teaching Scheme:	Credit	Examination Scheme:
TH: - 03 Hours/Week	TH: 03	In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Prerequisites:Basic knowledge of computer operations and understanding of fundamental programming.

Course Objective:

1. To familiarize with the basics of programming concepts, and develop a solution using C programming language.

2. To understand structured programming approach.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Understand the Fundamentals of C Programming

CO2: Implement Control Structures in C Programs

CO3: Utilize Functions for Modular Programming

CO4: Operate with Arrays and Perform Array-based Operations

CO5: Manage Strings and Perform String Operations in C

Course Contents

UNIT-I	C Fundamentals	08 Hours

History of 'C' language, Application areas, Structure of a 'C' program, C' Program development life cycle, Function as building blocks, 'C' tokens , Character set, Keywords, Identifiers , Variables, Constants (character, integer, float, string, escape sequences, enumeration constant), Data Types (Built-in and user defined data types), Operators, Expressions, types of operators, Operator precedence and Order of evaluation, Character input and output, String input and output, Formatted input and output.

UNIT-II	Control Structures	08 Hours

Decision making structures: - if, if-else, switch and conditional operator, Loop control structures: - while, do while, for, Jump statements (control transfer statements viz. goto, break, continue, return)

UNIT-III	Functions	08 Hours

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Concept of function, Advantages of Modular design, Standard library functions, User defined functions: - declaration, definition, function call, parameter passing (by value), return statement, Recursive functions, Scope of variables and Storage classes.		
UNIT-IV	**Arrays**	**08 Hours**
Concept of array, Types of Arrays – One and Multidimensional array, Array Operations - declaration, initialization, accessing array elements, Memory representation of two-dimensional array (row major and column major) Passing arrays to function, Array applications		
UNIT-V	**Strings in C**	**04 Hours**
String Literals, string variables, declaration, definition, initialization, Syntax and use of predefined string functions		

Text Books:

T1: Let Us C by Yashavant Kanetkar

T2: C: The Complete Reference by Herbert Schildt

Reference Books:

R1. C Programming by K.R. Venugopal and Sudeep R. Prasad

R2. Programming in ANSI C by E. Balagurusamy

R3. Programming in C: A Practical Approach by Ajay Mittal

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F. Y. BCA
Academic Year – 2024-2025 Semester -I
[BCA241101L]: C Programming

Teaching Scheme: PR: - 04 Hours/Week	Credit PR: 02	Examination Scheme: ISCE : 60 Marks End Sem. Exam : 40 Marks Total : 100 Marks

Course Prerequisites:Basic knowledge of computer operations and understanding of fundamental programming.

Course Objective:

1. To develop problem-solving skills using structured programming techniques.
2. To enable students to write efficient, maintainable, and modular C programs.
3. To provide hands-on experience with control structures, functions, arrays, and strings.

Course Outcome:
After successful completion of the course, students will able to:
CO1: Understand and apply the basic structure and syntax of C programs, including tokens, operators, and data types.
CO2:Develop C programs using decision-making and loop control structures to solve real-world problems.
CO3:Implement modular programming through the use of functions, including recursion and parameter passing.
CO4:Utilize arrays and perform operations such as searching, sorting, and matrix manipulation.
CO5:Work with string manipulation and predefined string functions effectively in C programs.

Lab Contents

Guidelines for Assessment

Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade / marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion,

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performance, innovation, efficient codes, punctuality and neatness.	
List of Laboratory Assignments / Experiments (to be covered)	
1	Write and execute a simple C program to demonstrate the structure of a C program.
2	Implement programs to demonstrate the use of various C tokens.
3	Programs to handle character input and output operations.
4	Programs for formatted input and output.
5	Programs to implement decision-making structures (if, if-else, switch).
6	Programs to demonstrate loop control structures (while, do-while, for).
7	Programs to use break and continue statements within loops.
8	Programs to demonstrate nested structures and unconditional branching (goto statement).
9	Programs to use standard library functions and user-defined functions.
10	Implement recursive functions.
11	Programs to demonstrate scope of variables and storage classes.
12	Programs to declare, initialize, and access array elements.
13	Programs to perform operations on two-dimensional arrays.
14	Programs to demonstrate memory representation of two-dimensional arrays.
15	Programs for passing arrays to functions.
16	Array applications such as finding maximum and minimum, counting occurrences, linear search, sorting, and matrix operations.
17	Programs to declare, define, and initialize string variables.
18	Programs to use predefined string functions for various operations on strings.

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Academic Year – 2024-2025 Semester-I

[BCA241102T]: Database Management System

Teaching Scheme:	Credit	Examination Scheme:
TH: - 03 Hours/Week	TH: 03	In Sem. Evaluation: 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1. Creation of Database and functions of Database Management System.
2. Database models, SQL and database operations, this creates a strong foundation for application database design.
3. Making aware of current databases used in industry.

Course Outcome:

After successful completion of the course, students will able to:

CO1. Understand file structure concepts, organization and applications.
CO2. Understand the database management system ,users and structure.
CO3. Understnad and implement the data models and relationship.
CO4. Implement use of SQL in querying database.
CO5. Understand the relational database design and normalization

Course Contents

UNIT-I	File Structure and Organisation	05 Hours
Introduction, Logical and Physical Files: File, File Structure, Logical and Physical File Definitions, Basic File Operations: Opening Files, Closing Files, Reading and Writing, Seeking ,File Organization-Field and Record structure in file, Record Types, Types of File Organisation: Files of Unordered Record, File of Ordered Record, Hash Files, Overview of Indexes: Dense Index ,Sparse Index		
UNIT-II	**Database Management System**	**06 Hours**
Introduction, Definition of DBMS,File Processing System VS DBMS: Limitation,Comparision,Advantages and Disadvantages of DBMS ,Users of DBMS: Database Designers, Application Programmer, Sophisticated Users, End Users,Capabilities of good DBMS,Overall System Structure.		
UNIT –III	**Data Models**	**10 Hours**
Introduction, Data Models: Object Based Logical Model,Record Based Logical Model: Relational Model,Network model,Hierarchical Model,Entity Relationship Model: Entity Set,Attribute,Relational Set,Entity Relationship Diagram,Extended features of ERD		
UNIT-IV	**Relational Databases**	**12 Hours**

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Introduction, Terms : Relation,Tuple,Attribute,Cordinality,Degree,Domain Keys: Super Key, Candidate Key, Primary Key, Foreign Key Relational Algebra: Operations : Select, Project, Union, Difference, Intersection,Cartesian Product.

UNIT-V	SQL(Structured Query Language) & Relational Database Design	07 Hours

SQL Commands and Queries: History, Basic Structure, DDL Commands, DML Commands , Simple Queries, Nested Queries, Aggregate Functions, Clauses, Normalization: Introduction, Anomalies of un normalized databases, Normalization, Normal Form: 1 NF,2 NF,3 NF

Text Books:

T1. AviSilberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, Sixth Edition
T2. Introduction to Database Systems, C,J Date, 8/e , Pearson, 2008.

Reference Books:

R1. Database Systems Concepts by Henry Korth and A.Silberschatz
R2. An Introduction to Database Systems by Bipin Desai
R3. File Structure by Micheal J.Folk,Greg,Riccardi
R4. Teach Yourself SQL in 14 days by Jeff Parkins and Bryan Morgan

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Academic Year – 2024-2025 Semester-I
[BCA241102L]: Database Management system

Teaching Scheme: PR: - 04 Hours/Week	Credit PR: 02	Examination Scheme: ISCE : 60 Marks End Sem. Exam : 40 Marks Total : 100 Marks

Course Objective:

1.Creation of Database and functions of Database Management System.

2.Database models, SQL and database operations, this creates a strong foundation for application database design.

3. Making aware of current databases used in industry.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Develop conceptual schema of database using conceptual model. Implement logical scheme of database.

CO2: Create and manage database with all integrity constraints. Perform various DDL and DML operations. Refine the scheme of database by applying normal forms.

CO3: Implement the transaction management protocols and crash recovery algorithms. Create views, procedures, functions and triggers on databases.

CO4: Create and manage NoSQL database, perform basic operations.

Lab Contents

Guidelines for Assessment

Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

List of Laboratory Assignments/Experiments (minimum -- to be covered)

1	Introduction to SQL – DDL, DML, DTL basic data types
2	Create Database, select database, Drop database
3	Create Table, Drop table, Insert Query, Select Query
4	Operators, Expressions, where clause, AND & OR clauses

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5	Update Query/Delete Query, Like clause, Limit Clause
6	Order By, Group By, With Clause, Having Clause, Distinct keyword
7	Constraints, Joins
8	Functions : Date & Time, String, Functions, Aggregate Functions
9	Alter Command

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F.Y. BCA
AcademicYear–2024-2025Semester-I
[BCA241103T]: Software Engineering

TeachingScheme:	Credit	ExaminationScheme:
TH:-Hours/Week :03	TH: 03	InSem.Evaluation : 20Marks MidSem.Exam : 30Marks EndSem.Exam : 50 Marks Total : 100 Marks

CoursePrerequisites: Understanding of different systems.

CourseObjective:

1. To understand the basic view of software Engineering
2. To provide an idea of using various process models in the software industry according to given circumstances.
3. To understand requirement specification and engineering for software development.
4. To understand and evaluate software design and coding techniques in software development process.
5. To understand and manage the effective quality management in software development process.

CourseOutcome:

After successful completion of the course, students will able to:

CO1: Conceptualize the system engineering and its elements.

CO2: Able to describe key activities in software development and the role of software modeling.

CO3: Students will be able to implement various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance while software development process

CO4: Students will able to do requirement analysis and specification process for software development..

CourseContents

UNIT-I	Overview of System Engineering	06 Hours
Introduction to System , Over View of System Design, Business System Concepts, Characteristics of a System Elements of a System , Types of Systems, Systems Models		
UNIT-II	**Introduction to Software Engineering**	**06 Hours**

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Definition of Software ,Characteristics of Software , Software Application Domain , Definition of Software Engineering , Need for software Engineering , Mc Call's Quality factors , The Software Process ,Software Engineering Practice ,Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, CMM Models.		
UNIT-III	**Software Development Methodologies**	**05 Hours**
Introduction , Activities of SDLC ,Different Approaches and Models for System Development, Waterfall Model, Spiral Model, Prototyping Model ,RAD , Rational Unified Process		
UNIT-IV	**Requirement Engineering**	**08 Hours**
Introduction, Requirement Engineering Tasks, Establishing Groundwork for understanding of Software Requirement , Requirement Gathering, Feasibility study, Fact Finding Techniques, Software requirement Specification (SRS) ,Structure and contents of SRS, IEEE standard format for SRS.		
UNIT-V	**Analysis and Design Engineering**	**05 Hours**
Introduction , What is Software Design , Levels of software Design , Design activities , Modularization, concurrency, Cohesion and Coupling ,Requirement Analysis , Activities involved in requirement analysis , Introduction to Software analysis and design Tools ,Introduction to Object oriented Analysis and design ,User Interface design , Command line interface , Graphical User interface ,Case studies		

TextBooks:

T1. System Analysis And Design By Elias M Awad

T2. Software Engineering – A practitioner's approach by Roger S. Pressman, 9th Edition

ReferenceBooks:

R1. Systems Analysis and Design Methods - SIE by Jeffrey Whitten (Author), Lonnie Bentley (Author)

R2. Shooman, "Software Engineering Design, Reliability and Management" McGraw Hill 198

R3. Fairley "Software Engineering Concepts" " McGraw--Hill Series, New York

R4. Software Engineering, Ian Sommerville, seventh edition, Pearson education

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F. Y. BCA
Academic Year – 2024-2025 Semester-I
[BCA241104T]: Fundamentals of Computer

Teaching Scheme:	Credit	Examination Scheme:
TH: -Hours/Week : 03	TH: 03	In Sem. Evaluation: 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1. Understanding System Fundamentals: Students should grasp the fundamental concepts of computer systems, including digital logic, data representation, and system components.

2. CPU and Memory Design: Gain an in-depth understanding of central processing unit (CPU) design, instruction set architecture (ISA), memory organization, and memory hierarchy.

3. Instruction Execution: Learn how instructions are fetched, decoded, and executed within the CPU, including pipelining concepts and performance optimization techniques.

4. Input / Output Systems: Understand the principles behind input/output (I/O) systems, including device interfaces, I/O organization techniques, and performance considerations.

5. Computer Arithmetic: Explore the principles of computer arithmetic, including fixed-point and floating-point number representation, arithmetic operations, and floating-point standards.

6. Parallel Processing: Study the concepts of parallel processing, multiprocessor systems, multicore processors, and their impact on system performance and scalability.

7. Memory Management: Learn about memory management techniques, virtual memory concepts, memory allocation strategies, and cache memory organization.

Course Outcome:

After successful completion of the course, students will able to:

CO1 Understanding of System Components: Students will demonstrate a comprehensive understanding of computer system components, including CPU, memory hierarchy, input/output systems, and their interactions.

CO2 Knowledge of Memory Systems: Students will gain knowledge of various number system and its inter conversion

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CO3 Proficiency in Computer Arithmetic: Students will demonstrate proficiency in computer arithmetic, including fixed-point and floating-point number representation, arithmetic operations, and IEEE floating-point standards.

CO4 Knowledge of Memory Systems: Students will gain knowledge of memory systems, including cache memory organization, virtual memory concepts, memory management techniques, and their impact on system performance.

CO5 Knowledge of Memory Systems: Students will gain knowledge of Input / Output interfaces.

CO6 Critical Thinking and Problem-Solving Skills: Students will develop critical thinking and problem-solving skills by tackling complex architectural problems, identifying performance bottlenecks, and proposing effective solutions.

Course Contents

UNIT-I	**Introduction to Computer Organization and Architecture**	7 Hours
Overview of computer organization and architecture, Historical perspective and evolution of computing systems, Role of computer organization in system design, Characteristics of Computers, Block diagram of computer, Types of computers and features, Types of Programming Languages (Machine Languages, Assembly Languages, High Level Languages)		
UNIT-II	**Digital Logic Fundamentals & Number System**	7 Hours
Introduction to Binary, Octal, Hexadecimal system, Inter Conversion, Simple Addition, Subtraction, Multiplication, Division, Boolean algebra and logic gates Combinational and sequential circuits, Arithmetic circuits (adders, subtractors)		
UNIT-III	**Central Processing Unit (CPU)**	**7 Hours**
CPU components and their functions (ALU, registers, control unit), Instruction Set Architecture (ISA) and instruction formats, CPU performance metrics (CPI, MIPS, clock cycle time)		
UNIT-IV	**Memory Hierarchy and Management**	**9 Hours**
Memory technologies (RAM, ROM, cache memory), Memory organization (virtual memory, paging, segmentation), Cache memory organization and operation (direct-mapped, set-associative, fully associative) Memory hierarchy and organization, Virtual memory concepts (paging, segmentation), Memory allocation techniques (contiguous allocation, paging, segmentation)		
UNIT-V	**I/O Organization Multiprocessor and Multicore Systems**	**9 Hours**
Input/output devices and interfaces, I/O organization techniques (programmed I/O, interrupt-driven I/O, DMA), I/O performance measures and optimization, Multiprocessor architecture, Parallel processing concepts, Multicore processors and architecture		

Text Books :

T1 "Computer Organization and Design: The Hardware/Software Interface" by David A. Patterson and John L. Hennessy

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T2 "Computer Architecture: A Quantitative Approach" by John L. Hennessy and David A. Patterson
T3 "Sructured Computer Organization" by Andrew S. Tanenbaum
T4 "Computer Systems: A Programmer's Perspective" by Randal E. Bryant and David R. O'Hallaron
T5 "Modern Operating Systems" by Andrew S. Tanenbaum and Herbert Bos
T6 "Computer Organization and Architecture: Designing for Performance" by William Stallings

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F. Y. BCA
Academic Year – 2024-2025 Semester-I
[BCA241105T]: Organisation Behaviour

Teaching Scheme:	Credit	Examination Scheme:
TH: -Hours/Week : 03	TH: 03	In Sem. Evaluation: 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Prerequisites: Basic understaning of Systems and Business.

Course Objective:

1. To expose the students to the fundamentals of Organizational Behaviour (OB) - such as working with people, nature of organizations, communication, leadership and motivation of people.
2. To help students develop a conceptual understanding of OB theories.
3. To enable the students to put the ideas and skills of OB into practice

Course Outcome:

After successful completion of the course, students will able to:

CO1. To understand the behavior of organization
CO2. Understand individual behavior in organizations, including diversity, attitudes
CO3. Justify the role of leadership qualities, motivation
CO4. To understand the dynamics of individual and organizational behavior and relationships
CO5. To understand the importance of organizational behavior in managerial functions

Course Contents

UNIT-I	Introduction to Organizational Behavior	6 Hours
Definition, Evolution of the Concept of OB, Contributions to OB by major behavioral science disciplines, Challenge and Opportunities for OB managers, Models of OB study.		
UNIT-II	**Foundations of Individual Behavior Attitudes and Job Satisfaction**	**7 Hours**
Components of Attitude, Major Job Attitude, Job Satisfaction, Personality and Values, Personality Determinants, MBTI, Big – Five Model, Values, Formation, Types of Values, Perception, Factors influencing perception.		
UNIT-III	**Motivation and Leadership**	**8 Hours**
Concept of motivation, Definition, Theories of Motivation, Maslow's need Theory, ERG Theory, Two Factor Theory, McClelland"s Theory, Equity Theory, Concept of Leadership, Theories of leadership, Traits of good Leader, Difference between Leader and Manager.		
UNIT-IV	**Groups and Teams**	**7 Hours**

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Foundations of Group Behavior, Formation of Group, Group - Classification, Properties, Roles, norms, status, size and cohesiveness, Group decision making, Understanding teams, creating effective teams, Conflict Process, Conflict management communication.

UNIT-V	Organizational Culture	7 Hours

Foundations of organization structure, organization design, organization culture, organization change, managing across cultures, human resource management policies and practices, diversity at work.

Reference Books:

R1) Kavita Singh, Organizational Behavior, Vikas Publications
R2) Robbins, Timothy Judge, SeemaSanghi, Organizational Behavior, Stephen Pearson Prentice Hall,12 edition
R3) Fred Luthans, Organizational Behavior, McGraw Hill Inc.
R4) John Newstrom and Keith Davis, Organizational Behavior, Tata McGraw Hill, 11 edition
R5) AshwaThapa, Organizational Behavior
R6). Griffin, Ricky W: Organizational Behaviour, Houghton Mifflin co., Boston.
R7). Hellreigel, Don, John W. Slocum, Jr., and Richards W. Woodman:
R8) Organizational Behavior, south western college Publishing, Ohio.
R9) Hersey, Paul, Kenneth H. Blanchard and Dewey E Johnson: Management of Organizational Behaviour: R10) Utilising Human Resources, Prentice Hall, New Delhi.
R11)Ivancevich; John and Micheeol T. Matheson: Organizational Behaviour and Management, Tata McGraw-Hill, New Delhi.
R12) Luthans, Fred: Organizational Behaviour, McGraw-Hill, New York
R13) Newstrom, John W. and Keith Davis: Organizational Behavior: Human Behavior at Work, Tata McGraw-Hill, New Delhi.
R14) Robbins, Stephen P: Organizational Behavior, Prentice hall., New Delhi.
R15) Steers Richard m. and J. Stewart black: Organizational Behavior, Hrper Collins college Publishers, New York.
R16). Sukla, Madhukar: Understanding Organizations: Organization Theory and Practice in India, Prentice Hall, New Delhi.

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Academic Year – 2024-2025 Semester-I

[BCAAE241101L]: English Essentials

Teaching Scheme:	Credit	ExaminationScheme:
PR:-Hours/Week:02	PR:01	ISCE : 50 Marks Total : 50 Marks

CourseObjective:
Prepare students to equip with the tools to express themselves accurately and assertively in both written and spokenform, thereby improving their professional and personal interactions.

CourseOutcome:
After successful completion of the course, students will able to:
CO1: Recognize fundamentals of language to enhance communication skills.
CO2: Express coherent and precise professional written communication.
CO3: Articulate persuasive and informative communication..

Course Contents

UNIT-I	Mastery in Grammar	05 Hours
Common errors, Subject – Verb – Agreement, Modal Auxiliary Verbs, Voice.		
UNIT-II	**Language Luminaries**	**05 Hours**
Phonetics, Communication – Process, Barriers, Types, Interview Techniques, Idea ExchangeForum.		
UNIT-III	**Art of Technical Writing**	**05 Hours**
Agenda of the meeting, Minutes of the meeting, Advertisement Writing, Report Writing, Email Writing.		
UNIT-IV	**Comprehensive Writing and Presentation Skills**	**05 Hours**
Introduction, Structure, Process and Implementation, Visual Data Translation, Book Analysis, Character Interaction Writing		

List of Laboratory Assignments / Experiments(to be covered)

1	Exercises based on Unit – I.
2	List of phonetic sounds along with examples Unit - II
3	Draft an informal email after completion of Unit – III.
4	Enlist rules of presentation after completion of Unit – IV.

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Textbook:

1. M Ashraf Rizvi, Effective Technical Communication, McGraw Hill Education India, 2nd Ed., 2017.
2. Meenakshi Raman and Sangeeta Sharma, Technical Communication: Principles and Practice, OxfordUniversity Press India, 3rd Ed., 2015.
Professional Communication (Global Goo English) by Dr. P. Prasad. Katson Books

Reference Books:

1. Paul V Anderson, Technical Communication, Cengage Learning, 9th Ed., 2017.
2. Susan Thurman, Only Grammar Book You Will Ever Need, Adams, 2003.
Practical English Grammar & Composition by SC Gupta, 2012.

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Academic Year – 2024-2025 Semester-I
[BCAVA241101T]: Generic IKS

Teaching Scheme:	Credit	Examination Scheme:
TH: -Hours/Week : 02	TH: 02	ISE : 20 Marks MSE : 30 Marks ESE : 50 Marks Total : 100 Marks

Course Prerequisites: Historical background of India

Course Objective:

1. Understand the foundational concepts and key tenets of Indian knowledge systems.
2. Understand various philosophical and spiritual traditions within the Indian context.
3. Examine the historical evolution of Indian literature, art, and science..

Course Outcome:

After successful completion of the course, students will able to:

CO1: Recollect the ancient Indian rich heritage through philosophy, science, spirituality and health.
CO2: Explain wisdom and moral framework to shape management skills , interpersonal and social interaction patterns required in every step of life's journey.
CO3: Develop collaborative learning to solve socio economical and Environmental problems.

Course Contents

UNIT-I	Introduction to Indian Knowledge Systems and Vedic Corpus	5 Hours

Overview of Indian Knowledge system with Ancient Indian Knowledge in Action. Shrutis with synopsis of Vedas. Message in Vedas. Application of concept in Vedas. Glimpses of Upanishads. Message of Upanishads.

UNIT-II	Wisdom through Smrutis and Foundation of Indian Education	6 Hours

Classification of Indian philosophy with Unique features. Science based knowledge from Darshanas. Wisdom through Ages, Glimpses of Kautilyas Arthashastra (Mind map on Statecraft, leadership and ethics, and Governance. for better management), Management Principles from Mahabharata. Indigenous Indian Education System overview.

UNIT-III	Health wellness and Psychology	5 Hours

Introduction wellness through Indian medical system, Glimpses of Yoga Shastra, Mind body consciousness complex. Ancient Indian approach to psychology, Contributions of Yoga to the world.

UNIT-IV	Foundational concepts for Science, Engineering and Technology through (IKS)	6 Hours

Ancient Indian Mathematics and its contribution to the world. Introduction to mathematics (number system). Binary Mathematics and Geometry.Metallurgy (Iron and steel in India and alloys). Mining and ore extraction.Surgical instruments and ship building. The great Indian Architecture and

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irrigation systems	
Guidelines for Assessment	
Assessment is a continuous assessment based on submission of the assignments, timely completion, attendance and understanding.	
List of Assignments	
1	Participation in class discussions and activities
2	Weekly quizzes to assess understanding of concepts
3	Theme based poster presentation exploring a specific aspect of Indian knowledge systems
4	Case Studies from ancient Indian knowledge and Foundational aspects of Ashtanga yoga

Text Books:

T1: An Introduction to Indian Knowledge Systems: Concepts and Applications, B Mahadevan, V R Bhat, and Nagendra Pavana R N; 2022 (Prentice Hall of India).

T2: Indian Knowledge Systems: Vol I and II, Kapil Kapoor and A K Singh; 2005 (D.K. Print World Ltd).

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F.Y. B CA
AcademicYear–2024-2025 Semester-II
[BCA241201T]: Programming in C++

TeachingScheme: TH:-Hours/Week :03	Credit TH: 03	ExaminationScheme: In Sem.Evaluation : 20Marks Mid Sem.Exam : 30Marks End Sem.Exam : 50 Marks Total : 100 Marks

Course Prerequisites:Core JAVA

Course Objective:

1. Students will be able to understand the concepts of OOProgramming and handle program for the same.
2. To develop programming skill and to solve engineering related problems using Object Oriented Programming Concepts.

Course Outcome:

After successful completion of the course,students will able to:

CO1: Understanding the concepts of C++.
CO2: Implementing the concept of classes and object to various real-world scenario**.**
CO3: Understand & Apply of the concept of Polymorphism**.**
CO4: Understand & Apply of the concept of Inheritance.
CO5: Implementation, use of file streams and exception handling.

Course Contents

UNIT-I	Introduction to OOPs	06 Hours

OOP's paradigm, evolution of programming language, Introduction to Object Oriented Programming: Object and Classes, Features of Object Oriented Programming, Data abstraction and encapsulation, Inheritance, Polymorphism, Dynamic Binding, Resilience to change, Reusability of Code, Modularity of Code, Data Types in C++, Operator and Expression Decision making and Branching Statement strings representation, string manipulation.

UNIT-II	**Programming Basics**	06 Hours

Modular programming: Classes, Object and Methods: Class Fundamentals, Declaring and Creating object, Accessing class, members and methods. Subclasses, scope of the function. Object initialization and Clean up: Constructor, parameterized Constructor, Constructor Overloading, Destructors order of construction and destruction, Static Member with constructors and destructors.

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UNIT-III	Polymorphism	08 Hours
Introduction, overloadable operators, unary operator overloading, operator keyword, binary operator overloading, concatenation of strings, comparison operator, assignment operator overloading, overloading of new and delete data conversion. Virtual Functions: Need for virtual functions, pointer to derived class objects, abstract classes, dynamic binding, virtual destructor, friend function		
UNIT-IV	**Inheritance**	**08Hours**
Inheritance: Defining a subclass, forms of inheritance, inheritance and member accessibility, constructor and destructor in derived class, overloaded member functions, Multilevel inheritance, Multiple Inheritance, Hybrid Inheritance, Hierarchical inheritance.		
UNIT-V	**File I/O Streams and Exception handling**	**07Hours**
Files: Stream Classes, Character Stream, Byte Stream, Using Stream I/O, Serialization Exception handling: Exception Handling Fundamentals, The try Block, the catch Exception Handler The try/throw/catch sequence, Uncaught Exception		

LabContents

GuidelinesforAssessment

Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well aseachLaboratoryassignmentassessmentinclude-timelycompletion,performance,innovation, efficient codes,punctualityand neatness.

ListofLaboratoryAssignments/Experiments(minimum--tobecovered)

1	Fundamental Programming with Classes, Object and Methods using C++
2	Programming with Object initialization .
3	Programming for polymorphism concepts.
4	Implementation of virtual function, friend function
5	Demonstration of Inheritance concepts.
6	Use of input output streams using file handling.
7	Programs on exception handling.

TextBooks:

T1. Object-Oriented Programming with C++, E. Balaguruswamy Tata McGraw Hill 4th Edition 2002.

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ReferenceBooks:

R1. Mastering, C++, T. Rajkumar, K.R Venugopal, T Ravikumar Tata McGraw Hill 1st Edition 2012.
R2. C++ Complete Reference, Herbert Schildt, Tata McGraw Hill, 4th Edition 2003.
R3. C++ and Object-Oriented Programming Paradigm, Debasish Jana, PHI, 3rd Edition, 2005

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F.Y. B CA
AcademicYear–2024-2025 Semester-II
[BCA241201L]: Programming in C++

TeachingScheme: LAB:-Hours / Week: 04	Credit: Lab: 02	ExaminationScheme: ISCE : 60 Marks ESE : 40 Marks Total : 100 Marks

Course Prerequisites: Basic knowledge of computer operations and understanding of fundamental programming concepts especially C Programming.

Course Objective:

1. To acquire an understanding of basic object-oriented concepts and the issues involved in effective class design.
2. To enable students to understand and implement object oriented concepts along with constructors, destructors, operator overloading, exception handling and file handling in C++ programs

Course Outcome:

After successful completion of the course, students will able to:
CO1: Demonstrate an understanding of the principles and concepts of Object-Oriented Programming
CO2: Apply C++ programming skills to create well-structured programs involving functions, data members, and member functions.
CO3: Design and implement constructors, destructors, and operator overloading to manage memory and operations efficiently.
CO4: Utilize inheritance and polymorphism to create programs with dynamic behavior.
CO5: Implement exception handling and file operations to build robust and user-friendly applications

Lab Contents

Guidelines for Assessment

Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

List of Laboratory Assignments/Experiments (to be covered)

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1.	Write and execute a simple CPP programs to demonstrate the structure of a CPP program.
2.	Develop simple programs to understand the use of manipulators in CPP.
3.	Writing program to simple input and output operations using CPP style of coding.
4.	Implement the programs based on reference variable and scope resolution operator
5.	Programs based on inline functions to understand its features.
6.	Program on function with default arguments.
7.	Fundamental Programming with Classes, Object and Methods using C++
8.	Programming with Object initialization and Clean up
9.	Programs based upon friend function
10.	Demonstrating difference between instance and class variables using static keyword
11.	Programs exhibiting the working of polymorphism using function overloading
12.	Programs exhibiting the working of polymorphism using operator overloading
13.	Demonstration of Inheritance concepts.
14.	Programs based on abstract class using virtual and pure virtual function
15.	Implementing the concept of runtime polymorphism (Function Overriding)
16.	Use of input output streams using file handling.
17.	Working on binary file handling
18.	Program to demonstrate the working of exception handling mechanism

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F. Y. - BCA
Academic Year – 2024-2025 Semester - II
[BCA241202T]: Advance Database Management System

Teaching Scheme:	Credit	Examination Scheme:
TH: - Hours/Week : 03	TH: 3	In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1. Creation of Database and functions of Database Management System.

2. Database models, SQL and database operations, this creates a strong foundation for application database design.

3. Making aware of current databases used in industry**.**

Course Outcome:

After successful completion of the course, students will able to:

CO1. Understand database concepts, applications, data models, schemas and instances.
CO2. Implement the relational database design and data modelling using entity-relationship (ER) model.
CO3. Use of SQL in querying the database.
CO4. Learn the concept of transaction processing, protocol
CO5. Learn the new emerging Technologies and Applications in database**..**

Course Contents

UNIT-I	Database Design	5 Hours

Database Design:- Database Tables and Normalization – The Need for Normalization – The Normalization Process: Inference Rules for Functional Dependencies (proof not needed) - Minimal set of Functional Dependencies - Conversion to First Normal Form, Conversion to Second Normal Form, Conversion to Third Normal Form - Improving the Design - Surrogate Key Considerations - Higher Level Normal Forms: Boyce/Codd Normal Form, Fourth Normal Form, Join dependencies and Fifth Normal Form – Normalization and Database Design.

UNIT-II	Data Storage and Querying	8 Hours

Data Storage and Querying:- RAID – File Organization – Organization of Records in Files – Indexing and Hashing: Basic concept, Ordered Indices, B+ tree Index Files: Structure of a B+- Tree (structure only, algorithms not needed) - B tree index files – Static Hashing – Dynamic Hashing – Query Processing: Overview - Selection Operation.

UNIT-III	Advance SQL	8 Hours

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Introduction ,Objectives ,Basics Concepts of SQL ,History of SQL, The Form of a basic SQL Query ,SQL Statements , Data Manipulation Language (DML) ,Viewing the Structure of a Table , SQL SELECT Statements, Using SQL for Web Site ,SQL SYNTAX ,The SQL SELECT Statement , INSERT statement, UPDATE statement ,Joining tables ,Arithmetic Operations ,Operator Precedence.		
UNIT-IV	**Transaction Processing**	**5 Hours**
Transaction processing and Error recovery - Concepts of transaction processing, ACID properties, concurrency control, Serializability, locking based protocols, Timestamp based protocols, recovery and logging methods.		
UNIT-V	**Distributed Database**	**4 Hours**
What is Distributed Database System? Types of Distributed Database Systems. Advantages and Disadvantages of Distributed Databases. Components of Distributed Database Systems .Current Trends in Distributed Databases.		

Lab Contents

GuidelinesforAssessment

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List of Laboratory Assignments/Experiments (minimum -- to be covered)

1	Introduction to graphs based query language using neo4j, implementation of graph queries.
2	MySQL database - creation and manipulation.
3	Creation of ER model.
4	Implement the database using MySQL and manipulate tables.
5	Converting the ER model to schema diagram.
6	Implement the front end pages.

Text Books:

T1. Data mining and knowledge discovery handbook, Second edition , Springer, ODED MAIMON, LIOR ROKACH

T2. Data Mining Introductory and advanced topics- Margaret Dunham, Prentice Hall

Reference Books:

R1. Alexis Leon, Mathews Leon, (leon press), Database Management System.

R2. AviSilberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, Sixth Edition

R3. Data Ware housing: Concepts, Techniques, Products and Applications, C.S.R. Prabhu, Prentice Hallof India, 2001

R4. Vikram Vaswani , MySQL™ : The complete reference

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F. Y. - BCA
Academic Year – 2024-2025 Semester - II
[BCA241202L]: Advance Database Management System

Teaching Scheme: LAB:-Hours / Week: 04	Credit: Lab: 02	Examination Scheme: ISCE : 60 Marks ESE : 40 Marks Total : 100 Marks

Course Objective:

1. Creation of database .
2. To explore the relational database and implement CRUD Operation using SQL.
3. To gain a knowledge of No-SQL databases.
4. To enhance schema design skills .
5. To gain knowledge of object oriented database

Course Outcome:

After successful completion of the course, students will able to:

CO1 Apply Demonstrate Basics of database concepts.

CO2 Apply Demonstrate CRUD Operation using SQL.

CO3 Apply Demonstrate database concepts using MYSQL .

CO4 Apply Demonstrate database concepts using Neo4j

CO5 Apply Demonstrate Object oriented database concepts

Lab Contents

Guidelines for Assessment

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List of Laboratory Assignments/Experiments (to be covered)

1.	Introduction to SQL – DDL, DML, DTL basic data types..
2.	Create Database, select database, Drop database

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3.	Create Table, Drop table, Insert Query, Select Query.
4.	Operators, Expressions, where clause, AND & OR clauses.
5.	Update Query/Delete Query, Like clause, Limit Clause.
6.	Order By, Group By, With Clause, Having Clause, Distinct keyword.
7.	Constraints, Joins, Union Clause, NULL Clause, Alias Syntax
8.	Alter Command, Truncate Table, Transactions Locks, Sub Queries, Auto increment, Priviliges
9.	Functions : Date & Time, String, Functions, Aggregate Functions.
10.	Synonym: Introduction , Create, Synonym as alias for table & view, drop
11.	Sequence: Introduction , alter sequence, drop
12.	View: Introduction, types, alter, drop
13.	Index: Introduction, types, alter, drop.
14.	Queries, Sub Queries and nested queries. Basic operations on open source NoSQL database
15.	Primary introduction to DBA- User create, alter user, Grant, Revoke
16.	Introduction to graphs based query language using neo4j, implementation of graph queries
17.	MySQL database - creation and manipulation.
18.	Creation of ER model.
19.	Implement the database using MySQL and manipulate tables
20.	Converting the ER model to schema diagram
21.	Object oriented database and queries

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F.Y.BCA

AcademicYear–2024-2025 Semester-II

[BCA241203T]: Mathematics I

Teaching Scheme:	Credit	ExaminationScheme:
TH:-Hours/Week:03	TH: 03	In Sem. Evaluation: 20 Marks MidSem.Exam :30 Marks EndSem.Exam :50 Marks Total : 100 Marks

Course Objective:

1. The understand mathematical concepts.
2. To implement concepts of mathematics in computer applications.
3. To understand the data and information representation using Mathematical
4. To understand analysis of problem statements for problem solving using Mathematical .

Course Outcome:

After successful completion of the course,students will able to:
CO1: Provide a basic understanding of fundamental mathematical concepts such as sets, functions, matrix algebra, and discrete mathematics.
CO2: This course enables the students to use mathematical models and techniques to analyze and understand problems in computer science.
CO3: This course demonstrates how the mathematical principles give succinct abstraction of computer science problems and help them to efficiently analyze.

CourseContents

UNIT-I	Set Theory and Logic	06 Hours

Sets– Set Theory, Need for Sets, Representation of Sets, Set Operations, cardinality of set, Types of Sets – Bounded and Unbounded Sets, Countable and Uncountable Sets, Finite and Infinite Sets, Countably Infinite and Uncountably Infinite Sets, power set, Propositional Logic- logic, Propositional Equivalences, Application of Propositional LogicTranslating English Sentences, Proof by Mathematical Induction and Strong Mathematical Induction.

UNIT-II	Relations and Counting	06 Hours

Relations: Properties, n-ary Relations and Applications, Representing Relations , Closures of Relations, Equivalence Relations, Partial Orderings, partitions, Hasse Diagram, Lattices, Chains and Anti-Chains, Transitive Closure and Warshall's Algorithm

Counting - The Basics of Counting, rule of Sum and Product, Permutations and Combinations, Binomial Coefficients and Identities, Generalized Permutations and Combinations, The Pigeonhole Principle.

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UNIT-III	Functions	06 Hours
Functions, properties of functions (domain, range), composition of functions, surjective (onto), injective (one-to-one) and bijective functions, inverse of functions. Some useful functions for Computer Science: Exponential and Logarithmic functions, Polynomial functions, Ceiling and Floor functions.		
UNIT-IV	**Elementary Graph Theory**	**06 Hours**
Basic terminologies of graphs, connected and disconnected graphs, subgraph, paths and cycles, complete graphs, digraphs, weighted graphs, Euler and Hamiltonian graphs. Trees, properties of trees, concept of spanning tree. Planar graphs. Definitions and basic results on the topics mentioned		
UNIT-V	**Matrix Algebra**	**10 Hours**
Types of matrices, algebra of matrices–addition, subtraction, and multiplication of matrices, determinant of a matrix, symmetric and skew-symmetric matrices, orthogonal matrix, rank of a matrix, inverse of a matrix, applications of matrices to solve system of linear equations, Eigen values and Eigen vectors, Caley-Hamilton theorem.		

TextBooks:

T1. Kenneth H. Rosen, Discrete Mathematics And Its Applications, Tata Mcgraw-Hill, Isbn 978-0-07-288008-3, 7th Edition.

T2. C L Liu, "Elements Of Discrete Mathematics", Tata Mcgraw-Hill, Isbn 10:0-07-066913-9..

ReferenceBooks:

R1. Trivedi, K.S., " Probability, Statistics, Design Of Experiments And Queuing Theory, With Applications Of Computer Science", Prentice Hall Of India, New Delhi

R2. C L Liu, "Elements Of Discrete Mathematics", Tata Mcgraw-Hill, Isbn 10:0-07-066913-9.

R3. . Kulkarni, M.B., Ghatpande, S.B. And Gore, S.D., "Common Statistical Tests" Satyajeet Prakashan, Pune

R4.. J.N. Kapur And H.C. Saxena, "Mathematical Statistics", S. Chand Publications, 20th Ed.

R5. John P. D'angelo & Douglas B. West, "Mathematical Thinking–Problem Solving And Proofs" Prentice Hall, 2nd Ed..

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Academic Year 2024-2025 Semester - II

[BCA241204T]: Computer Network

Teaching Scheme:	Credit	Examination Scheme:
TH:-03Hours/Week	TH:03	ISCE : 20Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1. To get familiar with basics of networking concepts, functions of various layers in networking architecture.
2. To know the basics of transmission techniques and media used in networking environments
1. To Understand the components used in networking and different protocols
2. It explains about DNS and network management protocols.
3. To acquire the knowledge about network security

Course Outcome:

After successful completion of the course, students will able to:

CO1: Gain the basic knowledge of transmission media, modes, network topologies and working of various layers in ISO/OSI, TCP/IP reference model.
CO2: Describes/summarizes different switching techniques & Data Transmission Media.
CO3: Obtain knowledge about wired and wireless LAN.
CO4: Obtain the skills of sub-netting and TCP & UDP.
CO5: Describes various network security mechanism & application protocol standards.

Course Contents

UNIT-I	Introduction	6 Hours

Network as an infrastructure for data communication, Applications of Computer network, Network Architecture, Types of computer Networks, Protocols and Standards, The OSI Reference Model, The TCP/IP Protocol Suite, Comparison between OSI and TCP/IP Reference model.

UNIT-II	The Physical Layer	6 Hours

Functions of Physical Layer, Data and Signals: Analog and Digital signals, Transmission Impairment, Data Rate Limits, Performance, Data Transmission Media: Guided Media, Unguided Media and Satellites, Bandwidth Utilization: Multiplexing and Spreading, Switching: Circuit switching, Message switching & Packet Switching, Telephone, Mobile and Cable network for data Communication.

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UNIT-III	The Data Link Layer	6 Hours
Functions of Data Link Layer, Data Link Control: Framing, Flow and Error Control, Error Detection and Correction, High-Level Data Link Control(HDLC) & Point - to – Point protocol(PPP), Wired LAN: Ethernet Standards and FDDI, Wireless LAN : IEEE 802.11x and Bluetooth Standards, Token Bus,Token Ring and Virtual LAN		
UNIT-IV	**Network Layer & Transport Layer**	**8Hours**
Functions of Network Layer, Virtual circuits and Datagram Subnets, IPv4 Addresses: Address Space, Notations, Classful addressing, Classless addressing, Subnetting and Network Address Translation(NAT), IPv4 Datagram format and fragmentation, IPv6 Address Structure and advantages over IPv4. Functions of Transport Layer, Elements of Transport Protocols: Addressing, Establishing and Releasing Connection, Flow Control & Buffering, Error Control, Multiplexing & Demultiplexing, Crash Recovery, User Datagram Protocol(UDP):User Datagram, UDP Operations, Uses of UDP, RPC, Transmission Control Protocol(TCP): TCP Services, TCP Features, TCP Segment Header.		
UNIT-V	**Application Layer & Network Security**	**8Hours**
Functions of Application layer, Application Layer Protocols: DNS, DHCP, WWW, HTTP, HTTPs, TELNET, FTP, SMTP, POP, IMAP. A Model for Network Security, Principles of cryptography: Symmetric Key and Public Key, Digital Signature.		
Reference Books: R1. Computer Networks by Andrew S. Tanenbaum 4ed R2. Data Communication and Networking by Behroz A. Forouzan, TMH, 4 ed. R3. Cryptography and Network Security by Atual Kahate, TMH 2 ed. R4. Cryptography and Network Security by William Stalling R5. Computer Networks and Internets with Internet Applications by Douglas E. Comer R6. Data and Computer Communication by William Stallings 9 ed., Pearson Education, 2007 R7. Network Security by Ankit Fadia		

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AcademicYear 2024-2025 Semester-II

[BCA241205T]: Operating System

Teaching Scheme: TH: -Hours/Week : 03	Credit TH: 03	Examination Scheme: InSem. Evaluation: 20Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1. To Learn and understand the fundamentals of Operating Systems.
2. To Learn principles of modern operating systems

Course Outcome:

After successful completion of the course, students will able to:

CO1:Basic knowledge of operating system and Concept of Process and process scheduling.
CO2: Implement disk scheduling, memory management, CPU Scheduling.
CO3: Explain the file structure, file system, directory system.
CO4: Identify system Parameter, used to evaluate system performance.
CO5: Storage structure and secondary data storage management and concepts.
CO6: Overall computer system functioning by Operating system.

Course Contents

UNIT-I	Basics of Operating Systems	06 Hours

Introduction: Basics of Operating Systems: Definition – Generations of Operating systems – Types of Operating Systems, Batch, multiprocessing, multitasking, timesharing, OS Service, System Calls, OS structure: Layered, Monolithic, Microkernel Operating Systems – Concept of Virtual Machine, concept OS Design, BASH Shell scripting: Basic shell commands, shell as a scripting language. Concept of Open source operating systems with examples e.g. Linux, Android

UNIT-II	Process Management & CPU Scheduling	06 Hours

Processes: Definition, Process Relationship Process states, Process State transitions, Process Control Block, Context switching, Process scheduling, Inter-process Communication: Inter-process Communication, IPC types, IPC in Client-Server, RTOS.CPU Scheduling: Definition, Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time (Definition only) , Scheduling algorithms : Preemptive and Non-preemptive , FCFS – SJF – RR

UNIT-III	Process Synchronization And Deadlock	08 Hours

Synchronization concept , Synchronization Requirement Critical Section Problem & Solutions(only Semaphore and Monitors) Deadlock concepts Deadlock prevention & avoidance with single instance and multiple instances of resources ,Deadlock Detection with single instance and multiple ,instances of resources ,Numerical exercise based on Deadlock ,Deadlock Recovery.

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UNIT-IV	Memory Management	8 Hours
Basic Memory Management: Definition, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition – Internal and External fragmentation and Compaction, Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing – Disadvantages of paging. Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging (Concepts only)		
UNIT-V	**I/O Management & Secondary Storage**	**6 Hours**
Principles of I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers , Device drivers , Device independent I/O software , Secondary-Storage Structure: Disk structure ,concept of Disk scheduling algorithm.		

Text Books:

T1. Operating System Principles (7th International Edition)Peter Baer Galvin, Greg Gagne Abraham Silverschatz

T2. Operating Systems : Design and Implementation - Andrew S. Tanenbaum

Reference Books:

R1. Operating System : Achyut Godbole,TMH,2ndEd
R2. Operating System : Galvin,Wiley,8th Ed.
R3. System Programming & OS : D.M. Dhamdhere, TMH,2ndEd
R4. Red Hat Bible Core Fedora Linux : Christopher Negus (Wiley Pub.)
R5. Operating System : Andrew Tanenbaum, PHI,3rd Ed.
R6. Operating Systems: Internals and design Principles, W. Stallings, Pearson Ed., LPE, 6th Ed.

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F.Y. BCA
Academic Year – 2024-2025 Semester-II
[BCAAE241102]: Environmental Studies

Teaching Scheme: Lab:-Hours/Week:02	Credit TH: 01	ExaminationScheme: ISCE: 50 Marks Total : 50 Marks

CourseObjective:

1. This course aims to familiarize students with basic environmental concepts, their relevance to business operations, and forthcoming sustainability challenges.
2. This course will equip students to make decisions that consider environmental consequences.
3. This course will enable future business graduates to become environmentally sensitive and responsible managers

CourseOutcome:

After successful completion of the course, students will able to:

CO1: Explore the basic environmental concepts and issues relevant to the business and management field.
CO2. Recognize the interdependence between environmental processes and socio-economic dynamics.
CO3. Determine the role of business decisions, policies, and actions in minimizing environmental degradation.
CO4. Identify possible solutions to curb environmental problems caused by managerial actions.
CO5. Develop skills to address immediate environmental concerns through changes in business operations, policies, and decisions.

Course Contents

UNIT-I	Introduction to environmental Studies	4 Hours
Multidisciplinary nature of environmental studies; Scope and importance, Concept of sustainability and sustainable development.		
UNIT-II	**Ecosystems**	**8 Hours**
What is an ecosystem?, Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems , Forest ecosystem , Grassland ecosystem , Desert ecosystem , Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries		
UNIT-III	**Natural Resources : Renewable and Non-renewable Resources**	**10 Hours**
Land resources and land use change; Land degradation, soil erosion and desertification. Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. Water: Use and over-exploitation of surface and ground water, floods, droughts conflicts overwater (international & inter-state). Energy resources : Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies		
UNIT-IV	**Biodiversity and Conservation**	**10 Hours**

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Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots . India as a mega-biodiversity nation; Endangered and endemic species of India , Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.Ecosystem and biodiversity services : Ecological, economic, social, ethical, aesthetic and informational value
TextBooks: T1. Environmental Science- Bharti Public T2. Introduction to Environmental Science- G. Tyler Miller, Scott Spool man. T3. A Text Book Of Environmental Science by P. C. J
ReferenceBooks: R1. Carson, R. 2002. Silent Spring. Houghton Mifflin Harcourt. R2. Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge R3. Odum, E.P., Odum, H.T. & Andrews. 1971. Fundamentals of Ecology. Philadelphia: Saunders

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Tathawade, Pune-411 033

Dr. Rakesh Jain
Director

F.Y. BCA

AcademicYear 2024-2025 Semester-II

[BCAVA241102]: Advance English

Teaching Scheme:	Credit	Examination Scheme:
Lab:-2 Hours/Week	TH:01	TW : 50 Marks Total : 50 Marks

Course Objective:

Students should be able to understand

1. Understand the role of communication in personal & professional success.
2. Develop awareness of appropriate communication strategies.
3. To enhance the verbal communication of students.
4. To focus on Formal and Informal Conversation, etiquettes.
5. Ethically use, document and integrate sources.
6. Practice critical thinking to develop innovative and well-founded perspectives related to theStudent's emphases.
7. Use technology to communicate effectively in various settings and contexts.
8. Demonstrate appropriate and professional ethical behavior.

CourseOutcome:

On completion of the course, student will be able to–

CO1: Understand and apply effective communication methods and Listening skills.
CO2: Display competence in oral, written, and visual communication.
CO3: Respond to industry professionals and recruiters and effectively answer interview questions,and clearly understand what to do before, during and after an interview.
CO4: Demonstrate positive group communication exchanges.
CO5: Display competence in written communication and use current technology related to the communication field
CO6: Respond effectively to cultural communication differences and communicate ethically

CourseContents

UNIT-I	Communication Skills	4 Hours

Communication: Meaning, Nature, Importance and Purpose of Communication, Types of Communication, Process of Communication, Communication Network in an Organization, Strategy for Effective Communication, Verbal and Non-Verbal Communication, Barriers to Communication, Essentials of Good Communication, Communication Techniques.

UNIT-II	Body Language	10 Hours

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Body Language : 1.Communicating with Your Body-Interpret a New Language, The Power of Para verbal Communication, Bodies Speak Louder than Words 2.How to Read Body Language- Head Movement, Translate Gestures into Words, Open vs. Closed Body Language, Watch Eye Movement 3.Body Language Assumptions-Common Postures, Personal Space Invasion, Reactive Movements, Fidgeting and Boredom 4.Male vs. Female Variations- Facial Expressions by Gender, Personal Space Differences, Common Female Body Language, Common Male Body Language 5.Nonverbal Signals- Gestures and Hand Signals, Sending Signals to Others, It's ,Not What You Say, It's How You Stand, What is Your Posture Communicating? 6. Facial Expressions- Emotions Displayed, Micro-Expressions, Facial Action Coding System (FACS), Universal Facial Expressions 7. Body Language in the Workplace-Communicate with Power, Cultural Differences, Building Rapport and Trust, Using Mirroring.

UNIT-III	Interview and Presentation skills	8 Hours

Interview Skills: Preparing for the Job Interview: Importance and Factors Involving Job Interview; Characteristics of Job Interview; Job Interview Process, How you should prepare for a job interview, find out about companies, overcome nerves, decide which clothes to wear, vocabulary about your hard and soft skills, and answering questions using the STAR technique, Job Interview Techniques-Mannersand etiquettes to be maintained during an interview.
Presentation Skills: Preparing a PowerPoint Presentation, Greeting and introducing, Presenting a Paper, Group Discussions. Preparing for and Facing a Job Interview.

UNIT-IV	Group Discussion Preparation	10 Hours

GD Introduction: What is a Group Discussion?, Who holds a Group Discussion?, How is a GD Conducted? Why is a "GD" conducted?, Why GD is important?,GD: Approach(Carefully craft the opening gambit, Use Key Word Approach, Apply Shock Strategy GD: Do's and Don'ts, GD: Communications, Types of GD topics: Techniques, GD: Ettiquette, GD: Content Discuss Solved Case Studies and Conduct GD in Class on different topics, Experience sharing by Industry people &Alumni.

List of Laboratory Assignments/Experiments (to be covered)

1.	Understanding and implementation of effective communication and Listening skills
2.	Implementation in oral, written, and visual communication
3.	Implementation of Interview skills
4.	Group communication exchanges
5.	Written communication and use current technology related to the communication field

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6.	Implementation effectively to cultural communication differences and communicate ethically

Reference Books:

R1: Communicating at work: Strategies for success in business and the professions: Adler, Elmhorst, & Lucas (2013). NE: McGraw Hill.
R2: The Definitive Book of Body Language Allan Pease
R3: The Art of Public Speaking by Dale Carnegie
R4: On Writing Well: The Classic Guide to Writing Nonfiction by William Zinsser
R5: Five Stars: The Communication Secrets to Get from Good to Great (Hardcover) by Carmine Gallo

Weblinks:

W1: www.google.com
W2: www.citehr.com

RSCOE

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S. Y. BCA
Academic Year – 2025-2026 Semester -III
[BCA242101T]: Web Technology

Teaching Scheme: TH: - 03 Hours/Week	Credit TH: 03	Examination Scheme: In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1. To introduce fundamental web technologies and their evolution.
2. To understand how websites function, including front-end and back-end components.
3. To learn HTML, CSS, and JavaScript for developing interactive web pages.
4. To explore basic server-side programming and database connectivity.
5. To understand web security, hosting, and emerging web technologies

Course Outcome:

After successful completion of the course, students will able to

CO1: Explain the structure and working of the internet and web technologies.
CO2: Develop static web pages using HTML and CSS.
CO3: Implement basic interactivity using JavaScript.
CO4: Understand server-side concepts and databases for web applications.
CO5: Deploy web applications and understand security aspects.
CO6: Stay updated with modern web development trends.

Course Contents

UNIT-I	Fundamentals of Web Technology	4 Hours

Introduction to the Internet and World Wide Web (WWW), Web Browsers and Web Servers, Web Architecture (Client-Server Model, HTTP/HTTPS, DNS), Introduction to Web Technologies (Frontend vs Backend), Evolution of Web (Web 1.0, 2.0, 3.0), Basics of Domain Names and Hosting.

UNIT-II	Markup Languages	8 Hours

Introduction to HTML, Basic HTML Structure, Common HTML Tags, Physical and Logical HTML, Types of Images, client side and server-side Image mapping, List, Table, Frames, HTML form and form elements, Introduction to HTML Front Page.

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UNIT-III	**CSS Styling the Web**	**7 Hours**
CSS with HTML, CSS Syntax, CSS Comments, CSS Borders, CSS colors, Selectors Properties, and Values, Types of CSS, CSS Height and Width.		
UNIT-IV	**JavaScript – Making the Web Interactive**	**8 Hours**
Introduction to JavaScript and its Features, Variables, Data Types, Operators, Conditional Statements and Loops, Functions in JavaScript, DOM Manipulation and Events.		
UNIT-V	**Introduction to PHP (Basics)**	**8 Hours**
What is PHP? Features and Advantages of PHP, Installing and Setting Up PHP (XAMPP, WAMP, LAMP), Writing Your First PHP Script, Embedding PHP in HTML, PHP Syntax, Variables, and Data Types, Operators in PHP (Arithmetic, Comparison, Logical, Assignment)		
UNIT-VI	**Arrays in PHP**	**5 Hours**
Indexed Vs Associative arrays, Identifying elements of an array, Storing data in arrays, Multidimensional arrays, Extracting multiple values		

Text Books :

1. Complete HTML- Thomas Powell
2. HTML and JavaScript – Ivan Bayross
3. Programming PHP - Rasmus Lerdorf and Kevin Tatroe, O'Reilly publication
4. Beginning PHP 5 - Wrox publication

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Academic Year – 2025-2026 Semester -III
[BCA242101L]: Web Technology Lab

Teaching Scheme: PR: - 04 Hours/Week	Credit TH: 02	Examination Scheme: ISCE : 60 Marks End Sem. Exam : 40 Marks Total : 100 Marks

Course Objective:

1. To introduce fundamental web technologies and their evolution.
2. To understand how websites function, including front-end and back-end components.
3. To learn HTML, CSS, and JavaScript for developing interactive web pages.
4. To explore basic server-side programming and database connectivity.
5. To understand web security, hosting, and emerging web technologies.

Course Outcome:

After successful completion of the course, students will able to

CO1: Explain the structure and working of the internet and web technologies.
CO2: Develop static web pages using HTML and CSS.
CO3: Implement basic interactivity using JavaScript.
CO4: Understand server-side concepts and databases for web applications.
CO5: Deploy web applications and understand security aspects.
CO6: Stay updated with modern web development trends.

Course Contents

Guidelines for Assessment

Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

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List of Assignments	
1	Write a code to implement all Text formatting tags (minimum10 tag)
2	Write a code to implement Audio and Video.
3	Write a program to add the background Image using CSS3.
4	Write a program to add the background Image size using CSS3.
5	Write a code to implement all border Properties in CSS3.
6	Write a code to implement External CSS.
7	Write a code to implement Inline CSS.
8	Write a code to implement target selector in CSS3.
9	Write a code to implement Simple Linear Gradient in CSS3.
10	Write a program to design Admission Registration form and validate at least 03 fields.
11	Implementation Text Formatting tags in HTML
12	Implementation of LINK tags in HTML
13	Implementation of Image tags in HTML
14	Implementation of LIST tags in HTML
15	Implementation of Image Mapping tags in HTML
16	Implementation of Table structure: (Lecture Time table) tags in HTML
17	Implementation of Table tags in HTML-Railway Time table
18	Implementation of Table: Purchased Order tags in HTML
19	Implementation of Table: ABCD Format tags in HTML
20	Implementation of form tag -Form Designing: Railway Reservation in HTML
21	Implementation of Frame tags in HTML
22	Implementation of Array in javascript
23	Implementation of Date() Object in JS
24	Implementation of Navigator Object :(simple) in JS

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25	Implementation of Navigator: (Using Function) in JS
26	Implementation of Windows Object in JS
27	Implementation of History Object in JS
28	Implementation Join Array in JS
29	Implementation of Math Object in JS
30	Implementation of String Object in JS
31	Write a code to design Library form having fields like Name of Author Name, Book Name and Price. Perform insert, edit, update and delete operations using PHP.

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S. Y. BCA
Academic Year – 2025-2026 Semester -III
[BCA242102T]: Data Structure with C++

Teaching Scheme: TH: - 03 Hours/Week	Credit TH: 03	Examination Scheme: In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Prerequisites: Basic knowledge of computer operations, understanding of fundamental programming concepts using C/C++ Programming and knowledge(understanding) of algorithms

Course Objective:

1. To understand the significance of pointers in low/middle level languages
2. To acquire the knowledge fundamentals of various data structure and algorithms
3. To understand and analyze various Searching, Sorting, Hashing and Heap technique to solve the problems
4. To formulate the problems using appropriate Linear and non-linear data structures

Course Outcome:

After successful completion of the course, students will able to

CO1: Demonstrate an understanding of pointers and their applications
CO2:Apply various searching and sorting algorithms
CO3:Demonstrate stack data structure and its types
CO4:Explain and apply the concept of Stack as a data structure
CO5:Implement and manipulate linked list data structure and its types
CO6: Implement techniques of Non-Linear data structures like Tree and Graph

Course Contents

UNIT-I	**Pointers**	**10 Hours**

Introduction to Pointers, Declaration, Definition, Initialization and Usage, Types of Pointers, Pointer Arithmetic, Multiple Indirection, Parameter Passing: Call by Value and Call by Reference, Pointers and Arrays, Pointer to Array, Array of Pointers

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UNIT-II	**Searching and Sorting**	**06 Hours**
Sorting Techniques, Bubble Sort, Selection Sort, Insertion Sort, Searching Techniques, Linear Search, Binary Search		
UNIT-III	**Linear Data Structure : Stack**	**08 Hours**
Introduction and Definition of a Stack, Implementation of a Stack, Implementation of Stacks Using Arrays, Applications of Stacks, Conversion of an expression (Infix, Prefix, Postfix) , Evaluation of Expression		
UNIT-IV	**Linear Data Structure : Queue**	**06 Hours**
Introduction and Definition of a Queue, Implementation of a Queue, Implementation of Queues Using Arrays, Applications of Queues		
UNIT-V	**Linear Data Structure : Linked List**	**08 Hours**
Introduction, Definition of a Linked List, Memory Allocation in a Linked List, Types of Linked Lists, Singly Linked List, Operations on a Singly Linked List, Circular Linked Lists, Operations on a Circular Linked List		
UNIT-VI	**Non Linear Data Structure: Tree and Graphs**	**07 Hours**
Tree Definition, representation, Binary Search Tree and its operations, AVL Tree and its operations, Directed and Undirected Graph, Graph Representations, Graph Traversals		

Text Books:

T1: Data Structures and Algorithms by C. V. Sastry, Rakesh Nayak, and C. H. Rajaramesh
T2: Data Structures and Algorithms in C++ by S. Baswana, S. K. Mehta, and R. Venkatesh
T3: Data Structures and Algorithms Made Easy by Narasimha Karumanchi

Reference Books:

R1. Mastering, C++, T. Rajkumar, K.R Venugopal, T Ravikumar Tata McGraw Hill 1st Edition 2012.
R2. Data Structures and Algorithms: Concepts, Techniques and Applications by G.A.V. Pai
R3. C++ and Object-Oriented Programming Paradigm, Debasish Jana, PHI, 3rd Edition, 2005
R4. Data Structures Using C ++ by Malik D S
R5. Data Structures and Algorithms in C++ by R.S. Salaria
R6. Data Structure Using C++ by Kasiviswanath N.

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Academic Year – 2025-2026 Semester -III
[BCA242102L]: Data Structure with C++ Lab

Teaching Scheme: PR: - 04 Hours/Week	Credit TH: 02	Examination Scheme: ISCE : 60 Marks End Sem. Exam : 40 Marks Total : 100 Marks

Course Prerequisites: : Basic knowledge of computer operations, understanding of fundamental programming concepts using C/C++ Programming and knowledge(understanding) of algorithms

Course Objective:

1. To understand the significance of pointers in low/middle level languages.
2. To acquire the knowledge fundamentals of various data structure and algorithms.
3. To understand and analyze various Searching, Sorting, Hashing and Heap technique to solve the problems.
4. To formulate the problems using appropriate Linear and non-linear data structures.

Course Outcome:

After successful completion of the course, students will able to

LO1: Implement and demonstrate pointer operations including pointer arithmetic, multiple indirection, and array-pointer relationships.

LO2: Develop programs to perform various sorting (Bubble, Selection, Insertion) and searching (Linear, Binary) algorithms with performance awareness.

LO3: Design and implement stack operations using arrays and apply stack applications

LO4: Construct and simulate queue operations using arrays

LO5: Create, manipulate, and perform operations on various types of linked lists such as singly linked list and circular linked list.

LO6: Demonstrate understanding of non-linear data structures like trees and graphs through conceptual analysis and traversal logic implementation.

Course Contents

Guidelines for Assessment

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Assessment is a continuous assessment based on submission of the quizzes, presentations, Attendance and understanding	
List of Assignments	
1	Program to demonstrate the working of pointers in C++
2	Program implement the concept of array of pointers and pointer to an array
3	Program based on pointer arithmetic
4	Program to implement the bubble sort algorithm
5	Program to implement the selection sort algorithm
6	Program based on searching techniques
7	Program to demonstrate the working of stack using array
8	Program based on applications of stack
9	Program to perform stack operations using linked list
10	Program based on linear queue
11	Program to demonstrate the application of queue
12	Program based on linked list
13	Program to search element in the linked list
14	Program to implement circular linked list
15	Program to demonstrate the linked list operations

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Academic Year – 2025-2026 Semester -III
[BCA242103T]: Mathematics II

Teaching Scheme: TH: - 03 Hours/Week	Credit TH: 03	Examination Scheme: In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Prerequisites: Basic knowledge of computer operations, understanding of fundamental programming concepts using C/C++ Programming and knowledge(understanding) of algorithms

Course Objective:

6. To understand the significance of pointers in low/middle level languages
7. To acquire the knowledge fundamentals of various data structure and algorithms
8. To understand and analyze various Searching, Sorting, Hashing and Heap technique to solve the problems
9. To formulate the problems using appropriate Linear and non-linear data structures

Course Outcome:

After successful completion of the course, students will able to

CO1: Demonstrate an understanding of pointers and their applications
CO2:Apply various searching and sorting algorithms
CO3:Demonstrate stack data structure and its types
CO4:Explain and apply the concept of Stack as a data structure
CO5:Implement and manipulate linked list data structure and its types
CO6: Implement techniques of Non-Linear data structures like Tree and Graph

Course Contents

UNIT-I	**Arithmetic and Algebra**	**07 Hours**

Simplification, BODMAS Rules,Averages,Problems on Ages, **Problems on Numbers** Computation of Whole Number,Decimal and Fractions,Relationship between numbers,

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Surds and Indices : Multiplication Rule,Division Rule,Power Rule		
UNIT-II	**Speed, Distance, and Geometry**	**08 Hours**
Mensuration : Triangle,Quadrilaterals,Regular Polygons,Circle,Right Prism Right Circular Cone,Right Circular Cylinder,Sphere,Hemispheres,Rectangular ParallelepipedRegular Right Pyramid with triangular or square Base. **Boats and Streams** :Speed Upstream, Downstream, Boat Speed,Stream speed ,Equating Distance, Average Speed of Stream and Boat in Still Water		
UNIT-III	**Fundamental Concepts :Applied & Engineering Mathematics**	**08 Hours**
Permutation and Combinations:Generalized Permutations and Combinations,The Pigeonhole Principle. **Probability** Use of Tables and Graphs,Histogram,Frequency polygon,Bar-diagramPie-chart,Measures of central tendency: mean, median, mode, standard deviation,Calculation of simple probabilities. Profit and Loss, Simple and Compound Interest		
UNIT-IV	**Applied Concepts**	**07 Hours**
Time, Speed, and Distance,Time & Work,Ratio and Proportion, Mixtures and Allegation		
UNIT-V	**Data Interpretation**	**07 Hours**
Data Interpretation Basics,Tables,Column Graphs, Bar Graphs, Line Charts, Pie Chart,Venn Diagrams		
UNIT-VI	**Logical Reasoning (Deductive Reasoning)**	**08 Hours**
Analogy, Blood Relation,Directional Sense,Number and Letter Series,Coding – Decoding,Calendars,Clocks,VennDiagrams,SeatingArrangement,Syllogism,Mathematical Operations		
Text Books: T1: Data Structures and Algorithms by C. V. Sastry, Rakesh Nayak, and C. H. Rajaramesh T2: Data Structures and Algorithms in C++ by S. Baswana, S. K. Mehta, and R. Venkatesh T3: Data Structures and Algorithms Made Easy by Narasimha Karumanchi		

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S. Y. BCA
Academic Year – 2025-2026 Semester -III
[BCA242104T]: Design and Analysis of Algorithm

Teaching Scheme: TH: - 03 Hours/Week	Credit TH: 03	Examination Scheme: In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Prerequisites: Basic knowledge of problem solving and understanding of algorithms

Course Objective:

1. To Analyze performance of algorithms, Big O Notations
2. To Choose the appropriate data structure and algorithm design method for a specific application
3. To Solve problems using algorithms design method such as greedy method
4. To Solve problems using algorithms design method such as the Divide and Conquer, Dynamic Programming
5. To Solve problems using algorithms design method such as the Backtracking

Course Outcome:

After successful completion of the course, students will able to

CO1. Analyze a problem and identify the computing requirements appropriate for its solution, and to understand how the worst-case time complexity of an algorithm is defined, how asymptotic notation is used to provide a rough classification of algorithms .
CO2. Apply Divide and Conquer strategy for problem solving.
CO3. Apply Greedy strategy for problem solving.
CO4. Apply dynamic programming strategy for problem solving.
CO5. Apply Backtracking strategy for problem solving.
CO6. Identify NP Hard and NP Complete Problems.

Course Contents

UNIT-I	**Introduction to Design and Analysis of Algorithm**	**08 Hours**

Definition of Algorithm, Analysis of Algorithm, Time Complexity, Space Complexity, Big

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O-Notations, Heaps and Heap-sort, Tower of Hanoi		
UNIT-II	**Divide and Conquer**	**07 Hours**
Introduction to Divide and Conquer, General Strategy, Binary Search Algorithm, Examples, Merge Sort Algorithm, Calculating Time complexity, Examples		
UNIT-III	**Greedy Method**	**07 Hours**
Introduction to Greedy Method, 0/1 Knapsack Problem algorithm with example, Job Sequencing with Deadlines algorithm with example, Minimal Spanning Tree algorithm with example		
UNIT-IV	**Dynamic Programming**	**07 Hours**
Introduction to Dynamic Programming, General strategy, 0/1 Knapsack Problem algorithm with example, Traveling Salesman Problem algorithm with example		
UNIT-V	**Backtracking**	**07 Hours**
Introduction to Backtracking, General Strategy, N-Queen Problem Algorithm with example, Graph Coloring Algorithm with example.		
UNIT-VI	**NP Hard and NP Complete Problems**	**04 Hours**
Introduction to NP Problems with examples, NP-Hard problems with examples, NP-Complete Problems with examples		
Text Books: T1: Design and Analysis of Algorithms, S. Sridhar Ist Ed. T2: Design and Analysis of Algorithms, Anay Levitin,3rd Ed		
Reference Books: R1: Bressard, " Fundamental of Algorithm" PHI Publications R2: Horowiz/Sahani, "Fundamentals of Computer Algorithms", Galgotia R3: Magnifying Data Structures, Arpita Gopal, PHI Publications R4: Thomas H Cormen and Charles E. L. Leiserson, " Introduction to Algorithm" PHI Publications R5: A. V. Aho and J. D. Ullman, " Design and Analysis of Algorithms", Addison Wesley		

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S. Y. BCA
Academic Year – 2025-2026 Semester -III
[BCA242105T]: Multimedia Applications

Teaching Scheme: TH: - 03 Hours / Week	Credit TH: 03	Examination Scheme: In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1. Introduce fundamental concepts, elements, categories, features, and real-world applications of multimedia, and to highlight its evolution and impact on modern communication.
2. Understand the principles and components of audio systems, including audio capture, processing, output, digital audio fundamentals, and system integration for multimedia applications.
3. Provide knowledge of digital image representation, editing, manipulation, graphics design principles, vector graphics, and image processing techniques using industry-standard tools.
4. Familiarize with digital video and animation concepts, including video formats, editing, production techniques, animation principles, and the integration of interactive and immersive multimedia technologies.
5. Impart an understanding of multimedia data compression techniques, standards, and codecs for efficient storage, transmission, and playback of audio, image, and video content.
6. develop ability to apply multimedia design principles, user interface and experience strategies, and project management skills in creating effective multimedia applications, while exploring emerging trends such as VR, AR, and AI.
7.

Course Outcome:

After successful completion of the course, students will able to

CO1. Explain the core concepts, elements, and applications of multimedia, and analyze its impact on communication and media.

CO2. Demonstrate practical skills in capturing, editing, and integrating audio, images, graphics, video, and animation using relevant software tools.

CO3. Apply multimedia data compression techniques and standards for optimizing multimedia content.

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CO4. Design user-centered multimedia applications by employing principles of multimedia design and user interface.
CO5. Develop interactive multimedia projects incorporating various media elements and evaluate their effectiveness.
CO6. Discuss and analyze current trends and future directions in multimedia technologies, including VR, AR, and AI.

Course Contents

UNIT-I	Introduction to Multimedia	04 Hours
Definition of Multimedia, Elements of Multimedia, Categories of Multimedia: Linear Multimedia, Non-Linear Multimedia, Features of Multimedia,Interactivity, DigitalRepresentation, Integration, Applications of Multimedia, Education, Entertainment, Advertising, Evolution and Impact of Multimedia, Historical development of multimedia technologies.		
UNIT-II	**Sound/Audio Systems**	**08 Hours**
Audio Signal Capture,Microphones,Types (dynamic, condenser), applications, and usage.Audio Interfaces,Audio Signal Processing,Mixers,Amplifiers,Audio Processors,Audio Signal Output,Speakers,Headphones, Digital Audio Fundamentals, Audio File Formats,Compression Techniques, Audio System Design and Integration,System Components,Troubleshooting Common Issues.		
UNIT-III	**Images and Graphics**	**07 Hours**
Digital Image Representation, Resolution and Pixel Density, Image Editing and Manipulation, Basic Editing Techniques,Advanced Techniques, Software Tools, Graphics Design Principles, Composition,Color Theory, Typography,Vector Graphics, Introduction to Vector Tools,Vector vs. Raster Graphics,Image Processing Techniques,Image Enhancement, Image Restoration, Image Segmentation.		
UNIT-IV	**Video and Animation**	**08 Hours**
Introduction to Digital Video,Video Signal Representation,Video Compression Techniques,Video File Formats,Video Editing Fundamentals, Basic Editing Techniques,Video Editing Software, Color Correction and Grading,Animation Principles, Types of Animation, Keyframe Animation, Animation Software,Video Production Techniques, Camera Work, Lighting Techniques, Sound Recording, Interactive Video and Animation, Interactive Elements, HTML5 for Interactive Media, Virtual Reality (VR) and Augmented Reality (AR).		

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UNIT-V	Multimedia Data Compression	08 Hours
Introduction to Data Compression, Definition,Importance, Types of Compression, Lossless Compression,Techniques, Advantages, Lossy Compression, Techniques, Advantages, Spatial Compression Techniques, Discrete Cosine Transform (DCT), Wavelet Transform, Quantization and Subsampling, Temporal Compression Techniques, Motion Estimation and Compensation, Frame Skipping and Interpolation,Video Compression Standards, Audio Compression Techniques, Codecs and Encoding, Definition of Codecs, Examples of Codecs.		
UNIT-VI	**Multimedia Design and Applications**	**05 Hours**
Principles of Multimedia Design, Coherence Principle, Signaling Principle, Redundancy Principle, Spatial Contiguity Principle, Temporal Contiguity Principle, Modality Principle, Multimedia Principle, Multimedia User Interface Design, User Experience (UX) Design,User Interface (UI) Elements,Accessibility Features, Applications of Multimedia, Education, Entertainment, Advertising, althcare, Project Development and Management,Project Planning,Team Collaboration, Testing and Evaluation, Emerging Trends in Multimedia, Virtual Reality (VR) and Augmented Reality (AR,Artificial Intelligence (AI) in Multimedia, Cloud-Based Multimedia Services.		

Text Books:

1. Multimedia: Making It Work – Tay Vaughan, McGraw-Hill Education
2. Fundamentals of Multimedia – Ze-Nian Li, Mark S. Drew, Pearson Education
3. Principles of Multimedia – Ranjan Parekh, Tata McGraw-Hill
4. Computer Graphics, Multimedia and Animation – Malay K. Pakhira, PHI Learning
5. Multimedia Systems – Ralf Steinmetz, Klara Nahrstedt, Springer
6. Multimedia Systems – S. Acharya, Vikas Publishing
7. Digital Image Processing – Rafael C. Gonzalez, Richard E. Woods, Pearson
8. Multimedia Technology and Applications – David Hillman, Galgotia Publications
9. Multimedia: Computing, Communications and Applications – Ralf Steinmetz, Klara Nahrstedt, Pearson

Adobe Photoshop Classroom in a Book – Conrad Chavez, Andrew Faulkner.

Reference Books:

1. Digital Multimedia – Nigel Chapman and Jenny Chapman, Wiley

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2. Multimedia: Computing, Communications and Applications – Ralf Steinmetz, Klara Nahrstedt, Pearson
3. Multimedia Technology and Applications – David Hillman, Galgotia Publications
4. Digital Image Processing – Rafael C. Gonzalez, Richard E. Woods, Pearson
5. Multimedia Systems Design – Prabhat K. Andleigh, Kiran Thakrar, PHI Learning
6. Principles of Digital Image Processing – Wilhelm Burger, Mark J. Burge, Springer

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Academic Year – 2025-2026 Semester -III
[HSCA2201T]: Universal Values and Ethics

Teaching Scheme: TH: - 02 Hours/Week	Credit TH: 02	Examination Scheme: ISCE Evaluation : 60 Marks End Sem. Exam : 40 Marks Total : 100 Marks

Course Objective:

1. To help students to distinguish between values and skills and understand the need, basic guidelines, content and process of value education.
2. To help students to initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession
3. To help students to understand the meaning of happiness and prosperity for a human being.
4. To facilitate the students to understand harmony at all the levels of human living, and live accordingly.

Course Outcome:

After successful completion of the course, students will able to
CO1: Distinguish between skills and values through value education.
CO2: Distinguish between self and body with program to nurture body with self- regulation.
CO3: Recognize the value of harmonious relationship based on naturally accepting values in human – human relationship.
CO4: Describe harmony in society and nature.

Course Contents

UNIT-I	Introduction to value education	**06 Hours**

Understanding value education, self-exploration as the process for value education, happiness and prosperity, right understanding, relationship and physical facility, happiness and prosperity–current scenario, method to fulfill the basic human aspiration.

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UNIT-II	Harmony in human being	**06 Hours**
Understanding human being as a coexistence of the self and body, understanding the needs of self and body, the body as an instrument of the self, understanding activities of self, understanding harmony in the self, understanding the harmony in self with body, programs to fulfill the self regulation and health.		
UNIT-III	Harmony in family and society	**06 Hours**
Harmony in family-a basic unit of human interaction, Human—human relationship, values in relationships, understanding harmony in the society and vision for universal human order.		
UNIT-IV	Harmony in nature	**07 Hours**
Understanding the harmony in society and nature, understanding the four orders of nature, realizing existence as co- existence at all levels.		
Guidelines for Assessment		
In semester evaluation shall be based on continuous assessment based on timely submission of assignments.		
Text Books: T1.Human values and Professional Ethics by RRGaur, RSangal, GPBagaria, Excel Books, New Delhi, 2010 T2.JeevanVidya:EkParichaya,ANagaraj,JeevanVidyaPrakashan,Amarkantak, 1999.		
Reference Books: R1.Manav Vyavhar Darshan,ANagaraj,JeevanVidyaPrakashan,Amarkantak,2001		

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S. Y. BCA
Academic Year – 2025-2026 Semester -III
[HSCA2202T]: Indian Constitution

Teaching Scheme: TH: - 01 Hours/Week	Credit TH: 01	Examination Scheme: In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1. To provide students with a comprehensive understanding of the meaning, importance, and making of the Indian Constitution.
2. 2. To educate students on the Fundamental Rights, Fundamental Duties, and Directive Principles of State Policy.
3. 3. To provide insights into the powers and functions of the Indian Parliament, the Rajya Sabha, the Lok Sabha, the Prime Minister, and the President, as well as the independence of the Supreme Court in the Indian judicial system.

Course Outcome:

After successful completion of the course, students will able to
CO1: Recall the structure and principles of the Indian Constitution and Indian Parliament.
CO2: Explain fundamental rights and directive principles of the Indian Constitution and Indian Parliament
CO3: Practice Fundamental Rights, Fundamental Duties, Directive Principles of State Policy.

Course Contents

UNIT-I	Constitution – Structure and Principles	**02 Hours**
Meaning and importance of constitution, making of Indian Constitution – Sources, Salient features of Indian Constitution.		
UNIT-II	Fundamental Rights and Directive Principles	**02 Hours**

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Fundamental Rights, Fundamental Duties and its legal status, Directive principles of state policy,		
UNIT-III	Union Government	**02 Hours**
Powers of Indian Parliament, Function of Rajya sabha and Lok sabha, Powers and functions of prime minister and president, Judiciary – The Independence of the Supreme Court. in the Indian judicial system.		
Text Books: T1. Durga Das Basu, Introduction to the Constitution of India, Gurgaon; LexisNexis, 2018 T2. . M. V. Pylee, India's Constitution, New Delhi; S. Chand Pub., 2017 T3. Constitution of India (Full Text), India. Gov. in., National Portal of India, https://www.india.gov.in/sites/upload_files/npi/files/coi_part_full.pdf T4. G. Austin Working of a Democratic Constitution of India, New Delhi: Oxford University Press. 2004		

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S. Y. BCA
Academic Year – 2025-2026 Semester -IV
[BCA242201T]: JAVA I

Teaching Scheme: TH: - 03 Hours/Week	Credit TH: 03	Examination Scheme: In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Prerequisites: Object Oriented Programming

Course Objective:

1. To familiarize students with the concepts of OOPs.
2. To enable the students to understand the principles of inheritance and polymorphism, and demonstrates how they relate to the design of abstract classes.
3. To enable the students to understand the concepts of packages.

Course Outcome:

After successful completion of the course, students will able to

CO1: Understand the Fundamentals of Object-Oriented Programming (OOP): Grasp the core concepts of OOPS

CO2: Create and Utilize Classes. Develop the ability to define classes

CO3: Create objects, and understand the relationship between classes and objects in Java.

CO4: Design and Implement Inheritance Hierarchies: Create class hierarchies using inheritance, understand method overriding, and utilize the super keyword

CO5: Understand and implement interface.

CO6: Creating and Importing Packages.

Course Contents

UNIT-I	**Fundamentals of Java Programming**	**08 Hours**

History and Features of Java,Java Environment: Compiler, Interpreter, JVM, Structure of a Simple Java Program, Java Keywords, Variables, Data Types, and Literals, Strings in Java, Operators and Type Casting, Control Flow: Selection Statements (if, if-else, switch), Iteration Statements (for, while, do-while)

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UNIT-II	**Classes and Objects in Java**	**08 Hours**
Introduction to Classes, Defining Classes: Syntax and Structure, Adding Variables and Methods to Classes, Static Members: Static Block, Static Field, Static Method, Constructors and Constructor Overloading, The 'this' Keyword, Creating Objects from Classes,Accessing Fields and Methods through Objects Reference Variables.		
UNIT-III	**Core Java Object Handling**	**08 Hours**
Method Overloading, Garbage Collection in Java, Command Line Arguments, Accepting Input: Using BufferedReader, Using Scanner class		
UNIT-IV	**Inheritance and Abstract Classes**	**08 Hours**
Introduction to Inheritance, Superclass and Subclass, Defining a Subclass, Types of Inheritance:- Single, Multilevel, Hierarchical, The 'super' Keyword, Method Overriding, Abstract Classes and Methods,The 'final' Keyword		
UNIT-V	**Interfaces and Polymorphism**	**04 Hours**
Introduction to Interfaces,Interface vs Abstract Classes,Defining and Implementing Interfaces, Interface Inheritance (Extending Interfaces), Runtime Polymorphism using Interfaces		
UNIT-VI	**Java Packages and Modularization**	**04 Hours**
Introduction to Packages,Types of Packages: Built-in , User-defined packages, Creating Packages with the 'package' Keyword, Compiling and Running Java Classes with Packages, Importing Packages with the 'import' Keyword.		

Text Books:

T1: Java Programming (for absolute beginner) – Russell – PHI.
T2: Java Beginning Guide By Herbert Schildt,8th Edition,Tata McGraw Hill Education
T3:Programming with Java, A Primer E. Balguruswami, McGraw-Hill, 4th Ed.

Reference Books:

1. Core Java Volume I:Fundamentals By Cay S. Horstmann, 11thEdition,Prentice Hall
2) The Complete Reference (Java 2) – Herbert Schildt,11th edition, Tata McGraw Hill Education
3) Java in a nut shell – Flanagan – Orielly Publication
4) Object oriented programming in Java by Dr.Thampi Wiley.

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S. Y. BCA
Academic Year – 2025-2026 Semester -IV
[BCA242201L]: JAVA I Lab

Teaching Scheme: PR: - 04 Hours/Week	Credit TH: 02	Examination Scheme: ISCE : 60 Marks End Sem. Exam : 40 Marks Total : 100 Marks

Course Objective:

1. To implement foundation of Object Oriented Concepts.
2. To implement concepts of Inheritance and Interface.
3. To implement Concepts of Package.

Course Outcome:

After successful completion of the course, students will able to

CO1: Understand the Fundamentals of Object-Oriented Programming (OOP): Grasp the core concepts of OOPS

CO2: Create and Utilize Classes. Develop the ability to define classes

CO3: Create objects, and understand the relationship between classes and objects in Java.

CO4: Design and Implement Inheritance Hierarchies: Create class hierarchies using inheritance, understand method overriding, and utilize the super keyword

CO5: Understand and implement interface.

CO6: Creating and Importing Packages.

Course Contents

Guidelines for Assessment

Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

List of Assignments

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1	Programs to implement decision-making statements (if, if-else, switch).
2	Programs to demonstrate loop control statements (while, do-while, for).
3	Programs to create Object of a class.
4	Programs to create method into a class.
5	Programs to create using String class.
6	Programs to create method overloading.
7	Programs to create constructor overloading.
8	Programs to create single level inheritance.
9	Program to create multilevel inheritance.
10	Programs to create interface.
11	Programs to achieve multiple inheritance through interface.
12	Programs for garbage collection.
13	Programs for abstract classes.
14	Programs to use predefined packages.
15	Programs to create classes using packages.

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S. Y. BCA
Academic Year – 2025-2026 Semester -IV
[BCA242202T]: Advance Web Technology

Teaching Scheme: TH: - 03 Hours/Week	Credit TH: 03	Examination Scheme: In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1. Describe the need of UI/UX design processes and user experience design in application development.
2. Describe the core syntax and semantics of JavaScript, Operators, control statements and functions
3. Discover the need for working with the JavaScript events, objects and form validation Infer the cookies concepts in JavaScript.
4. Create Asynchronous request through XML HttpRequest object and JSON.
5. Learning the MVC based applications using Angular JS components like directives, filters, expressions and form events.

Course Outcome:

After successful completion of the course, students will able to

CO1. Analyse an interaction design problem and propose of a user-centred process.
CO2. Identify common use of expressions and operators and know flow control, functions
CO3. Express proficiency in the handling of events and demonstrate usage of objects, cookies, form
CO4. Validation using JavaScript.
CO5. Proficiency to create dynamic web pages using AJAX and JSON.
CO6. Design content management system using Drupal.

Course Contents

UNIT-I	Introduction to UI/UX design	4 Hours

Introduction to UI/UX design process, difference between UX/UI design, good and bad UX, Role of UI and UX designer, UI/UX design principals, user research methods, introduction to UI/UX design tools, UX design phases: research, design, testing, and implementation.

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UNIT-II	Introduction to JavaScript	8 Hours
JavaScript Introduction, JavaScript data types, Variable declaration and scope, Operators, JavaScript Reserved Words, loops, control statements, break and continue statements. Functions: Function Declaration, Calling a Function, Function Parameter, return Statement, Nested Functions, Function () Constructor, Built In Functions, Standard Date and Time Functions, JavaScript Arrays, JavaScript objects		
UNIT-III	**JavaScript Events, Form Validation, Objects and classes**	**7 Hours**
JavaScript Events: What is an event, onClick Event Type, onSubmit Event Type, Mouse events, HML 5 Standard Events, What is Page Redirection? Form validation: Basic Form validation, data format validation, regular expression. Objects and Classes: object properties, object methods, User-Defined Objects, Defining Methods for an Object, Inheritance in JavaScript using prototype. Cookies: storing, reading and deleting cookies		
UNIT-IV	**JavaScript – DOM Manipulation**	**8 Hours**
What is the Document Object Model (DOM)? How Browsers Render Web Pages (DOM, CSSOM, and Rendering) DOM Tree Structure (Nodes, Elements, Attributes, and Text) Understanding the window and document objects, Selecting and Accessing DOM Elements, Forms and Input Handling in the DOM		
UNIT-V	**Introduction to Single Page Applications (SPAs)**	**8 Hours**
What is a Single Page Application?, Differences Between SPA and Multi-Page Applications (MPA), Evolution of Web Applications (Traditional vs. Modern), Benefits and Challenges of SPAs, Use Cases and Examples (Gmail, Facebook, Trello, Google Docs)		
UNIT-VI	**CMS (Content Management Systems)**	**5 Hours**
WordPress – Most popular CMS,Drupal – Secure and scalable CMS, Joomla – User-friendly CMS with a large plugin ecosystem, Strapi – Headless CMS for API-driven applications.		

Text Books :

1. Complete HTML- Thomas Powell
2. HTML and JavaScript – Ivan Bayross
3. Programming PHP - Rasmus Lerdorf and Kevin Tatroe, O'Reilly publication
4. Beginning PHP 5 - Wrox publication
5. 101 UX Principles A definitive Design Guide-Packt Publishing Ltd,Will Grant
6. Smashing UX Design-Jesmond Allen and James chudley

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7. JavaScript Bible, Wiley Pub.
8. HTML, DHTML, JavaScript, Perl & CGI Ivan Bayross, BPB Pub
9. Programming the World Wide Web by Robert W. Sebesta
10. Professional Ajax, 2nd Edition Wrox Press
11. AngularJS - Brad Green, ShyamSeshadriLearning Python By Mark Lutz,O'Reilly AngularJS Web Application Development Cookbook-Packt Publishing Ltd, Matt Frisbie

Reference Books:

R1. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd
R2. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd
R3. Android Application Development All in one for Dummies by Barry Burd, Edition: I

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Academic Year – 2025-2026 Semester -IV
[BCA242202L]: Advance Web Technology Lab

Teaching Scheme: PR: - 04 Hours/Week	Credit TH: 02	Examination Scheme: ISCE : 60 Marks End Sem. Exam : 40 Marks Total : 100 Marks

Course Objective:

1. Describe the core syntax and semantics of JavaScript, Operators, control statements and Functions.
2. Discover the need for working with the JavaScript events, objects and form validation Infer the cookies concepts in JavaScript.
3. Create Asynchronous request through XML HttpRequest object and JSON.

Course Outcome:

After successful completion of the course, students will able to
CO1. Analyse an interaction design problem and propose of a user-centred process.
CO2. Identify common use of expressions and operators and know flow control, functions
CO3. Express proficiency in the handling of events and demonstrate usage of objects, cookies, form.
CO4. Validation using JavaScript.
CO5. Proficiency to create dynamic web pages using AJAX and JSON.
CO6. Design content management system using Drupal.

Course Contents

Guidelines for Assessment

Continuous assessment of laboratory work is done based on overall performance and Laboratory assignments performance of student. Each Laboratory assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

List of Assignments

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1	Implementation of Navigator: (Using Function) in JS.
2	Implementation of Windows Object in JS.
3	Implementation of History Object in JS.
4	Implementation Join Array in JS.
5	Implementation of Math Object in JS.
6	Implementation of String Object in JS.
7	Implementation of AXAX.
8	Implementation of XML.
9	Implementation of PHP programs.
10	Implementation of Content Management Systems.
11	Implementation of Forms and Input Handling in the DOM.
12	Implementation of Selecting and Accessing DOM Elements.
13	Implementation of Understanding the window and document objects.
14	Implementation of AJAX web application model.
15	Implementation of Working with Drupal.

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S. Y. BCA
Academic Year – 2025-2026 Semester -IV
[BCA242203T]: Software Testing

Teaching Scheme: TH: - 03 Hours/Week	Credit TH: 03	Examination Scheme: In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

1. 1. **Understand the Fundamentals of Software Testing**
2. **Understand STLC,Test Planning and design test cases**
3. **Understand the types of testing and implement its techniques**
4. **Understand the difference types of manual testing**

Course Outcome:

After successful completion of the course, students will able to

CO1: Students will be able to explain the core principles and concepts of software testing

CO2: Students will be able to navigate and manage the various stages of the Software Testing Life Cycle (STLC), including test planning, design, execution, defect reporting, and closure.

CO3: Students will be able to perform different types of testing, including functional, non-functional, regression, and performance testing, ensuring a thorough evaluation of the software product.

CO4: Students will gain hands-on experience in manual testing.

CO5: Students will gain hands-on experience in automation testing.

CO6: Students will develop skills in advanced testing concepts, such as performance testing, security testing, and testing for mobile and web applications

Course Contents

UNIT-I	Introduction to Software Testing	06 Hours

Definition and Importance of Software Testing: Software Testing Fundamentals, Role of Testing in Software Development Life Cycle (SDLC), Objectives and Goals of Testing, Cost of Quality and Importance of Early Testing, Testing vs Debugging **Testing Principles**: Principles of Testing, Levels and Types of Testing,Testing Process.

UNIT-II	Software Testing Life Cycle (STLC)	06 Hours

Overview of STLC: Phases of STLC: Requirement Analysis, Test Planning, Test Design, Test Execution, Defect Reporting, and Test Closure **Test Planning**: Test Strategy, Test Plan Document, Test Case Design Techniques **Test Case Design**: Test Case Design Criteria,

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Equivalence Partitioning, Boundary Value , Analysis, Decision Table Testing, State Transition Testing, Cause-Effect Graphing.

UNIT –III	Types of Testing	07 Hours

Functional Testing: Unit Testing, Integration Testing, System Testing, Acceptance Testing (Alpha & Beta Testing) **Non-Functional Testing**: Performance Testing (Load Testing, Stress Testing), Usability Testing, Security Testing, Compatibility Testing. **Regression and Retesting:** Difference Between Regression and Retesting, Regression Testing Techniques

UNIT-IV	Manual Testing	07 Hours

Manual Testing Concepts: Manual vs Automation Testing, Advantages and Disadvantages of Manual Testing **Test Execution**: Test Execution Process, Reporting Defects. **Defect Life Cycle**: Introduction to Defect Management, Defect Reporting Tools (e.g., Bugzilla, Jira), Severity and Priority of Defects.

UNIT-V	Automation Testing	06 Hours

What is a Single Page Application?, Differences Between SPA and Multi-Page Applications (MPA), Evolution of Web Applications (Traditional vs. Modern), Benefits and Challenges of SPAs, Use Cases and Examples (Gmail, Facebook, Trello, Google Docs)

UNIT-VI	Advanced Testing Concepts and Techniques	08 Hours

Performance Testing: Introduction to Performance Testing,Load Testing, Stress Testing, and Scalability Testing,Tools for Performance Testing (e.g., JMeter, LoadRunner) **Security Testing**: Introduction to Security Testing,Common Security Vulnerabilities (SQL Injection, Cross-Site Scripting),Tools for Security Testing (e.g., OWASP ZAP, Burp Suite)
Mobile and Web Application Testing: Testing of Mobile Apps (Manual & Automation Tools),Testing Mobile Web Apps vs Native Apps, Responsive Web Design Testing
Continuous Testing and DevOps: Role of Testing in DevOps and CI/CD

Reference Books:

R1. **Foundations of Software Testing" by Rex Black**
R2. **Software Testing: Principles and Practices" by Naresh Chauhan**
R3.**The Art of Software Testing" by Glenford J. Myers**

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S. Y. BCA
Academic Year – 2025-2026 Semester -IV
[BCA242204T]: Cyber Security & Cyber Law

Teaching Scheme: TH: - 03 Hours/Week	Credit TH: 03	Examination Scheme: In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

Students should be able to understand

1. Develop a deeper understanding and familiarity with various types of cyberattacks, cyber crimes, vulnerabilities and remedies there to.
2. Analyze and evaluate existing legal framework and laws on cyber security.
3. Analyze and evaluate the importance of personal data its privacy and security.
4. Analyze and evaluate the digital payment system security and remedial measures against digital payment frauds.
5. Analyze and evaluate the security aspects of social media platforms and ethical aspects associated with use of social media.
6. Analyze and evaluate the cyber security risks and the risk assessment, plan suitable security controls , audit and compliance

Course Outcome:

After successful completion of the course, students will able to

CO1: understand the concept Cyber security issues and challenges

CO2: understand the different types of cyber crimes and their nature, legal remedies and how to report the crimes through available platforms and procedures

CO3: understand the basic security aspects related to Computer and Mobiles. They will be able to use basic tools and technologies to protect their devices.

CO4: understand the main components of cyber security plan and get insights into risk based assessment, requirement of security controls and need for cyber security audit and compliance.

Course Contents

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UNIT-I	**Introduction to Cyber Security**	**06 Hours**
Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Concept of cyber security, Issues and challenges of cyber security.		
UNIT-II	**Cyber crime and Cyber law**	**8 Hours**
Classification of cyber crimes, Common cyber crimes- cyber crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Reporting of cyber crimes, Remedial and mitigation measures, Legal perspective of cyber crime, IT Act 2000 and its amendments, Cyber crime and offences, Organizations dealing with Cyber crime and Cyber security in India.		
UNIT-III	**Social Media Overview and Security**	**08 Hours**
Introduction to Social networks. Types of Social media, Social media platform, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media, Case studies.		
UNIT-IV	**E - Commerce and Digital Payments**	**10 Hours**
Definition of E- Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments: Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments; Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorised banking transactions. Relevant provisions of Payament Settlement Act,2007,		
UNIT-V	**Digital Devices Security , Tools and Technologies for Cyber Security**	**06 Hours**
End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third party software, Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus,, Wi-Fi security, policy and permission		

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UNIT-VI	Cyber security Management , Compliance and Governance	05 Hours

Cyber security Plan- cyber security policy, cyber crises management plan., Business continuity, Risk assessment, Types of security controls and their goals, Cyber security audit and compliance, National cyber security policy and strategy

Text Books :

1. Cyber Crime Impact in the New Millennium, by R. C Mishra , Auther Press. Edition 2010.
2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011).
3. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson , 13th November, 2001).
4. Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd.
5. Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.
6. Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd.
7. Fundamentals of Network Security by E. Maiwald, McGraw Hill

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S. Y. BCA
Academic Year – 2025-2026 Semester -IV
[BCA242205T]: Cloud Computing

Teaching Scheme: TH: - 03 Hours/Week	Credit TH: 03	Examination Scheme: In Sem. Evaluation : 20 Marks Mid Sem. Exam : 30 Marks End Sem. Exam : 50 Marks Total : 100 Marks

Course Objective:

Students should be able to understand

1. Introduce the fundamental aspects of cloud computing
2. To understand the concept of Virtualization and design of cloud Services
3. Understanding the various cloud implementations and migration techniques
4. To understand the different aspects of Cloud Security
5. Demonstrate different features of cloud platforms used in Industry
6. Understand the different Application of Cloud Computing

Course Outcome:

After successful completion of the course, students will able to

CO1. Elaborating the basic concepts of cloud computing and defining the basic terms
CO2. Identify the components of cloud computing for service perspective
CO3. Ability to understand various service delivery models of a cloud computing architecture.
CO4. In depth learning of security challenges and preventive measures in cloud computing
CO5. Identifying cloud applications and its services
CO6. Identifying uses of cloud computing services in different fields

Course Contents

UNIT-I	Cloud Computing Fundamentals	8 Hours

Motivation for Cloud Computing, The Need for Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Open Challenges-Cloud Interoperability and Standards-Scalability and Fault Tolerance

UNIT-II	Cloud Virtualization	8 Hours

Introduction, Characteristics of Virtualized Environments, Taxonomy of Virtualization Techniques Execution Virtualization- Other Types of Virtualization, Virtualization and Cloud

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Computing, Pros and Cons of Virtualization, Technology Examples- Xen: Para-virtualization, VMware: Full Virtualization, Microsoft Hyper-V		
UNIT-III	**Cloud Computing Architecture**	**6 Hours**
Introduction, Cloud Reference Model-Architecture-Infrastructure / Hardware as a Service-Platform as a Service, Four Cloud Deployment Models- Public Clouds- Private Clouds- Hybrid Clouds, Community Clouds		
UNIT-IV	**Security in the Cloud**	**8 Hours**
Security Overview, Cloud Security Challenges and Risks, Software-as-a-Service Security, Security Governance, Risk Management, Security Monitoring, Security Architecture Design, Data Security, Application Security, Virtual Machine Security, Identity Management and Access Control, Autonomic Security.		
UNIT-V	**Cloud Platforms in Industry**	**5 Hours**
Amazon web services: Compute services, Storage services, Communication services, Google App Engine: Architecture and core concepts, Application life cycle, Microsoft Azure: Azure core concepts, SQL Azure, Windows Azure platform appliance.		
UNIT-VI	**Cloud Applications**	**5 Hours**
Scientific Applications- Healthcare: ECG Analysis in the Cloud, Biology: Protein Structure Prediction, Geoscience: Satellite Image Processing, Business and Consumer Applications- CRM and ERP, Social Networking, Media Applications.		
Text Books: **T1**. Dr. Kumar Saurabh, Cloud Computing – Insight into New Era Infrastructure, Wiley India. Gautam Shroff, (2011)Enterprise Cloud Computing, Cambridge University Press **T2**. Roger Jennings, Cloud Computing, , Wiley India		
Reference Books: R1: Dr. Kumar Saurabh, Cloud Computing – Insight into New Era Infrastructure, Wiley India. Gautam Shroff, (2011) Enterprise Cloud Computing, Cambridge University Press R2: Roger Jennings, Cloud Computing, , Wiley India R3: Rosenberg and Matheos, The Cloud at your service, Manning Publications		

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S. Y. BCA
Academic Year – 2025-2026 Semester -III
[BCACoC242206L]: Co-curricular II

Teaching Scheme: 02 Hours / Week	Credit : 01	Examination Scheme: Continous Assessment throughout semester : 50 Marks

Course Objective:

To provide students the opportunity to better explore their interests and to groom overall personality, apart from academic ability.

Course Outcome:

CO1: Broaden students' breadth of knowledge and horizons.
CO2: Stimulate out of the box thinking, self-reflection, and self-understanding to promote their individual growth.
CO3: Build solid foundation for "Whole Person Education" which will nurture and foster the holistic development .

Course Contents

List of Extra curricular activities :

1. Leadership Work and Positions
2. Sports and Athletic Participation
3. Academic Clubs and Teams/ Professional student chapters
4. Artistic and Creative Pursuits
5. Volunteering and Community Service
6. Internships

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Rules & Regulations:

- All the first year students should enroll in one of the Extra-Curricular Activities
- Students opting for Sports / Games / Yoga / Martial Arts / Dance can continue the same activity in the I/II/III/IV/V/VI/VII/VIII semester or can choose another activity
- Every week, any day last 2 hours are given for Cocurricular activity.
- Minimum of 50% attendance is required for these activities.
- In-charge faculty coordinator monitor the students and take the attendance.
- At the end of the year the attendance is submitted to the Attendance Committee and finally to the Exam Section.
- Students are given grades credits in the final memorandum.

Guideline for grading Co/Extra-Curricular Activity

- RSCOE shall organized various competitions through its various clubs(governed by either by Student Affairs pr Department) during the semester and academic year.
- All UG students shall choose at least ONE activity/event from the group of Co-curricular and Extra-curricular activities happening on campus or off campus during the semester. The student shall take active part in the activity, take part in competitions and earn grade points.
- On registering for a particular activity, the performance of a student shall be continuously monitored by the Faculty-in-charge.

RSCOE plans club activities into three categories.

1. Art Club
2. Technical Club
3. Sports and Games
4. SWAYAM

- Art club include various clubs related to liberal arts, music, performing arts etc.
- Technical club include chapters of professional societies like SAE,ASRAE,ISHRAE,CSI,RSI,IEEE, ISTE, IET, Department Associations, Shashwat (socio-technical club),Rotaract, ASCE,ICI etc.
- National Service Scheme (NSS) and Similar activities such as Unnat Bharat, Social Work, Blood donation etc.
- SWAYAM portal offers some self-paced courses related with YOGA such as Physical Activity (YOGA) (योग) or approved by Dean concern.

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- Participation in competitions, winning prizes, representing institute on state, national and international level etc shall get weightage as mentioned in the Annexure I and rubrics for same ids designed
- All competition to which Academic credit is concerned, shall have set of guidelines and rubrics defined by the department or Student Affair or concern faculty in charges.
- Few examples of Competition/Activity and is given in Annexure II

Annexure I: Assessment Rubrics:
Table A Rubrics for Assessment for Clubs Sports and cultural events(@UG Level)

		Clubs/Activity				Marks *	Grade point	Letter Grade
	Art clubs **Technical Clubs** **Sports** **Any other competition/activity defined by institute/ department.**	**NSS/NCC/Unnat Bharat Abhiyan**	**Participation in events outside of the institutes**	**SWAYAM Courses(only4 week course approved Dean concern)**	**Leadership & Management of clubs/activities/ Student Professional Societies/Institute Festival & Technical Events etc**			
Achievement level	I Prize winner, II Prize Winner, III winner	Best NSS/NCC Volunteer Awardee (State/National level) / Participation in Republic Day Parade Camp/International Youth Exchange Programme, Supported by certification	I Prize winner, II Prize Winner, III Prize Winner	As reflected in grade sheet	Top level management	50-45	10	O
	Active Participation (High)	Active Participation (High)	Selection in such events supported By certification		Middle level management	40-35	9	A+
						35-30	8	A

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	Active Participation (Medium)	Active Participation (Medium)			Lower-level management	30-25	7	B+
						25-20	6	B
	Active Participation (low)	Active Participation (low)				20-15	5	C
						12	4	P
	Not participate	Not participate	-		-	0	0	F

*Various clubs different marking system, however, it can be scaled down to 50 and assign credit accordingly.

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