

Prof. Rajendra Singh (Rajju Bhaiya) University, Prayagraj

Curriculum Structure & Syllabus

as per

National Education Policy -2020

Bachelor of Computer Application

BCA

[Three years Degree Course in Computer Application]

(W.E.F. 2026-27 onwards)



Prof. Rajendra Singh (Rajju Bhaiya) University

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Program Outcomes (POs)

PO1: Apply knowledge of computing, mathematics and information technology to solve problems in diverse domains.

PO2: Identify, analyze and develop appropriate solutions for computing and real-world problems using logical and analytical approaches.

PO3: Utilize contemporary computing tools, technologies and platforms for software development and problem solving.

PO4: Design, develop, test and maintain software applications to meet user and organizational requirements.

PO5: Apply data analytics, artificial intelligence and emerging computing techniques for informed decision making.

PO6: Demonstrate ethical values, professional responsibility and cyber security awareness in computing practices.

PO7: Communicate effectively and collaborate productively in individual and team-based environments.

PO8: Assess the impact of computing solutions on society, environment and sustainable development.

PO9: Demonstrate leadership and innovation in professional and societal contexts.

PO10: Engage in independent learning and adapt to evolving technologies and professional challenges.

Program Specific Outcomes (PSOs)

PSO1: Design and develop software, web and mobile applications using appropriate programming languages, databases and development frameworks.

PSO2: Apply artificial intelligence, machine learning, deep learning and data science techniques to analyze data and solve computational problems.

PSO3: Utilize cloud computing, cyber security, blockchain and other emerging technologies to develop secure, scalable and innovative digital solutions.

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Semester wise Course Structure with Credit Distribution

BCA Semester – I

Course Code	Core/ Elective	Course Title	Credit	Max Marks – 100	
				CIE	ETE
B230101T	Major	Problem Solving & Programming Using 'C'	3	25	75
B230102T	Major	Fundamentals of Computing and Programming	3	25	75
B230103T	Major	Digital Electronics	3	25	75
B230104T	Minor	Mathematics for Computing and Data Science	3	25	75
B230105T	Minor	Digital Productivity and AI Tools	2	25	75
	Elective	Vocational / Skill Enhancement Course	3		
	Elective	Value-Added Course (Select anyone) (1) Understanding India (2) Environmental Studies	2	25	75
B230106P	Lab	Principles of Programming Using 'C' Lab	1	25	75

BCA Semester – II

Course Code	Core/ Elective	Course Title	Credit	Max Marks – 100	
				CIE	ETE
B230201T	Major	Computer Organization and Architecture	3	25	75
B230202T	Major	Data Structure Using C/C++	3	25	75
B230203T	Major	Discrete Mathematics	3	25	75
B230204T	Minor	Computer Graphics	3	25	75
B230205T	Minor	Cyber Security	2	25	75
	Elective	Ability Enhancement Courses – Hindi BhashaKaushalEvam Sanchar (हिंदीभाषाएवंकौशलविकास)	3	25	75
	Elective	Summer Training	2		
B230206P	Lab	Data Structure Using C / C++ Lab	1	25	75

BCA Semester – III

Course Code	Core/ Elective	Course Title	Credit	Max Marks – 100	
				CIE	ETE
B230301T	Major	Java Programming	3	25	75
B230302T	Major	Design and Analysis of Algorithms	3	25	75
B230303T	Major	Python Programming	3	25	75
B230304T	Minor	Artificial Intelligence	2	25	75
B230305T	Minor	Block Chain Technology	3	25	75
	Elective	Vocational / Skill Enhancement Course	3		

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	Elective	Value-Added Course (Select from List) (1) Digital and Technological Solutions (2) Health and Wellness (3) NCC (4) NSS (5) Rovers and Rangers	2	25	75
B230306P	Lab	Java Programming Lab	1	25	75
BCA Semester – IV					
Course Code	Core/ Elective	Course Title	Credit	Max Marks – 100	
				CIE	ETE
B230401T	Major	Data Communication & Computer Network	3	25	75
B230402T	Major	Database Management Systems	3	25	75
B230403T	Major	Machine Learning	3	25	75
B230404T	Minor	Software Engineering	2	25	75
B230405T	Minor	Web Technology	3	25	75
	Elective	Ability Enhancement Courses (English Language Skill and Communication)	3		
	Elective	Summer Training	2		
B230406P	Lab	Web Technology Lab	1	25	75

BCA Semester – V

Course Code	Core/ Elective	Course Title	Credit	Max Marks – 100	
				CIE	ETE
B230501T	Major	Deep Learning	3	25	75
B230502T	Major	Cloud Computing	3	25	75
B230503T	Major	Data Science	3	25	75
B230504T	Major	Mobile Application Development	3	25	75
B230505T	Major	Operating System	3	25	75
B230506P	Lab	Data Science Lab	1	25	75
B230507R	MRP	Minor Research Project	4	25	75
BCA Semester – VI					
Course Code	Core/ Elective	Course Title	Credit	Max Marks – 100	
				CIE	ETE
B230601T	Major	Data Mining and Analytics	4	25	75
B230602T	Major	Emerging Technologies and Generative AI	4	25	75
B230603T	Major	Multimedia & Animation	3	25	75
B230604P	Lab	Multimedia & Animation Lab	1	25	75
B230605R	MRP	Major Research Project	8	25	75

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BCA 1st Year

BCA Syllabus 2026-27 Onwards		
Program Class: Degree	Year: First	Semester: First
Course Code: B230101T	Course Title: Problem Solving and Programming Using C	Credits: 3
Course Outcomes:		
CO 1:	Explain the structure and execution process of C programs.	
CO 2:	Use variables, data types, operators and expressions in program development.	
CO 3:	Develop programs using decision-making and iterative constructs.	
CO 4:	Apply functions, recursion and modular programming concepts.	
CO 5:	Develop applications using arrays and strings for problem solving.	
Units	Topics	
1	Introduction to C Programming: Structure of a C Program, Character Set, Tokens, Keywords, Identifiers, Constants, Variables, Data Types, Compilation and Execution Process, Standard Input and output functions.	
2	Operators and Control Statements: Arithmetic, Relational, Logical, Assignment, Increment-Decrement, Conditional and Bitwise Operators, Type Conversion, Expressions and Operator Precedence, if, if-else, nested if, switch statement, while, do-while, for loop, nested loops, break and continue statements.	
3	Array and Pointers: One-Dimensional and Two-Dimensional Arrays, Array Operations, Character Arrays, String Handling Concepts and Standard String Functions Pointer variable, Pointer arithmetic, Dynamic Memory Allocation, Pointer and Array	
4	Functions and Structure: Function Definition and Calling, Function Prototypes, Scope of Variables, Parameter Passing Concepts, Returning Values from Function, Recursive Functions , Structure, Union, Enumeration, Storage Classes	
5	File Handling and Preprocessor: File concept, Opening Modes, Closing a File, File Operations, Preprocessor Directive, Symbolic Constants, Conditional Compilation, Header Files and Standard Library Functions	
Suggested Reference Books	1. E. Balagurusamy – Programming in ANSI C, McGraw Hill. 2. Yashavant Kanetkar – Let Us C, BPB. 3. Byron Gottfried – Programming with C, Schaum Series. 4. Reema Thareja – Programming in C, Oxford University Press. 5. Brian W. Kernighan & Dennis Ritchie – The C Programming Language.	
Suggested Online Learning Platforms	SWAYAM – https://swayam.gov.in NPTEL – https://nptel.ac.in e-PG Pathshala – https://epgp.inflibnet.ac.in National Digital Library of India (NDLI) – https://ndli.iitkgp.ac.in DIKSHA – https://diksha.gov.in	

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BCA Syllabus 2026-27 Onwards		
Program Class: Degree	Year: First	Semester: First
Course Code: B230102T	Course Title: Fundamentals of Computing and Programming	Credits: 3
Course Outcomes: CO1: Explain the fundamentals of computer systems and data representation. CO2: Apply computational thinking and problem-solving techniques. CO3: Demonstrate understanding of basic programming concepts. CO4: Describe the principles of Object-Oriented Programming. CO5: Explain modern computing technologies and digital practices.		
Units	Topics	
1	Computer Systems and Digital Foundations: Evolution and Generations of Computers, Characteristics, Classification and Applications of Computers, Hardware and Software Concepts, Number Systems (Binary, Octal, Decimal and Hexadecimal), Number System Conversions, Binary Arithmetic, Data Representation and Character Encoding.	
2	Computational Thinking and Problem Solving: Problem Solving Concepts, Algorithms and Characteristics, Flowcharts and Pseudocode, Computational Thinking, Program Development Cycle, Debugging and Testing Concepts	
3	Programming Fundamentals: Programming Languages and Language Translators, Variables, Constants and Data Types, Operators and Expressions, Input and Output Concepts, Decision Making Constructs, Looping Concepts, Functions and Modular Programming.	
4	Object-Oriented Programming Concepts: Procedural Programming versus Object-Oriented Programming, Classes and Objects, Encapsulation and Abstraction, Inheritance, Polymorphism, Advantages and Applications of OOP	
5	Modern Computing Technologies: Internet and Web Fundamentals, Basics of Computer Networks, Cyber Security Fundamentals, Cloud Computing Overview, Artificial Intelligence and Generative AI Overview, Digital Ethics and Responsible Computing	
Suggested Reference Books	1. P.K. Sinha & Priti Sinha – Computer Fundamentals (BPB Publications) 2. Anita Goel – Computer Fundamentals (Pearson Education) 3. V. Rajaraman – Fundamentals of Computers (PHI Learning) 4. E. Balagurusamy – Object Oriented Programming with C++ (McGraw Hill Education) 5. Reema Thareja – Computer Fundamentals and Programming in C (Oxford University Press)	
Suggested Online Learning Platforms	1. SWAYAM – https://swayam.gov.in 2. NPTEL – https://nptel.ac.in 3. e-PG Pathshala – https://epgp.inflibnet.ac.in 4. National Digital Library of India (NDLI) – https://ndli.iitkgp.ac.in 5. DIKSHA – https://diksha.gov.in 6. Spoken Tutorial (IIT Bombay) – https://spoken-tutorial.org	

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BCA Syllabus 2026-27 Onwards		
Program Class: Degree	Year: First	Semester: First
Course Code: B230103T	Course Title: Digital Electronics	Credits: 3
Course Outcomes:		
CO 1:	Explain number systems and digital codes used in computing systems.	
CO 2:	Apply Boolean algebra and logic simplification techniques.	
CO 3:	Analyze combinational logic circuits.	
CO 4:	Describe sequential logic circuits and memory elements.	
CO 5:	Explain digital electronic subsystems and their applications in computing.	
Units	Topics	
1	Digital Fundamentals: Analog and Digital Signals, Number Systems, Binary Arithmetic, Complements, BCD, ASCII and Gray Codes.	
2	Boolean Algebra and Logic Gates: Boolean Laws and Theorems, De Morgan's Theorems, Logic Gates, Universal Gates, Simplification using Karnaugh Maps.	
3	Combinational Circuits: Half Adder, Full Adder, Subtractors, Encoders, Decoders, Multiplexers, Demultiplexers.	
4	Sequential Circuits: Flip-Flops (SR, JK, D, T), Registers, Shift Registers, Counters, Timing Concepts and Applications.	
5	Digital Integrated Circuit: Characteristics of digital IC, Introduction to Logic Families- RTL DTL, TTL, ECL, MOS and CMOS circuit and comparison.	
Suggested Reference Books	1. M. Morris Mano – Digital Logic and Computer Design. 2. R. P. Jain – Modern Digital Electronics. 3. Thomas L. Floyd – Digital Fundamentals. 4. Donald P. Leach – Digital Principles and Applications. 5. Anil K. Maini – Digital Electronics.	
Suggested Online Learning Platforms	SWAYAM – https://swayam.gov.in NPTEL – https://nptel.ac.in e-PG Pathshala – https://epgp.inflibnet.ac.in National Digital Library of India (NDLI) – https://ndli.iitkgp.ac.in DIKSHA – https://diksha.gov.in	

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Program Class: Degree	Year: First	Semester: First
Course Code: B230104T	Course Title: Mathematics for Computing and Data Science	Credits: 3
Course Outcomes:		
CO 1:	Apply mathematical concepts to computational problems.	
CO 2:	Perform matrix operations and solve linear equations.	
CO 3:	Apply probability concepts in data analysis and decision-making.	
CO 4:	Analyze data using statistical techniques.	
CO 5:	Explain mathematical foundations of Artificial Intelligence and Data Science.	
Units	Topics	
1	Mathematical Foundations for Computing: Sets and Set Operations, Functions and Graphs, Mathematical Modelling, Sequences and Series, Applications in Computing.	
2	Linear Algebra: Matrices and Matrix Operations, Determinants, Inverse of Matrix, Solution of Simultaneous Linear Equations, Applications of Linear Algebra in Computing.	
3	Probability Theory: Basic Concepts of Probability, Conditional Probability, Bayes' Theorem, Random Variables, Applications of Probability in Computing and Artificial Intelligence.	
4	Statistics and Data Analytics: Measures of Central Tendency, Measures of Dispersion, Correlation, Regression, Data Interpretation, Data Visualization Concepts.	
5	Mathematical Foundations of AI and Data Science: Vectors and Vector Operations, Distance Measures, Introduction to Derivatives, Basic Optimization Concepts, Applications in Artificial Intelligence, Machine Learning and Data Science.	
Suggested Reference Books	1. B.S. Grewal, Higher Engineering Mathematics, 45th Edition, Khanna Publishers, 2023. 2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley India, 2015. 3. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons, Latest Edition. 4. Joel Grus, Data Science from Scratch, 2nd Edition, O'Reilly Media, 2019. 5. Richard N. Aufmann and Joanne Lockwood, Mathematical Thinking and Problem Solving, Cengage Learning, Latest Edition.	
Suggested Online Learning Platforms	SWAYAM – https://swayam.gov.in NPTEL – https://nptel.ac.in e-PG Pathshala – https://epgp.inflibnet.ac.in National Digital Library of India (NDLI) – https://ndl.iitkgp.ac.in Khan Academy DIKSHA – https://diksha.gov.in	

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BCA Syllabus: 2026-27 Onwards		
Program Class: Degree	Year: First	Semester: Second
Course Code B230105T	Course Title: Digital Productivity & AI Tools	Credits: 2
Course Outcomes: Upon successful completion of the course, students will be able to:		
CO1: Understand digital workplace practices and professional communication requirements in modern business environments.		
CO2: Use digital tools for workplace organization, task management and productivity enhancement		
CO3: Develop business presentations, professional profiles and visual communication materials using digital platforms.		
CO4: Apply collaboration and virtual workplace tools for team coordination and remote work.		
CO5: Utilize AI-assisted tools for communication, content creation and workplace productivity		
CO6: Demonstrate ethical, secure and responsible use of digital and AI technologies in business organizations.		
Units	Topics	
1	Digital Workplace & Professional Communication: Digital workplace concepts and evolving nature of work; Professional communication in organizations; Business email writing and email etiquette; Virtual communication and workplace conduct; Digital professionalism; Cyber safety and responsible technology use.	
2	Digital Organization & Productivity Tools: Digital file and information management; Cloud storage and document sharing; Digital scheduling and calendar management; Task and workflow management; Workplace productivity and time management practices.	
3	Business Presentation & Professional Presence: Business presentation design principles; Visual communication and infographic creation; Resume and professional profile development; LinkedIn and professional networking basics; Personal branding and professional visibility.	
4	Collaboration & Virtual Workplace Practices: Virtual meetings and online meeting etiquette; Team collaboration and communication; Cloud-based file sharing and collaborative working; Remote workplace coordination; Digital project and team management practices.	
5	AI Tools for Business Productivity: Introduction to Artificial Intelligence and Generative AI; Prompt writing fundamentals; AI-assisted communication and content creation; AI tools for presentations, summaries and workplace tasks; Ethical, responsible and effective use of AI in business environments.	
Course Practical Requirements	(1). Professional email writing exercises. (2). Digital file management and cloud storage activities using Google Drive or OneDrive. (3). Digital scheduling and task management exercises using Google Calendar, Trello or Notion. (4). Business presentation and infographic creation using PowerPoint or Canva. (5). Resume preparation and LinkedIn profile development. (6). Virtual meeting and collaboration activities using Google Meet, Microsoft Teams or Zoom. (7). Team-based digital collaboration exercises. (8). AI-assisted content creation and summarization activities. (9). AI-assisted presentation and report preparation. (10). Workplace productivity exercises using digital and AI tools.	
Suggested Reference Books	(1). Bovee, C.L. & Thill, J.V. – <i>Business Communication Today</i> , Pearson. (2). Guffey, M.E. & Loewy, D. – <i>Essentials of Business Communication</i> , Cengage. (3). Alexis Leon & Mathews Leon – <i>Fundamentals of Information Technology</i> , Vikas Publishing House. (4). Joan Lambert – <i>Microsoft Office 365 Step by Step</i> , Microsoft Press. (5). Ethan Mollick – <i>Co-Intelligence: Living and Working with AI</i> . (6). Bernard Marr – <i>Generative AI in Practice</i> .	
Suggested Online	(1). SWAYAM – https://swayam.gov.in	

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Learning Platforms	(2). NPTEL – https://nptel.ac.in (3). National Digital Library of India (NDLI) – https://ndl.iitkgp.ac.in (4). e-PG Pathshala – https://epgp.inflibnet.ac.in (5). DIKSHA – https://diksha.gov.in (6). FutureSkills Prime – https://futureskillsprime.in (7). Microsoft Learn – https://learn.microsoft.com (8). LinkedIn Learning – https://www.linkedin.com/learning
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BCA Syllabus 2026-27 Onwards		
Program Class: Degree	Year: First	Semester: Second
Course Code: B230201T	Course Title: Computer Organization and Architecture	Credits: 3
Course Outcomes:		
CO 1:	Explain computer organization and architectural concepts.	
CO 2:	Analyze processor organization and instruction execution.	
CO 3:	Describe memory hierarchy and storage systems.	
CO 4:	Explain input-output mechanisms and bus architectures.	
CO 5:	Understand modern processor technologies and architectures.	
Units	Topics	
1	Processor Organization CPU Architecture, Registers and Register Organization, Arithmetic Logic Unit (ALU), Control Unit, Instruction Cycle, Instruction Execution.	
2	Instruction Set Architecture Machine Instructions, Instruction Formats, Addressing Modes, Program Control Instructions, RISC Architecture, CISC Architecture.	
3	Memory Organization Memory Hierarchy, Cache Memory, Main Memory, Secondary Storage, Virtual Memory, Memory Performance and Optimization.	
4	Input-Output Organization Input-Output Techniques, I/O Interfaces, Interrupts, Direct Memory Access (DMA), Bus Architecture, Peripheral Communication.	
5	Advanced Computer Architectures Parallel Processing Concepts, Pipelining, Multicore Processors, GPU Architecture, Cloud and Edge Computing Architecture, Performance Evaluation of Computer Systems.	
Suggested Reference Books	1. William Stallings, <i>Computer Organization and Architecture: Designing for Performance</i> , 11th Edition, Pearson Education, 2019. 2. Carl Hamacher, Zvonko Vranesic, Naraig Manjikian and Safwat Zaky, <i>Computer Organization and Embedded Systems</i> , 6th Edition, McGraw Hill, 2017. 3. M. Morris Mano, <i>Computer System Architecture</i> , Revised 3rd Edition, Pearson Education, 2017. 4. David A. Patterson and John L. Hennessy, <i>Computer Organization and Design</i> , 5th Edition, Morgan Kaufmann, 2017. 5. V. Carl Hamacher, <i>Computer Organization</i> , McGraw Hill Education, Latest Edition.	
Suggested Online Learning Platforms	SWAYAM – https://swayam.gov.in NPTEL – https://nptel.ac.in e-PG Pathshala – https://epgp.inflibnet.ac.in National Digital Library of India (NDLI) – https://ndl.iitkgp.ac.in DIKSHA – https://diksha.gov.in	

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BCA Syllabus 2026-27 Onwards		
Program Class: Degree	Year: First	Semester: Second
Course Code: B230202T	Course Title: Data Structure using C/C++	Credits: 3
Course Outcomes:		
CO 1:	Explain Abstract Data Types and fundamental data structures.	
CO 2:	Implement linear data structures using C/C++.	
CO 3:	Apply tree and graph structures to solve computational problems.	
CO 4:	Analyze the efficiency of data structure operations.	
CO 5:	Develop solutions using appropriate data structures.	
Units	Topics	
1	Introduction to Data Structures and Algorithm Analysis: Data and Information, Data Types, Abstract Data Types (ADT), Data Structure Classification, Operations on Data Structure, Algorithm, Complexity of Algorithm, Time Complexity, Space Complexity, Analysis of Algorithms, Performance Evaluation of Algorithms.	
2	Linear Data Structure- Array, Stake and Queue: Range of Arrays, Memory Representation of Arrays, Address Calculation and Mapping Functions Stack ADT, Stack Operations, Array and Linked List Implementation of Stacks, Applications of Stacks, Infix, Prefix and Postfix Expressions, Expression Evaluation, Queue ADT, Circular Queue, Priority Queue, Double Ended Queue, Applications of Queues.	
3	Linked Lists: Dynamic Data Structures, Singly Linked Lists, Doubly Linked Lists, Circular Linked Lists, Linked List Operations (Insertion, Deletion, Traversal), Applications of Linked Lists.	
4	Trees, Graphs and Hashing: Tree Terminology, Binary Trees, Binary Tree Traversals, Binary Search Trees, AVL Trees, Heap Data Structures, Graph Terminology, Graph Representation using Matrix and List, Breadth First Search (BFS), Depth First Search (DFS), Hashing Techniques, Hash Functions, Collision Resolution Methods, Applications of Trees, Graphs and Hashing.	
5	Searching and Sorting Techniques: Linear Search, Binary Search, Searching Performance Analysis, Internal and External Sorting Concepts, Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort, Heap Sort, Comparison of Sorting Techniques, Applications of Searching and Sorting Algorithms.	
Suggested Reference Books	1. Seymour Lipschutz – Data Structures with C 2. Ellis Horowitz, Sartaj Sahni – Fundamentals of Data Structures 3. Reema Thareja – Data Structures Using C 4. Yedidyah Langsam – Data Structures Using C and C++ 5. Mark Allen Weiss – Data Structures and Algorithm Analysis	
Suggested Online Learning Platforms	SWAYAM – https://swayam.gov.in NPTEL – https://nptel.ac.in e-PG Pathshala – https://epgp.inflibnet.ac.in National Digital Library of India (NDLI) – https://ndl.iitkgp.ac.in DIKSHA – https://diksha.gov.in	

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BCA Syllabus 2026-27 Onwards		
Program Class: Degree	Year: First	Semester: Second
Course Code: B230203T	Course Title: Discrete Mathematics	Credits: 3
Course Outcomes:		
CO 1:	Apply logical reasoning to computational problems.	
CO 2:	Solve combinatorial and recurrence-based problems.	
CO 3:	Analyze relations and functions in computing applications.	
CO 4:	Apply graph and tree concepts in computer science.	
CO 5:	Use Boolean algebra in digital and computational systems.	
Units	Topics	
1	Mathematical Logic: Propositions and Logical Connectives, Truth Tables, Logical Equivalences, Predicate Logic, Rules of Inference, Applications of Logic in Computing.	
2	Combinatorics: Principles of Counting, Permutations, Combinations, Pigeonhole Principle, Binomial Theorem, Recurrence Relations.	
3	Relations and Functions: Relations and their Properties, Equivalence Relations, Partial Order Relations, Functions and Types of Functions, Applications in Computing.	
4	Graph Theory: Graphs and Types of Graphs, Graph Representation, Graph Traversal Concepts, Connected Graphs, Euler and Hamiltonian Graphs, Matrix representation of diagraph, Warshall's algorithm.	
5	Trees and Boolean Algebra: Trees and Binary Trees, Tree Traversal Techniques, Spanning Trees, Boolean Algebra, Boolean Functions, Logic Gates and Applications.	
Suggested Reference Books	1. Kenneth H. Rosen, Discrete Mathematics and Its Applications, 8th Edition, McGraw Hill, 2019. 2. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, McGraw Hill Education, Reprint Edition, 2017. 3. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science, PHI Learning, Reprint Edition, 2017. 4. C.L. Liu and D.P. Mohapatra, Elements of Discrete Mathematics, 4th Edition, McGraw Hill Education, 2017. 5. V. Krishnamurthy, Combinatorics: Theory and Applications, Affiliated East-West Press, Latest Edition.	
Suggested Online Learning Platforms	SWAYAM – https://swayam.gov.in NPTEL – https://nptel.ac.in e-PG Pathshala – https://epgp.inflibnet.ac.in National Digital Library of India (NDLI) – https://ndl.iitkgp.ac.in DIKSHA – https://diksha.gov.in	

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BCA Syllabus 2026-27 Onwards		
Program Class: Degree	Year: First	Semester: Second
Course Code: B230204T	Course Title: Computer Graphics	Credits: 3
Course Outcomes:		
CO 1:	Explain computer graphics systems and applications.	
CO 2:	Implement graphics generation algorithms.	
CO 3:	Apply geometric transformations.	
CO 4:	Analyze viewing and clipping techniques.	
CO 5:	Utilize graphics concepts in multimedia and visualization applications.	
Units	Topics	
1	Introduction to Computer Graphics: Computer Graphics Systems, Graphics Hardware, Display Devices, Input Devices, Graphics Software, Applications of Computer Graphics, Graphics Standards and Graphics Packages.	
2	Graphics Primitives: Points and Coordinate Systems, Line Drawing Algorithms, DDA Algorithm, Bresenham Line Algorithm, Circle Generation Algorithms, Polygon Representation, Scan Conversion Techniques.	
3	Two-Dimensional Transformations: Translation, Rotation, Scaling, Reflection, Shearing, Composite Transformations, Homogeneous Coordinates, Transformation Matrices.	
4	Viewing and Clipping: Windowing Concepts, Viewport Transformation, Viewing Pipeline, Line Clipping Algorithms, Polygon Clipping Algorithms, Visible Surface Determination Concepts.	
5	Multimedia Graphics and Visualization: Color Models, Multimedia Concepts, Animation Principles, Two-Dimensional Graphics, Three-Dimensional Graphics Concepts, Virtual Reality Concepts, Augmented Reality Overview, Graphics Applications in Industry, Healthcare and Gaming.	
Suggested Reference Books	1. Donald Hearn & Pauline Baker – Computer Graphics 2. Steven Harrington – Computer Graphics 3. David F. Rogers – Procedural Elements of Computer Graphics 4. Foley, Van Dam – Computer Graphics Principles and Practice 5. Zhigang Xiang – Computer Graphics	
Suggested Online Learning Platforms	SWAYAM – https://swayam.gov.in NPTEL – https://nptel.ac.in e-PG Pathshala – https://epgp.inflibnet.ac.in National Digital Library of India (NDLI) – https://ndl.iitkgp.ac.in DIKSHA – https://diksha.gov.in	

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BCA Syllabus 2026-27 Onwards		
Program Class: Degree	Year: First	Semester: Second
Course Code: B230205T	Course Title: Cyber Security	Credits: 2
Course Outcomes:		
CO 1:	Explain fundamental concepts of cyber security and cyber threats.	
CO 2:	Identify common security risks and protective measures.	
CO 3:	Apply safe computing and data protection practices.	
CO 4:	Explain network and web security concepts.	
CO 5:	Describe emerging cyber security challenges and solutions.	
Units	Topics	
1	Introduction to Cyber Security: Fundamentals of Cyber Security, Cyber Threats and Cyber Attacks, Types of Hackers, Cyber Crime and Cyber Laws, Security Principles: Confidentiality, Integrity and Availability (CIA), Digital Footprint and Online Privacy	
2	Information and System Security: Authentication and Authorization, Password Security and Multi-Factor Authentication, Malware: Virus, Worm, Trojan, Ransomware, Spyware, Data Backup and Recovery, Endpoint Security, Safe Computing Practices	
3	Network and Web Security: Network Security Fundamentals, Firewalls and Intrusion Detection Systems, Phishing and Social Engineering, Email Security, Web Security Concepts, Secure Browsing Practices	
4	Data Security and Cloud Security: Data Protection and Privacy, Encryption and Decryption Concepts, Digital Signatures, Cloud Security Fundamentals, Mobile Security Concepts, Security Challenges in Digital Platforms	
5	Emerging Trends in Cyber Security: Cyber Security in AI and Machine Learning, Internet of Things (IoT) Security, Blockchain and Security Applications, Cyber Security Governance and Compliance, Ethical Hacking Overview, Career Opportunities in Cyber Security	
Suggested Reference Books	1. Nina Godbole and Sunit Belapure, Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley India, Latest Edition. 2. Charles P. Pfleeger and Shari Lawrence Pfleeger, Security in Computing, Pearson Education, Latest Edition. 3. William Stallings, Cryptography and Network Security, Pearson Education, Latest Edition. 4. Joseph Migga Kizza, Guide to Computer Network Security, Springer, Latest Edition. 5. Michael E. Whitman and Herbert J. Mattord, Principles of Information Security, Cengage Learning, Latest Edition.	
Suggested Online Learning Platforms	SWAYAM – https://swayam.gov.in NPTEL – https://nptel.ac.in e-PG Pathshala – https://epgp.inflibnet.ac.in National Digital Library of India (NDLI) – https://ndl.iitkgp.ac.in DIKSHA – https://diksha.gov.in	

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Second Year

BCA Syllabus 2026-27 Onwards		
Program Class: Degree	Year: Second	Semester: Third
Course Code: B230301T	Course Title: Java Programming	Credits: 3
Course Outcomes:		
CO 1:	Explain Java programming fundamentals and object-oriented programming principles.	
CO 2:	Develop applications using classes, objects, inheritance and polymorphism.	
CO 3:	Apply packages, interfaces, string handling and exception handling mechanisms.	
CO 4:	Utilize collection framework and multithreading for application development.	
CO 5:	Develop event-driven applications using AWT components and event handling techniques.	
Units	Topics	
1	Introduction to Java Programming Fundamentals: Features of Java, Java Environment, Structure of Java Program, Compilation and Execution Process, Data Types, Variables and Constants, Operators, Input and Output using Scanner Class, Control Statements, Type Conversion and Casting, Wrapper Classes	
2	Object-Oriented Programming Concepts: Characteristics of OOPS, Classes and Objects, Access Modifiers, Methods, Constructors, Constructor Overloading, Method Overloading, Inheritance, Types of Inheritance, Method Overriding, Runtime Polymorphism, Abstract Classes, Interfaces	
3	Array, String Handling and Exception Handling: Array, Immutable string, Mutable string, Exception Handling Mechanism, try-catch-finally Blocks, Multiple Catch Blocks, Nested try Statements, Static Members	
4	Collections Framework, Package and Multithreading: Introduction to Collection Framework, ArrayList, Package in java, Thread Life Cycle, Creating Threads, Runnable Interface, Thread Priorities, Thread Synchronization.	
5	AWT and Event Handling: Introduction to Abstract Window Toolkit (AWT), Components and Containers, Labels, Buttons, Text Fields, Text Areas, Check Boxes, Choice Controls, Lists, Menus and Menu Bars, Layout Managers, Event Handling Mechanism, Event Classes, Event Listener Interfaces, Adapter Classes, Mouse Events, Keyboard Events, Window Events, Developing Simple Event-Driven Applications	
Suggested Reference Books	1. Herbert Schildt, <i>Java: The Complete Reference</i> , 12th Edition, McGraw-Hill Education, 2021. 2. Cay S. Horstmann, <i>Core Java Volume I: Fundamentals</i> , 12th Edition, Pearson Education, 2021. 3. Kathy Sierra, Bert Bates and Trisha Gee, <i>Head First Java</i> , 3rd Edition, O'Reilly Media, 2022. 4. E. Balagurusamy, <i>Programming with Java: A Primer</i> , 7th Edition, McGraw-Hill Education, 2024. 5. P. Radha Krishna, <i>Object-Oriented Programming through Java</i> , Universities Press, 2022.	
Suggested Online Learning Platforms	SWAYAM – https://swayam.gov.in NPTEL – https://nptel.ac.in e-PG Pathshala – https://epgp.inflibnet.ac.in National Digital Library of India (NDLI) – https://ndl.iitkgp.ac.in DIKSHA – https://diksha.gov.in	

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BCA Syllabus: 2026-27 Onwards		
Program Class: Degree	Year: Second	Semester: Third
Course Code: B230302T	Course Title: Design and Analysis of Algorithm	Credits: 3
Upon successful completion of the course, students will be able to: CO1: Analyze algorithm efficiency using complexity measures and recurrence relations. CO2: Apply divide-and-conquer and greedy techniques to solve computational problems. CO3: Design solutions using dynamic programming approaches. CO4: Implement backtracking and graph-based algorithms. CO5: Evaluate advanced algorithmic techniques for modern computing applications.		
Units	Topics	
1	Algorithm Analysis and Complexity Introduction to Algorithms, Characteristics of Algorithms, Performance Analysis, Time and Space Complexity, Asymptotic Notations (Big O, Big Omega and Big Theta), Recurrence Relations, Substitution Method, Iteration Method, Master Method.	
2	Divide and Conquer and Greedy Algorithms Divide and Conquer Strategy, Binary Search, Merge Sort, Quick Sort, Matrix Multiplication Concepts, Greedy Method, Activity Selection Problem, Fractional Knapsack Problem, Minimum Spanning Tree, Dijkstra's Algorithm, Huffman Coding.	
3	Dynamic Programming Principles of Dynamic Programming, Matrix Chain Multiplication, 0/1 Knapsack Problem, Longest Common Subsequence, All-Pairs Shortest Paths, Optimal Binary Search Tree, Applications of Dynamic Programming.	
4	Backtracking and Graph Algorithms Backtracking Strategy, N-Queen Problem, Sum of Subsets Problem, Graph Coloring, Traveling Salesperson Problem, Graph Traversal Concepts, Applications of Graph Algorithms.	
5	Advanced Algorithm Concepts Approximation Algorithms, Heuristic Approaches, Introduction to NP-Completeness, Amortized Analysis, Algorithmic Problem Solving, Applications of Algorithms in Artificial Intelligence, Machine Learning and Data Science.	
Suggested Reference Books	1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, <i>Introduction to Algorithms</i>, 4th Edition, MIT Press, 2022. 2. Anany Levitin, <i>Introduction to the Design and Analysis of Algorithms</i>, 4th Edition, Pearson Education, 2023. 3. Steven S. Skiena, <i>The Algorithm Design Manual</i>, 3rd Edition, Springer, 2020. 4. Sara Baase and Allen Van Gelder, <i>Computer Algorithms: Introduction to Design and Analysis</i>, 3rd Edition, Pearson Education, 2000. 5. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, <i>The Design and Analysis of Computer Algorithms</i>, Pearson Education, Reprint Edition, 2013	
Suggested Online Learning Platforms	(1). SWAYAM (2). NPTEL (3). National Digital Library of India (NDLI) (4). MIT OpenCourseWare – Algorithms (5). Stanford Online – Algorithms (6). GeeksforGeeks Learning Portal (7). VisuAlgo	

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BCA Syllabus: 2026-27 Onwards		
Program Class: Degree	Year: Second	Semester: Third
Course Code: B230303T	Course Title: Python Programing	Credits: 3
Course Outcomes: Upon successful completion of the course, students will be able to: CO1: Develop Python programs using appropriate programming constructs. CO2: Apply functions, modules and data structures in Python applications. CO3: Implement object-oriented programming concepts using Python. CO4: Perform data manipulation and visualization using Python libraries. CO5: Develop Python-based solutions for automation, analytics and emerging applications.		
Units	Topics	
1	Python Fundamentals Python Environment and Jupyter Notebook, Python Interpreter, Variables and Data Types, Type Casting, Operators and Expressions, Input and Output Operations, Comments and Indentation, Conditional Statements, Looping Constructs, Range Function, Pass Statement.	
2	Data Structures and Functions Strings, Lists, Tuples, Dictionaries and Sets, Sequence Operations and Slicing, List, Set and Dictionary Comprehensions, Functions, Scope and Namespace, Lambda Functions, Modules and Packages.	
3	Object-Oriented Programming and File Handling Classes and Objects, Constructors, Inheritance, Polymorphism, Exception Handling, File Handling, Working with CSV Files, Introduction to APIs and JSON Data.	
4	Data Analysis with Python Introduction to NumPy, Array Operations and Indexing, Random Number Generation, Introduction to Pandas, Series and DataFrames, Data Import and Export, Data Cleaning and Transformation, Data Analysis using Common Pandas Functions.	
5	Visualization and Applications of Python Matplotlib Fundamentals, Line Charts, Bar Charts, Histograms and Scatter Plots, Introduction to Scikit-Learn, Python for Automation and Scripting, Python Applications in Artificial Intelligence, Machine Learning and Data Science.	
Suggested Reference Books	1. Reema Thareja, <i>Python Programming: Using Problem Solving Approach</i> , Oxford University Press, 2024 Edition. 2. Charles R. Severance, <i>Python for Everybody: Exploring Data Using Python 3</i> , Shroff Publishers/O'Reilly, 2023 Edition. 3. Allen B. Downey, <i>Think Python: How to Think Like a Computer Scientist</i> , 2nd Edition, O'Reilly Media, 2016. 4. Wes McKinney, <i>Python for Data Analysis</i> , 3rd Edition, O'Reilly Media, 2022. 5. Eric Matthes, <i>Python Crash Course</i> , 3rd Edition, No Starch Press, 2023.	
Suggested Online Learning Platforms	(1). SWAYAM (2). NPTEL (3). National Digital Library of India (NDLI) (4). Python Official Documentation (5). Google Colab (6). Kaggle Learn (7). Spoken Tutorial (IIT Bombay) (8). W3Schools Python Tutorials (9). Real Python Learning Platform	

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BCA Syllabus: 2026-27 Onwards		
Program Class: Degree	Year: Second	Semester: Third
Course Code: B230304T	Course Title: Artificial Intelligence	Credits: 2
Upon successful completion of the course, students will be able to: CO1: Explain fundamental concepts and applications of Artificial Intelligence. CO2: Describe intelligent agents and problem-solving techniques. CO3: Apply search and reasoning methods in AI systems. CO4: Explain knowledge representation and machine learning concepts. CO5: Describe AI applications, challenges and ethical considerations.		
Units	Topics	
1	Introduction to Artificial Intelligence Introduction to Artificial Intelligence, History and Evolution of AI, Characteristics of Intelligent Systems, AI Domains and Technologies, Applications of AI, Future of Artificial Intelligence.	
2	Intelligent Agents and Problem Solving Intelligent Agents, Types of Intelligent Agents, Problem Solving in AI, State Space Representation, Problem Characteristics, AI in Decision Making.	
3	Search Techniques Uninformed Search Techniques, Breadth First Search, Depth First Search, Heuristic Search, Best First Search, A* Search Algorithm, Applications of Search Techniques.	
4	Knowledge Representation and Machine Learning Fundamentals Knowledge Representation, Knowledge-Based Systems, Expert Systems, Reasoning Concepts, Introduction to Machine Learning, Supervised Learning, Unsupervised Learning, AI Data Requirements.	
5	Modern AI Applications and Responsible AI Natural Language Processing, Computer Vision, Robotics, Generative AI Overview, AI Applications in Business and Industry, Responsible AI, Ethical Issues in AI, Future Trends in Artificial Intelligence.	
Practical Requirements	1. Exploration of AI-enabled applications and tools. 2. Problem formulation using state-space representation. 3. Implementation of basic search algorithms. 4. Comparative analysis of search techniques. 5. Development of simple rule-based systems. 6. Case studies on expert systems. 7. Demonstration of supervised and unsupervised learning concepts. 8. Exploration of Natural Language Processing applications. 9. Study of Computer Vision and Robotics applications 10. Analysis of ethical and societal implications of AI.	
Suggested Reference Books	1. Stuart Russell and Peter Norvig, <i>Artificial Intelligence: A Modern Approach</i>, 4th Edition, Pearson Education, 2021. 2. Ethem Alpaydin, <i>Introduction to Artificial Intelligence</i>, 2nd Edition, MIT Press, 2021. 3. Elaine Rich, Kevin Knight and Shivashankar B. Nair, <i>Artificial Intelligence</i>, 3rd Edition, McGraw Hill Education, 2009. 4. Tom Taulli, <i>Artificial Intelligence Basics: A Non-Technical Introduction</i>, Apress, 2019. 5. Kevin Warwick, <i>Artificial Intelligence: The Basics</i>, 2nd Edition, Routledge, 2023	
Suggested Online Learning Platforms	1. SWAYAM 2. NPTEL 3. National Digital Library of India (NDLI) 4. Elements of AI (University of Helsinki)	

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	5. Google AI Learning Resources 6. Microsoft Learn – AI Fundamentals 7. IBM SkillsBuild – Artificial Intelligence
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BCA Syllabus: 2026-27 Onwards		
Program Class: Degree	Year: Second	Semester: Third
Course Code: B230305T	Course Title: Block Chain Technology	Credits: 3
Upon successful completion of the course, students will be able to: CO1: Explain the concepts, architecture and characteristics of blockchain technology. CO2: Describe cryptographic techniques and consensus mechanisms used in blockchain networks. CO3: Explain cryptocurrencies, blockchain platforms and digital transactions. CO4: Describe smart contracts and decentralized applications. CO5: Analyze blockchain applications, challenges and emerging trends.		
Units	Topics	
1	Introduction to Blockchain Technology Introduction to Blockchain, Evolution of Blockchain Technology, Distributed Ledger Technology, Characteristics and Features of Blockchain, Blockchain Architecture, Types of Blockchain (Public, Private and Consortium), Blockchain Ecosystem.	
2	Blockchain Fundamentals Blocks and Chain Structure, Hash Functions, Merkle Trees, Cryptographic Concepts, Digital Signatures, Peer-to-Peer Networks, Distributed Ledger Concepts, Consensus Mechanisms (Proof of Work, Proof of Stake and Delegated Proof of Stake), Comparison of Consensus Mechanisms.	
3	Cryptocurrencies and Blockchain Platforms Introduction to Cryptocurrencies, Bitcoin Fundamentals, Cryptocurrency Transactions, Wallets and Digital Assets, Ethereum Overview, Blockchain Platforms and Frameworks, Tokenization Concepts	
4	Smart Contracts and Decentralized Applications Smart Contracts, Components of Smart Contracts, Smart Contract Lifecycle, Introduction to Solidity, Decentralized Applications (DApps), Decentralized Finance (DeFi), Non-Fungible Tokens (NFTs).	
5	Blockchain Applications and Emerging Trends Blockchain Applications in Finance, Supply Chain Management, Healthcare, Education and Governance, Blockchain for Digital Identity, Web3 Concepts, Blockchain Security Challenges, Regulatory and Ethical Issues, Future Trends in Blockchain Technology.	
Practical Requirements	(1). Exploration of blockchain platforms and blockchain explorers. (2). Creation and management of digital wallets. (3). Analysis of blockchain transactions and blocks. (4). Demonstration of cryptographic hashing techniques. (5). Study of consensus mechanisms through simulations and case studies. (6). Deployment of basic smart contracts using suitable development environments. (7). Exploration of decentralized applications (DApps). (8). Analysis of cryptocurrency transactions and blockchain networks. (9). Case studies on blockchain applications in various sectors. (10). Evaluation of emerging blockchain, Web3 and digital identity solutions.	
Suggested	(1). Imran Bashir, <i>Mastering Blockchain</i> , 4th Edition, Packt Publishing, 2023. (2). Melanie Swan, <i>Blockchain: Blueprint for a New Economy</i> , O'Reilly Media, 2015.	

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Reference Books	(3). Andreas M. Antonopoulos, <i>Mastering Bitcoin</i>, 3rd Edition, O'Reilly Media, 2023. (4). Andreas M. Antonopoulos and Gavin Wood, <i>Mastering Ethereum</i>, O'Reilly Media, 2018. (5). Arshdeep Bahga and Vijay Madisetti, <i>Blockchain Applications: A Hands-On Approach</i>, VPT Publications, 2020.
Suggested Online Learning Platforms	(1). SWAYAM (2). NPTEL (3). National Digital Library of India (NDLI) (4). Linux Foundation Blockchain Courses (5). IBM SkillsBuild – Blockchain Fundamentals (6). Ethereum Developer Documentation (7). Hyperledger Foundation Learning Resources

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BCA Syllabus: 2026-27 Onwards		
Program Class: Degree	Year: Second	Semester: Fourth
Course Code: B230401T	Course Title: Data Communication & Computer Network	Credits: 3
Upon successful completion of the course, students will be able to: CO1: Explain data communication principles and network architectures. CO2: Describe network devices, transmission media, and communication protocols. CO3: Analyze the functions of layered network models. CO4: Explain routing, switching, and wireless communication technologies. CO5: Describe modern networking technologies and network security practices.		
Units	Topics	
1	Fundamentals of Data Communication Data Communication Concepts, Components of Data Communication Systems, Data Transmission Modes, Communication Channels, Network Types (LAN, MAN, WAN), Network Topologies.	
2	Network Models and Protocols OSI Reference Model, TCP/IP Model, Functions of Network Layers, Protocols and Standards, IPv4 and IPv6 Addressing, Domain Name System (DNS).	
3	Network Devices and Transmission Media Transmission Media (Guided and Unguided), Network Interface Cards, Repeaters, Hubs, Bridges, Switches, Routers, Gateways, Modems, Network Performance Concepts.	
4	Routing, Switching and Wireless Networks Routing Concepts, Switching Techniques, Circuit Switching and Packet Switching, Wireless Communication Fundamentals, Wi-Fi Networks, Cellular Networks, Mobile Communication Concepts.	
5	Modern Networking Technologies Internet Architecture, Network Virtualization, Cloud Networking Basics, Internet of Things (IoT) Networking, Software Defined Networking (SDN), Network Security Fundamentals.	
Suggested Reference Books	1. Behrouz A. Forouzan, <i>Data Communications and Networking</i>, 5th Edition, McGraw Hill Education, 2017. 2. Andrew S. Tanenbaum and David J. Wetherall, <i>Computer Networks</i>, 5th Edition, Pearson Education, 2019. 3. William Stallings, <i>Data and Computer Communications</i>, 11th Edition, Pearson Education, 2020. 4. James F. Kurose and Keith W. Ross, <i>Computer Networking: A Top-Down Approach</i>, 8th Edition, Pearson Education, 2021. 5. Larry L. Peterson and Bruce S. Davie, <i>Computer Networks: A Systems Approach</i>, 6th Edition, Morgan Kaufmann, 2021	
Suggested Online Learning Platforms	1. SWAYAM 2. NPTEL 3. National Digital Library of India (NDLI) 4. Cisco Networking Academy 5. MIT OpenCourseWare 6. Spoken Tutorial (IIT Bombay) 7. Wireshark Learning Resource	

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BCA Syllabus 2026-27 Onwards		
Program Class: Degree	Year: Second Year	Semester: Fourth
Course Code: B230402T	Course Title: Database Management System	Credits: 3
Course Outcomes:		
CO 1:	Explain the concepts, architecture, and components of database management systems.	
CO 2:	Design databases using conceptual, logical, and physical data models.	
CO 3:	Apply normalization techniques for efficient database design.	
CO 4:	Analyze transaction processing, concurrency control, security, and recovery mechanisms.	
CO 5:	Understand advanced database technologies including distributed databases, NoSQL databases, cloud databases, and data warehousing systems	
Units	Topics	
1	Introduction: Data, Information and Knowledge, Characteristics of Database Approach, Data Independence, Architecture of Database System, Data Dictionary, Types of Database Languages, Database System Life Cycle, Overview of Hierarchical, Network and Relational Model, Relations and Codd's Rules, Concepts of Keys, Data Definition, Data Manipulation, View Definition, Nested Queries, Updation, SQL, Handling of Nulls and Cursors.	
2	Data Models: Conceptual Design, Logical Design and Physical Design, Entity Relationship (ER) Model, ER Diagrams, Strong and Weak Entity Sets, Generalization, Specialization, Aggregation, Conversion of ER Model into Relational Schemas.	
3	Normalization: Normalization Concepts, Functional Dependencies and Dependency Preservation, Normal Forms – 1NF, 2NF, 3NF, BCNF, 4NF, 5NF, DKNF, Indexing, De-normalization, Clustering of Tables and Indexes.	
4	Transaction Processing and Database Security and Recovery: Transaction Recovery, System Recovery, Two Phase Commit Protocol, Concurrency Problems, Locking Mechanisms, Database Security and Authorization, Access Control Mechanisms, Database Backup Techniques, Advanced Recovery Techniques,	
5	Advanced Database Concepts: Distributed Database Systems, Client-Server Database Architecture, Data Warehousing Concepts, Data Mining Overview, NoSQL Databases, MongoDB Fundamentals, Cloud Database Systems, Big Data Database Technologies, Emerging Trends in Database Management Systems.	
Suggested Reference Books	1. C. J. Date, <i>An Introduction to Database Systems</i>, 8th Edition, Pearson Education. 2. Ramez Elmasri and Shamkant B. Navathe, <i>Fundamentals of Database Systems</i>, 7th Edition, Pearson Education. 3. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, <i>Database System Concepts</i>, 7th Edition, McGraw-Hill Education. 4. Thomas Connolly and Carolyn Begg, <i>Database Systems: A Practical Approach to Design, Implementation and Management</i>, 6th Edition, Pearson Education. 5. Carlos Coronel and Steven Morris, <i>Database Systems: Design, Implementation and Management</i>, 14th Edition, Cengage Learning.	
Suggested Online Learning Platforms	SWAYAM – https://swayam.gov.in NPTEL – https://nptel.ac.in e-PG Pathshala – https://epgp.inflibnet.ac.in National Digital Library of India (NDLI) – https://ndli.iitkgp.ac.in DIKSHA – https://diksha.gov.in	

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BCA Syllabus: 2026-27 Onwards		
Program Class: Degree	Year: Second	Semester: Third
Course Code: B230303T	Course Title: Machine Learning	Credits: 3
Upon successful completion of the course, students will be able to: CO1: Explain the concepts and workflow of machine learning. CO2: Apply data preprocessing techniques for machine learning applications. CO3: Implement supervised learning techniques for prediction and classification. CO4: Apply unsupervised learning techniques for pattern discovery. CO5: Evaluate machine learning models and applications.		
Units	Topics	
1	Introduction to Machine Learning Introduction to Machine Learning, Types of Machine Learning, Machine Learning Workflow, Applications of Machine Learning, Data Collection and Preparation, Training and Testing Data, Challenges in Machine Learning.	
2	Data Preprocessing and Feature Engineering Data Cleaning, Handling Missing Values, Data Transformation, Feature Selection, Feature Extraction, Data Normalization and Standardization, Exploratory Data Analysis.	
3	Supervised Learning Regression and Classification Concepts, Linear Regression, Logistic Regression, Decision Trees, K-Nearest Neighbors (KNN), Naïve Bayes Classifier, Applications of Supervised Learning.	
4	Unsupervised Learning Introduction to Clustering, K-Means Clustering, Hierarchical Clustering, Association Rule Mining Concepts, Dimensionality Reduction Concepts, Applications of Unsupervised Learning.	
5	Model Evaluation and Applications Model Evaluation Techniques, Confusion Matrix, Accuracy, Precision, Recall and F1 Score, Overfitting and Underfitting, Introduction to Deep Learning, Machine Learning Applications in Business, Healthcare, Finance and Smart Systems.	
Suggested Reference Books	1. Aurélien Géron, <i>Hands-On Machine Learning with Scikit-Learn, Keras and TensorFlow</i>, 3rd Edition, O'Reilly Media, 2022. 2. Ethem Alpaydin, <i>Introduction to Machine Learning</i>, 5th Edition, MIT Press, 2021. 3. Tom M. Mitchell, <i>Machine Learning</i>, McGraw Hill Education, Reprint Edition, 2017. 4. Andreas C. Müller and Sarah Guido, <i>Introduction to Machine Learning with Python</i>, O'Reilly Media, 2016. 5. Kevin P. Murphy, <i>Probabilistic Machine Learning: An Introduction</i>, MIT Press, 2022.	
Suggested Online Learning Platforms	(1). SWAYAM (2). NPTEL (3). National Digital Library of India (NDLI) (4). Kaggle Learn (5). Google Machine Learning Crash Course (6). Microsoft Learn – Machine Learning (7). Scikit-Learn Documentation	

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BCA Syllabus 2026-27 Onwards		
Program Class: Degree	Year: Second	Semester: Fourth
Course Code: B230404T	Course Title: Software Engineering	Credits: 2
Course Outcomes:		
CO 1:	Explain software engineering principles and software development processes.	
CO 2:	Analyze software requirements and prepare software design models.	
CO 3:	Apply software testing and quality assurance techniques.	
CO 4:	Understand project management and software maintenance activities.	
CO 5:	Describe modern software development methodologies and practices.	
Units	Topics	
1	Introduction: Software and Software Engineering, Characteristics of Software, Software Crisis, Software Development Life Cycle (SDLC), Software Process Models, Waterfall Model, Prototype Model, Spiral Model, Incremental Model, Agile Development Concepts, Software Engineering Ethics.	
2	Software Requirements Engineering: Requirement Engineering Process, Feasibility Study, Requirement Elicitation Techniques, Functional and Non-Functional Requirements, Software Requirement Specification (SRS), Requirement Validation, Requirement Management, Introduction to Use Case Modeling.	
3	Software Design and Modeling: Software Design Concepts, Design Principles, Modular Design, Cohesion and Coupling, Structured Design, Object-Oriented Design Concepts, UML Diagrams (Use Case, Class, Sequence, Activity), User Interface Design Principles.	
4	Software Testing and Quality Assurance: Software Testing Fundamentals, Testing Levels, Unit Testing, Integration Testing, System Testing, Acceptance Testing, Black Box Testing, White Box Testing, Software Quality Assurance, Software Reliability, Software Metrics, Debugging Concepts.	
5	Project Management and Modern Software Development: Software Project Planning, Cost Estimation Basics, Risk Management, Configuration Management, Software Maintenance, Software Re-engineering, Agile Methodologies (Scrum Overview), DevOps Fundamentals, Version Control using Git, Continuous Integration Concepts.	
Suggested Reference Books	1. Roger S. Pressman and Bruce Maxim, <i>Software Engineering: A Practitioner's Approach</i> , 9th Edition, McGraw-Hill, 2019. 2. Ian Sommerville, <i>Software Engineering</i> , 10th Edition, Pearson Education, 2016. 3. Pankaj Jalote, <i>An Integrated Approach to Software Engineering</i> , 3rd Edition, Springer, 2005. 4. Rajib Mall, <i>Fundamentals of Software Engineering</i> , 5th Edition, PHI Learning, 2018. 5. K. K. Aggarwal and Yogesh Singh, <i>Software Engineering</i> , 3rd Edition, New Age International.	
Suggested Online Learning Platforms	SWAYAM – https://swayam.gov.in NPTEL – https://nptel.ac.in e-PG Pathshala – https://epgp.inflibnet.ac.in National Digital Library of India (NDLI) – https://ndli.iitkgp.ac.in DIKSHA – https://diksha.gov.in	

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BCA Syllabus 2026-27 Onwards		
Program Class: Degree	Year: Second	Semester: Fourth
Course Code: B230405T	Course Title: Web Technology	Credits: 3
Course Outcomes:		
CO 1:	Design static and dynamic web pages using HTML, CSS, and JavaScript.	
CO 2:	Develop server-side web applications using PHP.	
CO 3:	Implement form handling and state management in web applications.	
CO 4:	Integrate PHP applications with databases.	
CO 5:	Develop complete database-driven web applications.	
Units	Topics	
1	Introduction to Web Technologies: Internet and World Wide Web, Web Architecture, Client-Server Model, Web Browsers and Web Servers, HTML5 Fundamentals, Text Formatting, Hyperlinks, Lists, Tables, Forms, Multimedia Elements, Semantic HTML.	
2	Cascading Style Sheets and JavaScript: CSS Fundamentals, Selectors, Box Model, Layout Design, Responsive Web Design Concepts, Introduction to JavaScript, Variables, Operators, Functions, Arrays, Objects, Event Handling, Form Validation, DOM Manipulation.	
3	PHP Programming Fundamentals: Introduction to PHP, PHP Environment Setup, PHP Syntax, Variables and Constants, Data Types, Operators, Control Statements, Arrays, Functions, String Handling, User Defined Functions, Include and Require Statements.	
4	Advanced PHP Programming: Form Handling using PHP, GET and POST Methods, Session Management, Cookies, File Uploading Concepts, Exception Handling, Email Handling Basics, PHP and JSON, Introduction to Object-Oriented Programming in PHP.	
5	PHP and MySQL Integration: Introduction to MySQL, Database Connectivity using PHP, CRUD Operations, Form-Based Database Applications, Authentication and Login Systems, PHP Security Practices, Mini Web Application Development, Introduction to RESTful Web Services.	
Suggested Reference Books	1. Luke Welling and Laura Thomson, <i>PHP and MySQL Web Development</i>, 5th Edition, Addison-Wesley, 2016. 2. Robin Nixon, <i>Learning PHP, MySQL & JavaScript</i>, 7th Edition, O'Reilly Media, 2021. 3. Jon Duckett, <i>HTML and CSS: Design and Build Websites</i>, Wiley, 2014. 4. Jon Duckett, <i>JavaScript and JQuery</i>, Wiley, 2015. 5. Xue Bai et al., <i>The Web Warrior Guide to Web Programming</i>, Cengage Learning, 2016.	
Suggested Online Learning Platforms	SWAYAM – https://swayam.gov.in NPTEL – https://nptel.ac.in e-PG Pathshala – https://epgp.inflibnet.ac.in National Digital Library of India (NDLI) – https://ndl.iitkgp.ac.in DIKSHA – https://diksha.gov.in	

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Third Year

BCA Syllabus: 2026-27 Onwards		
Program Class: Degree	Year: Third	Semester: Fifth
Course Code: B230501T	Course Title: Deep Learning	Credits: 3
Upon successful completion of the course, students will be able to: CO1: Explain the concepts and architecture of deep learning models. CO2: Apply neural networks for pattern recognition and prediction tasks. CO3: Describe deep learning frameworks and model training techniques. CO4: Explain advanced deep learning architectures and applications. CO5: Analyze deep learning solutions for real-world problems.		
Units	Topics	
1	Introduction to Deep Learning Introduction to Deep Learning, Evolution of Deep Learning, Artificial Neural Networks, Biological and Artificial Neurons, Perceptron Model, Multi-Layer Perceptron, Deep Learning Applications.	
2	Neural Network Fundamentals Network Architecture, Activation Functions, Forward Propagation, Backpropagation Concept, Loss Functions, Optimizers, Training and Validation of Models, Hyperparameter Tuning.	
3	Deep Learning Frameworks and Model Development Introduction to TensorFlow and Keras, Data Preparation for Deep Learning, Building Neural Network Models, Model Training, Model Evaluation, Model Performance Improvement Techniques.	
4	Advanced Deep Learning Architectures Convolutional Neural Networks (CNN), Recurrent Neural Networks (RNN), Long Short-Term Memory (LSTM), Transfer Learning Concepts, Applications in Image and Text Processing	
5	Deep Learning Applications and Emerging Trends Computer Vision, Natural Language Processing, Recommendation Systems, Deep Learning for Healthcare and Business Analytics, Generative AI Overview, Ethical Issues and Challenges in Deep Learning, Future Trends.	
Practical Requirements	1. Development of simple neural network models. 2. Implementation of perceptron and multilayer neural networks. 3. Data preprocessing for deep learning applications. 4. Model training and validation using TensorFlow/Keras. 5. Performance evaluation of deep learning models. 6. Image classification using CNN models. 7. Sequence analysis using RNN/LSTM models. 8. Transfer learning demonstrations. 9. Deep learning applications using real-world datasets. 10. Mini-project based on deep learning applications	
Suggested Reference Books	1. Ian Goodfellow, Yoshua Bengio and Aaron Courville, <i>Deep Learning</i>, MIT Press, 2016. 2. François Chollet, <i>Deep Learning with Python</i>, 2nd Edition, Manning Publications, 2021. 3. Umberto Michelucci, <i>Applied Deep Learning: A Case-Based Approach to Understanding Deep Neural Networks</i>, Apress, 2022. 4. John D. Kelleher, <i>Deep Learning</i>, MIT Press Essential Knowledge Series, 2019 5. Josh Patterson and Adam Gibson, <i>Deep Learning: A Practitioner's Approach</i>, 2nd	

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	Edition, O'Reilly Media, 2024
Suggested Online Learning Platforms	1. SWAYAM 2. NPTEL 3. National Digital Library of India (NDLI) 4. TensorFlow Official Tutorials 5. Keras Documentation 6. DeepLearning.AI Learning Resource 7. Google Colab

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BCA Syllabus: 2026-27 Onwards		
Program Class: Degree	Year: Third	Semester: Fifth
Course Code: B230502T	Course Title: Cloud Computing	Credits: 3
Upon successful completion of the course, students will be able to: CO1: Explain the concepts and architecture of cloud computing. CO2: Describe cloud service and deployment models. CO3: Apply virtualization and containerization concepts in cloud environments. CO4: Explain cloud storage, resource management and security practices. CO5: Analyze cloud-based solutions and emerging cloud technologies.		
Units	Topics	
1	Introduction to Cloud Computing Introduction to Cloud Computing, Evolution of Cloud Computing, Characteristics of Cloud Computing, Cloud Architecture, Benefits and Challenges of Cloud Computing, Cloud Service Providers.	
2	Cloud Service and Deployment Models Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), Public Cloud, Private Cloud, Hybrid Cloud, Community Cloud, Cloud Adoption Strategies.	
3	Virtualization and Containerization Virtualization Concepts, Virtual Machines, Hypervisors, Resource Virtualization, Containerization Concepts, Docker Overview, Kubernetes Overview, Applications of Virtualization and Containerization.	
4	Cloud Storage and Security Cloud Storage Concepts, Distributed Storage, Data Backup and Recovery, Cloud Resource Management, Identity and Access Management, Cloud Security Fundamentals, Privacy and Compliance Issues.	
5	Cloud Applications and Emerging Trends Cloud-Based Application Development, Serverless Computing, Edge Computing, Multi-Cloud and Hybrid Cloud Strategies, Cloud for Artificial Intelligence and Data Science, Internet of Things (IoT) and Cloud Integration, Future Trends in Cloud Computing.	
Practical Requirements	(1). Exploration of cloud service platforms. (2). Creation and management of cloud-based resources. (3). Deployment of applications on cloud environments. (4). Virtual machine creation and configuration. (5). Demonstration of containerization concepts using Docker. (6). Study of cloud storage and backup mechanisms. (7). Configuration of identity and access controls. (8). Analysis of cloud security practices. (9). Development of simple cloud-enabled applications. (10). Case studies on AI, IoT and business applications using cloud computing.	
Suggested Reference Books	(1). Rajkumar Buyya, Christian Vecchiola and S. Thamarai Selvi, Mastering Cloud Computing, McGraw Hill Education, 2013. (2). Thomas Erl, Ricardo Puttini and Zaigham Mahmood, Cloud Computing: Concepts, Technology and Architecture, Pearson Education, 2014. (3). Anthony T. Velte, Toby J. Velte and Robert Elsenpeter, Cloud Computing: A Practical Approach, McGraw Hill Education, 2019. (4). Michael J. Kavis, Architecting the Cloud: Design Decisions for Cloud Computing Service Models, Wiley, 2014. (5). Dan C. Marinescu, Cloud Computing: Theory and Practice, 3rd Edition, Morgan Kaufmann, 2017.	
Suggested Online	(1). SWAYAM	

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Learning Platforms	(2). NPTEL (3). National Digital Library of India (NDLI) (4). AWS Academy Learning Resources (5). Microsoft Learn – Azure Fundamentals (6). Google Cloud Skills Boost (7). IBM SkillsBuild – Cloud Computing
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BCA Syllabus: 2026-27 Onwards		
Program Class: Degree	Year: Third	Semester: Fifth
Course Code: B230503T	Course Title: Data Science	Credits: 3
Upon successful completion of the course, students will be able to: CO1: Explain the concepts, processes and applications of Data Science. CO2: Apply data collection, preprocessing and exploratory analysis techniques. CO3: Perform statistical analysis and data visualization for decision making. CO4: Develop predictive models using data science techniques. CO5: Analyze data-driven solutions for real-world applications.		
Units	Topics	
1	Introduction to Data Science Introduction to Data Science, Evolution of Data Science, Data Science Process and Lifecycle, Data Science Roles and Responsibilities, Data Science Ecosystem, Data Sources and Types, Applications of Data Science, Data Privacy, Security and Ethical Issues.	
2	Data Collection and Data Preparation Data Collection Strategies, Data Acquisition from Structured and Unstructured Sources, Data Cleaning, Data Integration, Data Transformation, Data Reduction, Data Discretization, Handling Missing and Inconsistent Data, Data Quality Assessment.	
3	Exploratory Data Analysis and Visualization Exploratory Data Analysis (EDA), Descriptive Statistics, Mean, Median, Mode, Standard Deviation, Skewness and Kurtosis, Correlation Analysis, Box Plots, Heat Maps, Pivot Tables, Data Visualization Principles, Dashboard and Reporting Concepts, Data Storytelling.	
4	Predictive Analytics and Model Development Simple and Multiple Regression, Model Development Process, Residual Analysis, Distribution Plots, Polynomial Regression, Pipelines, Model Evaluation Metrics, Prediction and Data-Driven Decision Making, Business Analytics Applications.	
5	Model Evaluation and Modern Data Science Applications Generalization Error, Cross Validation, Overfitting and Underfitting, Ridge Regression, Hyperparameter Tuning using Grid Search, Data Science Applications in Business, Healthcare and Finance, Introduction to Big Data Analytics, Responsible AI and Future Trends in Data Science.	
Practical Requirements	(1). Data collection from various structured and unstructured sources. (2). Data cleaning and preprocessing using Python. (3). Handling missing, noisy and inconsistent data. (4). Exploratory Data Analysis using Pandas. (5). Statistical analysis of datasets. (6). Data visualization using Matplotlib and Seaborn. (7). Correlation and regression analysis. (8). Predictive model development and evaluation. (9). Dashboard creation and data reporting. (10). Mini-project based on real-world data science applications.	
Suggested Reference Books	(1). Joel Grus, Data Science from Scratch: First Principles with Python, 2nd Edition, O'Reilly Media, 2019. (2). Foster Provost and Tom Fawcett, Data Science for Business, 2nd Edition, O'Reilly Media, 2023. (3). Jake VanderPlas, Python Data Science Handbook, 2nd Edition, O'Reilly Media, 2023. (4). Cathy O'Neil and Rachel Schutt, Doing Data Science, O'Reilly Media, 2013. (5). Jure Leskovec, Anand Rajaraman and Jeffrey D. Ullman, Mining of Massive Datasets, 3rd Edition, Cambridge University Press, 2020.	

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Suggested Online Learning Platforms	(1). SWAYAM (2). NPTEL (3). National Digital Library of India (NDLI) (4). Kaggle Learn (5). Google Data Analytics Learning Resources (6). IBM SkillsBuild – Data Science (7). Microsoft Learn – Data Analytics and Data Science
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BCA Syllabus: 2026-27 Onwards		
Program Class: Degree	Year: Third	Semester: Fifth
Course Code: B230504T	Course Title: Mobile Application Development	Credits: 3
Upon successful completion of the course, students will be able to: CO1: Explain the concepts and architecture of mobile applications. CO2: Design user interfaces for mobile applications. CO3: Develop mobile applications using Android development tools and Kotlin. CO4: Integrate data storage and web services in mobile applications. CO5: Deploy and evaluate mobile applications for real-world use.		
Units	Topics	
1	Introduction to Mobile Application Development Introduction to Mobile Applications, Evolution of Mobile Computing, Mobile Operating Systems, Mobile Application Architecture, Mobile Development Platforms, Mobile Application Lifecycle, Trends in Mobile Application Development.	
2	Mobile User Interface Design Mobile UI/UX Principles, Layouts and Navigation, User Interface Components, Event Handling, Responsive Design, Accessibility in Mobile Applications, Mobile Design Guidelines.	
3	Android Application Development Fundamentals Introduction to Android Studio and Kotlin, Application Structure, Activities and Intents, User Interface Development, User Inputs and Controls, Application Navigation, Debugging and Testing.	
4	Data Management and Web Services SQLite Overview, Shared Preferences, File Storage, JSON Processing, REST APIs, Web Service Integration, Firebase Overview, Cloud-Enabled Mobile Applications.	
5	Advanced Mobile Applications and Deployment Push Notifications, Mobile Security Fundamentals, Location-Based Services, Mobile Application Testing, Application Deployment Process, Cross-Platform Development Concepts, Future Trends in Mobile Applications.	
Practical Requirements	(1). Installation and configuration of Android Studio. (2). Development of basic Android applications using Kotlin. (3). Design of mobile user interfaces and layouts. (4). Event handling and navigation implementation. (5). Development of forms and user input applications. (6). Data storage using SQLite and Shared Preferences. (7). Reading and processing JSON data. (8). Integration of REST APIs in mobile applications. (9). Testing and debugging of mobile applications. (10). Development and presentation of a mini mobile application project.	
Suggested Reference Books	(1). Bill Phillips, Chris Stewart, Kristin Marsicano and Brian Hardy, Android Programming: The Big Nerd Ranch Guide, 5th Edition, Big Nerd Ranch, 2022. (2). John Horton, Android Programming for Beginners, 4th Edition, Packt Publishing, 2023. (3). Dawn Griffiths and David Griffiths, Head First Android Development, 3rd Edition, O'Reilly Media, 2021. (4). Barry Burd, Android Application Development All-in-One For Dummies, 3rd Edition, Wiley, 2020. (5). Wei-Meng Lee, Beginning Android Application Development, Wiley, 2020.	
Suggested Online Learning Platforms	(1). SWAYAM (2). NPTEL (3). National Digital Library of India (NDLI) (4). Android Developers Training Resources	

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	(5). Google Android Developer Documentation (6). Kotlin Official Documentation (7). Flutter Documentation and Learning Resources
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BCA Syllabus 2026-27 Onwards		
Program Class: Degree	Year: Third	Semester: Fifth
Course Code: B230505T	Course Title: Operating System	Credits: 3
Course Outcomes:		
CO 1:	Explain operating system concepts and system structures.	
CO 2:	Analyze process management and CPU scheduling techniques.	
CO 3:	Apply memory management and virtual memory concepts.	
CO 4:	Understand file systems, storage management, and security mechanisms.	
CO 5:	Describe modern operating system technologies and architectures.	
Units	Topics	
1	Introduction to Operating Systems: Introduction to Operating Systems, Functions of Operating System, Types of Operating Systems, Operating System Structures, System Calls, Kernel Concepts, User and Kernel Modes, Operating System Services, Linux and Windows Overview.	
2	Process Management: Processes and Threads, Process States, Process Control Block, Context Switching, CPU Scheduling Concepts, Scheduling Algorithms (FCFS, SJF, Priority, Round Robin), Inter-Process Communication, Process Synchronization, Critical Section Problem.	
3	Deadlocks and Memory Management: Deadlock Concepts, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery, Memory Management Techniques, Contiguous and Non-Contiguous Allocation, Paging, Segmentation, Virtual Memory Concepts.	
4	File Systems and Storage Management: File System Concepts, File Organization Methods, Directory Structures, File Allocation Methods, Secondary Storage Structure, Disk Management Techniques, RAID Concepts.	
5	Security and Modern Operating Systems: Protection and Security Mechanisms, Authentication and Access Control, Operating System Security Threats, Malware Protection Concepts, Distributed Operating Systems, Real-Time Operating Systems, Mobile Operating Systems, Virtualization Concepts, Cloud-Based Operating Systems.	
Suggested Reference Books	1. Abraham Silberschatz, Peter B. Galvin and Greg Gagne, <i>Operating System Concepts</i>, 10th Edition, Wiley, 2018. 2. William Stallings, <i>Operating Systems: Internals and Design Principles</i>, 9th Edition, Pearson, 2018. 3. Andrew S. Tanenbaum and Herbert Bos, <i>Modern Operating Systems</i>, 4th Edition, Pearson, 2015. 4. D. M. Dhamdhere, <i>Operating Systems: A Concept-Based Approach</i>, 3rd Edition, McGraw-Hill. 5. Achyut S. Godbole, <i>Operating Systems</i>, 3rd Edition, Tata McGraw-Hill.	
Suggested Online Learning Platforms	SWAYAM – https://swayam.gov.in NPTEL – https://nptel.ac.in e-PG Pathshala – https://epgp.inflibnet.ac.in National Digital Library of India (NDLI) – https://ndl.iitkgp.ac.in DIKSHA – https://diksha.gov.in	

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BCA Syllabus 2026-27 Onwards		
Program Class: Degree	Year: Third	Semester: Sixth
Course Code: B230601T	Course Title: Data Mining and Analytics	Credits: 4
Course Outcomes:		
CO 1:	Explain the concepts and applications of data mining and analytics.	
CO 2:	Apply data preprocessing and exploratory data analysis techniques.	
CO 3:	Analyze data using classification, clustering, and association techniques.	
CO 4:	Utilize data visualization and business analytics tools.	
CO 5:	Interpret analytical results for decision-making.	
Units	Topics	
1	Introduction to Data Mining and Analytics: Data Mining Concepts, Knowledge Discovery in Databases (KDD), Data Mining Process, Data Warehousing Fundamentals, OLTP and OLAP Systems, Business Analytics Overview, Applications of Data Mining and Analytics.	
2	Data Preprocessing and Exploration: Data Collection, Data Cleaning, Data Integration, Data Transformation, Handling Missing Values, Exploratory Data Analysis (EDA), Descriptive Statistics, Data Visualization Concepts.	
3	Data Mining Techniques: Classification Concepts, Decision Trees, Clustering Concepts, K-Means Clustering, Association Rule Mining, Apriori Algorithm, Pattern Discovery and Knowledge Extraction.	
4	Data Analytics and Visualization: Predictive Analytics Concepts, Business Intelligence Fundamentals, Dashboards and Reports, Introduction to Power BI, Introduction to Tableau, Data Interpretation and Reporting.	
5	Applications and Emerging Trends: Text Analytics Fundamentals, Social Media Analytics, Recommendation Systems Overview, Ethical Issues in Data Analytics, Data Privacy and Emerging Trends in Data Analytics.	
Suggested Reference Books	1. Jiawei Han, Micheline Kamber and Jian Pei, <i>Data Mining: Concepts and Techniques</i>, 4th Edition, 2022. 2. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, <i>Introduction to Data Mining</i>, 2nd Edition, 2018. 3. Galit Shmueli, Peter Bruce and Nitin Patel, <i>Data Mining for Business Analytics</i>, 2020. 4. A. K. Pujari, <i>Data Mining Techniques</i>, 2013. 5. V. K. Jain, <i>Data Mining and Data Warehousing</i>, 2021.	
Suggested Online Learning Platforms	SWAYAM – https://swayam.gov.in NPTEL – https://nptel.ac.in e-PG Pathshala – https://epgp.inflibnet.ac.in National Digital Library of India (NDLI) – https://ndli.iitkgp.ac.in DIKSHA – https://diksha.gov.in	

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BCA Syllabus 2026-27 Onwards		
Program Class: Degree	Year: Third	Semester: Sixth
Course Code: B230602T	Course Title: Emerging Technologies and Generative AI	Credits: 4
Course Outcomes: Explain the concepts and significance of emerging technologies. CO2: Describe the fundamentals and applications of Generative AI. CO3: Analyze intelligent automation and AI-driven digital transformation. CO4: Evaluate the impact of emerging technologies on business and society. CO5: Assess ethical and governance issues related to advanced technologies.		
Units	Topics	
1	Emerging Technologies and Digital Transformation: Introduction to Emerging Technologies, Digital Transformation, Industry 4.0 and Industry 5.0, Technology Convergence, Intelligent Systems, Emerging Technology Trends and Applications.	
2	Generative AI Fundamentals: Introduction to Generative AI, Foundation Models, Large Language Models (LLMs), Multimodal AI Systems, Text, Image and Video Generation, Applications and Limitations of Generative AI.	
3	AI Agents and Intelligent Automation: AI Agents and AI Assistants, Intelligent Automation, Human-AI Collaboration, AI in Business Processes, Workflow Automation, AI-Powered Decision Support Systems.	
4	Emerging Digital Technologies: Internet of Things (IoT), Digital Twins, Extended Reality (AR, VR and MR), Edge Computing, Quantum Computing Concepts, Smart Cities and Intelligent Infrastructure.	
5	Responsible AI and Future Trends: Responsible AI, AI Governance, Privacy and Security Issues, Bias and Fairness in AI Systems, Future of Work, Future Trends in Emerging Technologies.	
Suggested Reference Books	1. Bernard Marr, <i>Generative AI in Practice</i> , Wiley, 2024. 2. Bernard Marr, <i>Future Skills</i> , Wiley, 2022. 3. Thomas H. Davenport and Nitin Mittal, <i>All-in on AI</i> , Harvard Business Review Press, 2023. 4. Kai-Fu Lee and Chen Qiufan, <i>AI 2041: Ten Visions for Our Future</i> , Currency, 2021. 5. Bernard Marr, <i>The Future Internet</i> , Wiley, 2022.	
Suggested Online Learning Platforms	1. SWAYAM 2. NPTEL 3. National Digital Library of India (NDLI) 4. Google AI Learning Resources 5. Microsoft Learn – AI Skills 6. IBM SkillsBuild – Artificial Intelligence 7. OpenAI Learning Resources	

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BCA Syllabus 2026-27 Onwards		
Program Class: Degree	Year: Third	Semester: Sixth
Course Code: B230603T	Course Title: Multimedia and Animation	Credits: 3
Course Outcomes:		
CO 1:	Explain multimedia concepts and components.	
CO 2:	Create and edit digital graphics, audio, and video content.	
CO 3:	Apply animation principles in multimedia projects.	
CO 4:	Utilize multimedia authoring and design tools.	
CO 5:	Develop multimedia applications for various domains.	
Units	Topics	
1	Introduction to Multimedia: Multimedia Concepts, Multimedia Components, Text, Graphics, Audio, Video and Animation, Multimedia Systems, Multimedia Applications, Multimedia Hardware and Software.	
2	Digital Graphics and Image Processing: Raster and Vector Graphics, Image Resolution, Color Models, Image File Formats, Graphic Design Principles, Image Editing Concepts, Digital Photography Fundamentals.	
3	Audio and Video Technologies: Digital Audio Concepts, Audio File Formats, Audio Recording and Editing, Digital Video Fundamentals, Video Formats, Video Compression Techniques, Video Editing Concepts.	
4	Animation Fundamentals: Principles of Animation, Types of Animation, 2D Animation Concepts, 3D Animation Concepts, Storyboarding, Character Design Fundamentals, Motion Graphics.	
5	Multimedia Authoring and Modern Applications: Multimedia Authoring Tools, Interactive Multimedia Systems, User Interface Design for Multimedia Applications, Web Multimedia, Virtual Reality Concepts, Augmented Reality Concepts, Multimedia Applications in Education, Entertainment and Digital Marketing.	
Suggested Reference Books	1. Tay Vaughan, <i>Multimedia: Making It Work</i>, 9th Edition, 2017. 2. Ze-Nian Li and Mark S. Drew, <i>Fundamentals of Multimedia</i>, 3rd Edition, 2021. 3. Ralf Steinmetz and Klara Nahrstedt, <i>Multimedia Systems</i>, 2012. 4. Judith Jeffcoate, <i>Multimedia in Practice</i>. 5. Jim Maivald, <i>Adobe Creative Cloud Classroom in a Book</i>, 2023.	
Suggested Online Learning Platforms	SWAYAM – https://swayam.gov.in NPTEL – https://nptel.ac.in e-PG Pathshala – https://epgp.inflibnet.ac.in National Digital Library of India (NDLI) – https://ndl.iitkgp.ac.in DIKSHA – https://diksha.gov.in	