ST. ALOYSIUS COLLEGE(AUTONOMOUS), JABALPUR

Reaccredited 'A++ 'Grade by NAAC(CGPA:3.58/4.00)

College with Potential for Excellence by UGC

DST-FIST Supported & STAR College Scheme by DBT

Faculty of Science

Bachelor of Computer Application

BCA I Semester

Paper-Major

COMPUTER ARCHITECTURE

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Understand the basic structure, operation and characteristics of digital computer.	U
CO 2	Be able to design simple combinational digital circuits based on given parameters.	Apply
CO 3	Understand the working of arithmetic & logic unit.	Apply, Analyze
CO 4	Know about hierarchical memory system including cache memories and virtual memory.	Create, Apply
CO 5	Know the contributions of Indians in the field of computer architecture and related technologies.	Apply

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	30	70	**100**
Practical	2	30	70	**100**
Total	**6**	**200**		

Evaluation Scheme

	Marks	
	Internal	**External**
Theory	3 Internal Exams of 15 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)

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BCA I Semester **COMPUTER ARCHITECTURE** **Paper-Major**

Content of the Course

Theory

Total No. of Lectures: 60 Hrs. **Maximum Marks:** 70

Units	Topics	No. of Lectures
I	**Indian Knowledge System:** Ancient Indian Contribution in Computer Architecture: Pingala's "Chandahśāstra", Panini Sanskrit Grammar. Modern Contribution: Dr. Vinod Dhami, Dr. Ajay Bhat, Dr. Vinod Khosla, Dr. Vijay P Bhatkar. **Fundamentals of Computer:** Definition of a computer and its characteristics, Evolution and generations of computers, Types of computers (e.g., desktops, laptops, servers), Basic computer organization (hardware and software), Input devices (keyboard, mouse, scanner). Output devices (monitor, printer), CPU (Arithmetic Logic Unit, Control Unit, Memory Unit).	12
II	**Memory** (RAM, ROM, cache), Storage devices (hard drive, SSD, USB drive). System software (operating systems, utilities), Application software (word processors, spreadsheets), Programming languages, Firmware. **Fundamentals of Digital Electronics:** Decimal, Binary, Octal, Hexadecimal, Number System Conversions, Binary Arithmetic-Addition and subtraction, BCD, GRAY, ASCII, EBCDIC.	12
III	Logic Gates, Boolean Algebra, K-Map Simplification, Combinational Circuits, Sequential Circuits, simple combinational circuit design problems. **Combinational Circuits:** Half Adder and Full Adder, Subtractor, Decoders, Encoder, Multiplexer, Demultiplexer. **Sequential Circuits:** Flip-Flops- SR Flip- Flop, D Flip-Flop, J-K Flip-Flop, T Flip-Flop.	12
IV	**Basic Computer Organization:** Instruction codes, Computer Registers, Computer Instructions, Instruction Cycles, Memory Reference Instruction, Instruction formats, Addressing modes, Instruction codes. **Processor and Control Unit:** Hardwired vs. Micro programmed Control Unit, General Register Organization, Stack Organization, Instruction Format, Data Transfer & Manipulation, Program Control.	12
V	**Data Transfer Schemes** - Program Control, Interrupt, DMA Transfer, I/O Processor. **Memory Hierarchy**, Processor vs. Memory Speed, High-Speed Memories, Main memory, Auxiliary memory, Cache Memory, Associative Memory, Interleaving, Virtual Memory, Memory Management.	12

Textbook:

1. Gerard G. Emch, R. Sridharan, M. D. Srinivas: Contributions to the History of Indian Mathematics, Hindustan Book Agency, Vol. 3, 2005.
2. Udayan S. Patankar & Sunil M. Patankar: Elements of Vedic Mathematics, TTU Press, Tallinn 2018.
3. M. Morris Mano: "Computer System Architecture", PHI.
4. Heuring Jordan: "Computer System Design & Architecture" (A.W.L.).
5. Donald P Leach, Albert Paul Malvino, Goutam Saha: "Digital Principles & Applications", Tata McGraw Hill Education Private Limited, 2011Edition.

Reference Books:

1. William Stalling, "Computer Organization & Architecture", Pearson Education Asia.
2. V. Carl Hamacher , "Computer Organization", TMH
3. Tannenbaum, "Structured Computer Organization", PHI.
4. Er. Rajiv Chopra, "Computer Architecture", Revised 3rd Edition, S. Chand & Company Pvt. Ltd

Suggestive digital platform web links

6. https://web.iitd.ac.in/-minati/MTL458.html
7. https://www.cse.iitb.ac.in/-mythili/os/https://www.youtube.com/watch?v=aCJ3YgHQ

Suggested

Equivalent online courses : https://nptel.ac.in/courses/106/102/106102132

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DST-FIST Supported & STAR College Scheme by DBT

BCA I Semester **COMPUTER ARCHITECTURE** **Paper-Major**

List of Practical

PART-1 (Computer Fundamentals)

1. Various parts of a Computer
2. Identify various parts inside the CPU like motherboard, SMPS, Ports, Buses, IC chip, Processor, HDD, RAM.
3. Identify various I/O devices

PART-II (Digital Electronics)

1. Verification and interpretation of truth table for AND gate
2. Verification and interpretation of truth table for OR gate
3. Verification and interpretation of truth table for NOT gate
4. Verification and interpretation of truth table for NAND gate
5. Verification and interpretation of truth table for NOR gate
6. Solve a basic Boolean Algebra Expression using Logic Gates.
7. To verify De-Morgan's First Law Theorem.
8. To verify De-Morgan's Second Law Theorem.

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Faculty of Science

Bachelor of Computer Application

BCA I Semester

Paper-Minor

Mathematical Foundations to Computer Science

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Perform key operations for image processing, computer graphics, and data analysis.	U
CO 2	Solve linear systems that arise in cryptography, game development, and AI algorithms.	U
CO 3	Use matrices in machine learning models for efficient data manipulation and optimization.	U, Analyze
CO 4	Implement algorithms that involve graph theory, network flow analysis, and dynamic systems.	Apply
CO 5	Construct truth tables for logical expressions; test statements for logical equivalence and represent mathematical statements in the language of predicate language.	Apply
CO 6	Using the appropriate set theoretic concepts, thinking process, tools and techniques in the solution to various conceptual or real-world problems.	Apply

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	30	70	**100**
Total	**4**	**100**		

Evaluation Scheme

	Marks	
	Internal	**External**
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)

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BCA I Semester **Paper-Minor**

Mathematical Foundations to Computer Science

Content of the Course

Theory

Total No. of Lectures: 60 Hrs. **Maximum Marks:** 70

Units	Topics	No. of Lectures
I	**Indian Knowledge System**: Basic concepts of Mathematical Logic in ancient India: Panini's Logical Structure, Avaktavtakta, Navya-Nyaya Logic. Indian Contributions in Statistics: P. C. Mahalanobis, C. Radhakrishna Rao, Samanta Chandra Sekhar Harichandan, J. K. Ghose, P. Maiti. Suggested Activities: Decoding Ancient Logic, Statistical Legends: A Tribute to Indian Pioneers, Logic Meets Statistics: A Fun Debate.	15
II	Determinants: Basic Properties of Determinants, Minor determinant, Co-factors, Applications of determinants in finding the area of a triangle. Matrices: Concept of Matrices, Notation, order and equality of Matrices,Types of Matrices, Operations on Matrices, Addition and multiplication, Multiplication with a scalar, Simple properties of addition, multiplication and scalar multiplication, Transpose of a Matrix, Application of Matrices to solve real world problems.	15
III	Statistics: Frequency distribution, Measures of central tendency: Mean, Median, Mode. Measure of dispersion: mean deviation, variance and standard deviation of ungrouped/grouped data. Suggested Activities: Applications of Mean, Median, Mode, mean deviation, variance and standard deviation to solve the problems related to Industries, Business, Economics and real world problems.	15
IV	Mathematical Logic: Statements and notations, Propositions and Truth table,Negation, Conjunction and Disjunction, Implications and Double implication, Bi-conditional propositions, Contrapositive Implication and converse, Contrapositive and inverse propositions, Tautology and Contradiction, Logical equivalences, De-Morgan Law. Suggested Activities: Applications of Mathematical Logic to solve the problems related to Industries, Business, Economics and real world problems.	15

References

Text Books:

1. Gerard G. Emch, R. Sridharan, M. D. Srinivas: Contributions to the History of Indian Mathematics,
2. Hindustan Book Agency, Vol. 3, 2005.
3. 2. Udayan S. Patankar & Sunil M. Patankar: Elements of Vedic Mathematics, TTU Press, Tallinn 2018.

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Faculty of Science

Bachelor of Computer Application

BCA II Semester

Paper-Major I

Programming Methodology

CO. No.	Course Outcomes	Cognitive Level
CO 1	Develop simple algorithms and flow charts to solve a problem with programming using top down design principles.	U
CO 2	Writing efficient and well-structured computer algorithms/programs.	U
CO 3	Learn to formulate iterative solutions and array processing algorithms for problems.	U, Analyze
CO 4	Use recursive techniques, pointers and searching methods in programming.	Apply

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	30	70	**100**
Practical	2	30	70	**100**
Total	**6**	**200**		

Evaluation Scheme

	Marks	
	Internal	**External**
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)

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BCA II Semester **Paper-Major I**

Programming Methodology

Theory

Total No. of Lectures: 60 Hrs. **Maximum Marks:** 70

Units	Topics	No. of Lectures
I	**Introduction to Programming** - Program Concept, Characteristics of Programming, Stages in Program Development, Algorithms, Notations, Design, Flowcharts, Types of Programming Methodologies. **Basics of C++:** A Brief History of C++, Application of C++, Compiling & Linking, Tokens, Keywords, Identifiers & Constants , Basic Data Types, User-Defined Data Types, Symbolic Constant, Type Compatibility, Reference Variables, Operator in C++, Scope Resolution Operator, Member Dereferencing Operators, Memory Management Operators, Manipulators, Type Cast Operator. Conditional Statements if construct, switch-case construct. **Iterative Statements**: while, do-while, and for loops, use of break and continue in loops, Using Nested Statements (Conditional as well as Iterative).	12
II	**Functions In C++:** The Main Function, Function Prototyping, Call by Reference Call by Address, Call by Value, Return by Reference, Inline Function, Default Arguments, Constant Arguments, Function Overloading, Function with Array.	12
III	**Classes & Objects:** A Sample C++ Program with class, Defining Member Functions, Making an Outside Function Inline, Nesting of Member Functions, Private Member Functions, Arrays within a Class, Memory Allocation for Objects, Static Data Members, Static Member, Functions, Array of Objects, Object as Function Arguments, Friend Functions, Virtual functions, Returning Objects, Constant member functions, Pointer to Members, Local Classes.	12
IV	**Constructor & Destructor:** Constructor, Parameterized Constructor, Multiple Constructors in a Class, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructor, Dynamic Constructor and Destructor. **Inheritance:** Defining Derived Classes, Single Inheritance, Making a Private Member Inheritable, Multilevel Inheritance, Hierarchical Inheritance, Multiple Inheritance, Hybrid Inheritance.	12
V	**Various types of Classes:** Virtual Base Classes, Abstract Classes, Constructor in Derived Classes, Nesting of Classes. **Operator Overloading** & Type Conversion, Polymorphism. **Pointers:** Pointers with Arrays C++. **Streams**: C++ Stream Classes, Unformatted I/O Operation, Formatted I/O Operation, Managing Output with Manipulators, Exception Handling.	12

Textbooks:

1. Gerard G. Emch, R. Sridharan, M. D. Srinivas: Contributions to the History of Indian Mathematics, Hindustan Book Agency, Vol. 3, 2005.
2. Udayan S. Patankar & Sunil M. Patankar: Elements of Vedic Mathematics, TTU Press, Tallinn 2018.
3. J. R. Hanly and E. B. Koffman, "Problem Solving and Program Design in C", Pearson, 2015.
4. E. Balguruswamy, "C++ ", TMH Publication ISBN O-07-462038-X
5. Herbert Shildt, "C++ The Complete Reference "TMH Publication ISBN 0-07-463880-7.

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BCA II Semester **Paper-Major I**

Programming Methodology
List of Practical

Given the problem statement, students are required to formulate problem, develop flowchart/algorithm, write code in C++, execute and test it. Students should be given assignments on following:

1. Write a program to swap the contents of two variables.
2. Write a program for finding the roots of a Quadratic Equation.
3. Write a program to find area of a circle, rectangle, square using switch case.
4. Write a program to print table of any number.
5. Write a program to print Fibonacci series.
6. Write a program to find factorial of a given number using recursion.
7. Write a program to convert decimal (integer) number into equivalent binary number.
8. Write a program to check given string is palindrome or not.
9. Write a program to print digits of entered number in reverse order.
10. Write a program to print sum of two matrices.
11. Write a program to print multiplication of two matrices.
12. Write a program to generate even/odd series from 1 to 100.
13. Write a program whether a given number is prime or not.
14. Write a program for call by value and call by reference.
15. Write a program to create a pyramid structure
    1
    12
    123
    1234
16. Write a program to check entered number is Armstrong or not.
17. Write a program to input N numbers and find their average.
18. Write a program to find the area and volume of a rectangular box using constructor.
19. Write a program to design a class time with hours, minutes and seconds as data members. Use a data function to perform the addition of two time objects in hours, minutes and seconds.
20. Write a program to implement single inheritance.

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Faculty of Science

Bachelor of Computer Application

BCA II Semester

Paper-Major II

Data Structure

CO. No.	Course Outcomes	Cognitive Level
CO 1	Will be familiar with fundamental data structures, their implementation; become accustomed to the description of algorithms in both functional and procedural styles	U
CO 2	Have knowledge of complexity of basic operations like insert, delete, search on these data structures.	U
CO 3	Possess ability to choose a data structure to suitably model any data used in computer applications.	U, Analyze
CO 4	Design programs using various data structures including hash tables, Binary and general search trees, heaps, graphs etc.	Apply

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	30	70	**100**
Practical	2	30	70	**100**
Total	**6**	**200**		

Evaluation Scheme

	Marks	
	Internal	**External**
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)

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BCA II Semester **Paper-Major II**

Data Structures

Theory

Total No. of Lectures: 60 Hrs. **Maximum Marks:** 70

Units	Topics	No. of Lectures
I	**Data Structure:** Basic concepts, Linear and Non-Linear data structures **Algorithm Specification:** Introduction, Recursive algorithms, Data Abstraction, Performance analysis. **Arrays:** Representation of single, two-dimensional arrays, triangular arrays, sparse matrices-array and linked representations.	12
II	**Stacks:** Operations, Array and Linked Implementations, Applications- Infix to Postfix Conversion, Infix to Prefix Conversion, Postfix Expression Evaluation, Recursion Implementation. **Queues:** Definition, Operations, Array and Linked Implementations. Circular Queue-Insertion and Deletion Operations, Dequeue (Double Ended Queue), Priority Queue- Implementation. **Linked Lists:** Singly Linked Lists, Operations, Concatenating, circularly linked lists-Operations for Circularly linked lists, Doubly Linked Lists- Operations, Doubly Circular Linked List, Header Linked List.	12
III	**Trees:** Representation of Trees, Binary tree, Properties of Binary Trees, Binary Tree Representations- Array and Linked Representations, Binary Tree Traversals, Threaded Binary Trees. **Heap:** Definition, Insertion, Deletion.	12
IV	**Graphs:** Graph ADT, Graph Representations, Graph Traversals, Searching. **Hashing:** Introduction, Hash tables, Hash functions, Overflow Handling.	12
V	**Sorting:** Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Comparison of Sorting Methods, **Search Trees:** Binary Search Trees, AVL Trees- Definition and Examples.	12

Textbooks:

1. Gerard G. Emch, R. Sridharan, M. D. Srinivas: Contributions to the History of Indian Mathematics, Hindustan Book Agency, Vol. 3, 2005.
2. Udayan S. Patankar & Sunil M. Patankar: Elements of Vedic Mathematics, TTU Press, Tallinn 2018.
3. Sartaj Sahani, "Data Structures, Algorithms and Applications with C++", McGraw Hill.
4. Robert L. Kruse, "Data Structures and Program Design in C++", Pearson.
5. D. S. Malik, "Data Structure using C++", Second edition, Cengage Learning.

Reference Books:

1. Adam Drozdek, "Data Structures and algorithm in C++", Third Edition, Cengage Learning.
2. M. A. Weiss, "Data structures and Algorithm Analysis in C", 2nd edition, Pearson.
3. Lipschutz, "Schaum's outline series Data structures", Tata McGraw-Hill.

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BCA II Semester **Paper-Major II**

Data Structures

List of Practical

1. Write a program to find largest element from an array.
2. Write a program to implement push and pop operations on a stack using array.
3. Write a program to perform insert and delete operations on a queue using array.
4. Write a program for Linear search.
5. Write a program for Binary search.
6. Write a program for Bubble sort.
7. Write a program for Selection sort.
8. Write a program for Quick sort.
9. Write a program for Insertion sort.
10. Write a program to implement linked list.

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Faculty of Science

Bachelor of Computer Application

BCA II Semester

Paper-Minor

Operating System

CO. No.	Course Outcomes	Cognitive Level
CO 1	Describe the importance of computer system resources and the role of operating system in their management policies and algorithms.	U
CO 2	Specify objectives of modern operating systems and describe how operating systems have evolved over time.	U
CO 3	Understand various process management concepts and can compare various scheduling techniques, synchronization, and deadlocks.	U, Analyze
CO 4	Describe the concepts of multithreading and memory management techniques.	Apply
CO 5	Identify the best suited memory management technique for any process.	Apply

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	30	70	**100**
Practical	2	30	70	**100**
Total	**6**	**200**		

Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)

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BCA II Semester **Paper-Minor**

OPERATING SYSTEM

Theory

Total No. of Lectures: 60 Hrs. **Maximum Marks:** 70

Units	Topics	No. of Lectures
I	**Indian Knowledge System:** The BOSS operating system, open source softwares, growth of LINUX, Aryabhatt Linux, contributions of innovators – Rajen Sheth, Sunder Pichai etc.	15
II	**Introduction to Operating System**: What is Operating System? History and Evolution of OS, Basic OS functions, Resource Abstraction, Types of Operating Systems– Multiprogramming Systems, Batch Systems, Time Sharing Systems; Operating Systems for Personal Computers, Workstations and Hand-held Devices, Process Control & Real time Systems. **Process Management**: Process Concepts, Process states & Process Control Block. **Process Scheduling**: Scheduling Criteria,Scheduling Algorithms (Preemptive & Non-Preemptive) – FCFS, SJF, SRTN, RR, Priority, Multiple-Processor, Real-Time, Multilevel Queue and Multilevel Feedback Queue Scheduling. **Deadlock -** Definition, Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock.	15
III	**Memory Management**: Introduction, Address Binding, Logical versus Physical Address Space, Swapping, Contiguous & Non-Contiguous Allocation, Fragmentation (Internal & External), Compaction, Paging, Segmentation, Virtual Memory, Demand Paging, Performance of Demand Paging, Page Replacement Algorithms. **File Management**: Concept of File System(File Attributes, Operations, Types), Functions of File System, Types of File System, Access Methods (Sequential, Direct & other methods), Directory Structure (Single-Level, Two-Level, Tree-Structured, Acyclic-Graph, General Graph), Allocation Methods (Contiguous, Linked, Indexed) **Disk Management**: Structure, Disk Scheduling Algorithms (FCFS, SSTF, SCAN, C-SCAN, LOOK), Space Management, Disk Reliability, Recovery.	15
IV	**LINUX**: Introduction, History and features of Linux, advantages, hardware requirements for installation, Linux architecture, file system of Linux - boot block, super block, inode table, data blocks. Linux standard directories, Linux kernel, Partitioning the hard drive for Linux, installing the Linux system, system - startup and shut-down process, init and run levels. Process, Swap, Partition, fdisk, checking disk free spaces. Difference between CLI OS & GUI OS, Windows v/s Linux, Importance of Linux Kernel, Files and Directories. Concept of Open Source Software.	15

Textbooks:

1.A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications.
2.A. S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education.
3. Operating System by Peterson.

Reference Books:

1.G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education.
2. W. Stallings, Operating Systems, Internals & Design Principles, 8th Edition, Pearson Education.
3. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill.

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BCA II Semester **Paper-Minor**

OPERATING SYSTEM

List of Practical

1. Linux Directory Commands: pwd, mkdir, rm -rf, ls, cd, cd / , cd ~
2. Linux File Commands: touch, cat, cat >, cat >>, rm , cp, mv, rename
3. Linux Permission Commands: su, id, useradd, passwd, groupadd, chmod, groupdel, chown, chgrp
4. Linux File Content & Filter Commands: head, tail, tac, more, less, grep, cat, cut, grep, comm, sed, tee, tr, uniq, wc, od, sort, diff.
5. Linux Utility Commands: find, bc, locate, date, cal, sleep, time, df, mount, exit, clear, gzip, gunzip.
6. Linux Networking Commands: ip, ssh, mail, ping, host
7. Edit Crontab file: to wall message on system on particular time automatically.
8. Vi editor: Create file, edit, save and quit. Highlighting the searched term within a file. cut, yank, undo.

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Faculty of Science

Bachelor of Computer Application BCA III Sem

Paper: -Major

Data Communication and Computer Networks

Course Outcomes

CO. No.	Course Outcomes
CO 1	Demonstrate the Basic Concepts of Networking, Networking Principles, Routing Algorithms, IP Addressing and working of Networking Devices.
CO 2	Demonstrate the significance, purpose and application of Networking protocols and Standards.
CO 3	Describe, compare and contrast LAN, WAN, MAN, Intranet, Internet, AM, FM, PM and Various Switching Techniques.
CO 4	Explain the working of Layers and apply the various protocols of OSI & TCP/IP model.
CO 5	Analyze the Requirement for a given Organizational structure and select the most appropriate Networking Architecture and Technologies.
CO 6	Design the Network Diagram and solve the Networking problems of the Organization with consideration of Human and Environment install and configure the networking device.

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	6	40	60	**100**
Total		**100**		

Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 40 Marks (During the Semester) (Best 2 will be taken)	1 External Exams of 60 Marks (At the End of Semester)

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BCA III Sem **Paper: -Major**

Data Communication and Computer Networks

Theory

No. of Lectures (in hours per week): 3 Hrs. per week

Total No. of Lectures: 60 Hrs. **Maximum Marks: 60**

Units	Topics	No. of Lectures
I	Network goals and application, Network structure, Network services, Network Standardization, **Networking model- (**Centralized, Distributed and Collaborative), **Network Topologies-** (Bus, Star, Ring, Tree, Hybrid), Selection and Evaluation factors.	12
II	**Theoretical basis for Data communication, Transmission media – Guided media** (Twisted pair, Coaxial Cable, Fiber optics), **Unguided media** (Radio waves, Micro waves, Infrared transmission), Line of Sight Transmission, Communication Satellites, Transmission impairments, Analog and Digital transmission. **Transmission-** frequency division and time division multiplexing, **Switching-** Circuit switching, packet Switching and message switching.	12
III	**Network Hardware:** Personal Area Networks, Local Area Networks, Metropolitan Area Networks, Wide Area Networks, Internetworks **Network Software:** Protocol Hierarchies, Design Issues for the Layers, Connection-Oriented Versus Connectionless Service, Service Primitives, Relationship of Services to Protocols **Reference Models:** The OSI Reference Model, The TCP/IP Reference Model,A Comparison of the OSI and TCP/IP Reference Models	12
IV	**Data Link Layer Design Issues:** Services Provided to the Network Layer, Framing, Error Control, Flow Control, **Error Detection And Correction:** Error-Correcting Codes, Error-Detecting Codes **Data Link Protocols:** Stop-and-Wait Protocol, Sliding Window Protocols	12
V	**Network Layer Design Issues:** Store-and-Forward Packet Switching, Services Provided to the Transport Layer, Connectionless Service, Connection-Oriented Service, Comparison of Virtual-Circuit and Datagram Networks **Routing Algorithms:** The Optimality Principle, Shortest Path Algorithm, **Congestion Control Algorithms:** Approaches to Congestion Control, Traffic-Aware Routing, Admission Control **The Network Layer in the Internet:** The IP Version 4 Protocol, IP Addresses, IP Version 6	12

Textbooks, Reference Books, Other Resources

1.Tannanbaum, A.S.: Computer Networks, Prentice Hall, 1985.processing, Prentice Hall,1983.

2.Black : Computer Networks : Protocols, standards and Interfaces, Prentice Hall

3.International I. Tannanbaum, A.S.: Computer Networks, Prentice Hall, 1985.processing, Prentice Hall, 1983.

4.Fourauzan B., "Data Communications and Networking", 3rd edition, TataMcGraw- Hill Publications,

5.Comer· D., "Computer Networks and Internet", 2ND Edition, Pearson Education

6.S.K.Basandra& s. Jaiswal, "Local Area Networks", Galgotia Publication.

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DST-FIST Supported & STAR College Scheme by DBT

Faculty of Science

Bachelor of Computer Application

BCA III Semester

Paper: Minor

Database Management System

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Understand the fundamental concepts of databases and DBMS, including their components, functions, and characteristics, and compare traditional file systems with DBMS.	Understanding
CO 2	Analyze the three-level database architecture (external, conceptual, internal) and various data models (Hierarchical, Network, Relational) to evaluate their significance in database design.	Analysing
CO 3	Apply the principles of the Entity-Relationship model to construct ER diagrams and convert them into relational tables, including the use of extended ER models.	Applying
CO 4	Evaluate the use of relational algebra operations and relational calculus to solve complex queries, and analyse the integrity constraints to maintain database consistency.	Evaluating
CO 5	Create and implement SQL queries and PL/SQL procedures, triggers, and functions to manage and manipulate databases effectively, while demonstrating exception handling techniques.	Creating

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	40	60	**100**
Practical	2	40	60	**100**
Total	**6**	**200**		

Evaluation Scheme

	Marks	
	Internal	**External**
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)

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BCA III Semester **Paper: -Minor**

Database Management System

Theory

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs. **Maximum Marks:** 60

Units	Topics	No. of Lectures
I	**Database Concepts:** Database and DBMS, Comparison between traditional file and DBMS, Characteristics, Components and Functions of DBMS, Advantages and disadvantages of the DBMS, DBMS users, Database administrator, ACID properties. **Database Design and Architecture:** Essentials of Database Design, Three level Architecture of Database- external, conceptual and internal, Data Models concepts: Hierarchical, Network and Relational, Operators, relations, domains and attributes, keys, traditional set operations, special relational operations.	12
II	**The E/R model:** Components of ER Diagram (Entity, attributes and relation), Notations for E-R diagram, Mapping Constraints, Extended E-R model (Generalization, Specialization and aggregation), Convert ER into table, Decomposition of tables. **Functional Dependency:** Introduction, types of FDs :- Trivial, Non- Trivial, Multivalued and Transitive FD. **Normalization:** Normalization Process, 1st NF , 2nd NF, 3rd NF, 4th NF and 5th NF, Relational decomposition.	12
III	**Relational algebra**: introduction, Selection and projection, set operations, renaming, Joins, Division, Tuple relational calculus, Domain relational Calculus, What is constraints, types of constrains, Integrity constraints.	12
IV	**SQL**: SQL commands: Data Definition Language, Data Manipulation Language and Transaction Control Language, index, view, Pattern Matching: like predicate, in, not in, between, not between, any, all, exist, order by, aggregate functions, group by, Sub query, Joining: inner, outer and Cartesian join. **SQL functions**: string functions, date functions, math functions.	12
V	Introduction to PL/SQL, variable, constant, control statements: if, case, loop, exit loop, for loop, continue and goto. Local and stored procedure, local and stored function, Database Trigger, Cursor, Exception handling: system defined and user defined exception.	12

TEXTBOOKS:

1. Gary W. Hansen & James V. Hansen,Database Management and Design,Prentice Hall of India Pvt Ltd.
2. Ramez Elmasri, Shamkant Navathe,Fundamentals of Database Systems,Pearson
3. Prateek Bhatia and Gurvinder Singh, Simplified approach to DBMS.

REFERENCE BOOK:

4. C.J. Date,An Introduction to Database System,Pearson
5. Abraham Silberschatz , Henry F. Korth, S. Sudharshan,Database System Concepts,Tata McGraw Hill

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BCA III Semester **Paper: -Minor**

Database Management System

List of Practical

1. To draw ER Model and Relational Model for a given database. Show ER to Relational Model reduction.
2. Implementation of Database
   a. Creation of Database with proper constraints
   b. Insert into database using different types of insert statements
   c. Display
3. Data Definition (schema) Modification
4. Simple SQL queries (Single table retrieval)
   a. Make use of different operators (relational, logical etc.)
   b. Selection of rows and columns, renaming columns, use of distinct keyword
   c. String handling (%, etc.)
   d. Update statement
   e. Delete
5. Advanced SQL Queries-1
   a. Group by, having clause, aggregate functions
   b. Set operations like union, union all and use of order by clause
   c. Nested queries: in, not in, exists, not exists and any, all
6. Advanced SQL Queries -2
   a. Join (Inner & Outer)
   b. Exists & Union
7. PL/SQL:
   a. Implement trigger.
   b. Implement cursor

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Faculty of Science

Bachelor of Computer Application

BCA III Semester

Paper-Elective

Artificial Intelligence with Power BI

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	To Understand the basic structure, operation, and characteristics of digital computer	U
CO 2	To understand the concept of office automation.	U
CO 3	To understand the basic concepts of various application software.	U, Analyze
CO 4	To study various methods of formatting of documentation.	Apply
CO 5	To learn the different search strategies in AI	Apply
CO 6	To know about the various applications of AI.	Apply

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	3	40	60	**100**
Practical	1	40	60	**100**
Total	**4**	**200**		

	Marks	
	Internal	**External**
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)

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BCA III Semester **Paper-Elective**

Artificial Intelligence with Power BI

Content of the Course

Theory

Total No. of Lectures: 60 Hrs. **Maximum Marks:** 60

Units	Topics	No. of Lectures
I	Introduction: Overview of AI, Definition of AI, Aim of AI, Components of AI, Applications of AI, History of AI , Challenges of AI , Common Techniques of AI , Machine learning – Supervised and Unsupervised learning , Predictive Modeling . AI Development life cycle	15
II	Understanding Business Intelligence -Introduction , Advantage and Component of Business Intelligence , Business Intelligence Architecture, Concept of Star and Snowflake schema , Key Performance Indicator (KPI), Role of BI Tools , Power BI as a business intelligence application – Functions of Power BI , Power BI components , Power BI environment , Different users of Power BI, Power BI desktop interface ,Development Life Cycle in Power BI desktop	15
III	Data connections in Power BI – Connecting to database tables and loading the table . Power Query Editor , Loading data from an Excel file , loading CSV files , Static table in Power BI – creating and its need. Advanced Data Transformation - Data profiling using Query Editor , Data transformation on text data, OLAP and OLTP ,OLAP Architecture, DAX expressions and Functions, Visualizat Power BI – Power BI Reports , Creating Visualizations (Charts)	15
IV	Artificial Intelligence in Power BI – Use of AI Visual , AI visuals in Power BI Desktop , Key Influencers visual , Decomposition tree visual , Q&A Visual , Narrative Visual , AI IN Query Editor, Power BI Service – workflow , Interface , Foundational elements , Publishing reports , Visualizations, Creating Dashboard	15

References

Text Books:

1.S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education

2.David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence : a logical approach", Oxford University Press.

Reference Books:

1. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education.
2. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers.

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BCA III Semester **Paper-Elective**

Artificial Intelligence with Power BI

List of Practical

1. Import a dataset from an Excel file and clean the data by removing duplicates and handling missing values.
2. Use Power Query Editor to transform a dataset, such as splitting columns, merging tables, or changing data types.
3. Create a bar chart to show the total sales by region.
4. Create a line chart to display the trend of sales over time.
5. Build a report that includes various visualizations, such as pie charts, bar charts, and tables, to analyze sales data.
6. Create a dashboard that combines several key performance indicators (KPIs) to give an overview of business performance.
7. Create a relationship between tables manually through Power BI.
8. Use the DAX expression to add a new column in the data source.
9. Use the Donut Chart for Profit Analysis.
10. Analyze the more profitable day from the sales analysis table using Bar Chart in Power BI.

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Faculty of Science

Bachelor of Computer Application (B.C.A.)

SUBJECT: COMPUTER APPLICATION

B.CA. IV Semester

Paper-Major

Programming using Java

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Use an integrated development environment to write,compile, run, and test simple object-oriented Java programs.	U, A
CO 2	Read and make elementary modifications to Java programsthat solve real-world problems.	U
CO 3	Validate input in a Java program.	U
CO 4	Design and use basic applet for web page.	U, Analyze

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	40	60	**100**
Practical	2	40	60	**100**
Total	**6**	**200**		

Evaluation Scheme

	Marks	
	Internal	**External**
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)

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B.CA. IV Semester **Paper-Major**

Programming using Java
Theory

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs. **Maximum Marks:** 60

Units	Topics	No. of Lectures
I	**The Java Environment:** History and features of java, C++ VS java, JAVA Program Structure, Java Virtual Machine concepts, Primitive data types, variables and constants, operators, expression, statement-branching, looping and jumping, labeled statements.	12
II	**Object Oriented Programming in Java:** Classes, objects and methods: defining a class, adding variables and methods, creating objects, constructor, Instances, field and methods initialization by constructors, Copy constructor. Arrays, String classes, Wrapper classes.	12
III	Inheritance: Inheritance basics, Super class, Sub-class, Method overloading,abstract classes. Interfaces: defining an interface, implementing & applying interfaces, variables in interfaces, extending interfaces.	12
IV	Multithreading and Exception Handling: Basic idea of multithreaded programming; The lifecycle of a thread, Creating thread with the thread class and runnable interface, Basic idea of exception handling: The try, catch and finally.	12
V	Applet programming-Local and Remote Applets, Applet Vs Application, creating and executing java applets, inserting applets in a web page, passing parameter to applets, Applet Tag, Getting Input from User.	12

References

Text Books:

4. Java A Complete reference by Herbert Schildt, Mc Graw hill publication
5. Thinking in Java (3rd edition) Bruce Eckel, Prentice Hall
6. The Java Language Specification, Java SE 8, Cay S. Horstmann, Gary Cornell, PrenticeHall
7. Core Java an Integrated Approach (Black Book), Dr. R. Nageswara Rao, Prentice Hall

Web Links:

1.www.javatutorials.com
2.www.javatpoint.com www.tutorialspoint.com

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B.CA. IV Semester **Paper-Major**

Programming using Java

List of Practical

1.Write a program to print number in words using Nested if and Switch case.
2.WAP called Odd Even which prints "odd number" if the int variable "number" is odd or "even number" otherwise.
3.WAP to find sum and average of 10 number using array.
4.WAP to display reverse of a number digit using arrays.
5.WAP to display grade according to the marks obtained by the student.
6.Find the factorial of a given number.
7.WAP to print Fibonacci series.
8.WAP to implement method overloading.
9.WAP to design a class using abstract method and classes.
10.WAP to create a package of your name and use that package in a class.
11.WAP to implement parameterized constructor with default argument.
12.WAP to implement multiple inheritance.
13.Write an applet program to draw a rectangle (color=orange) and a right aligned oval.
14. Develop and applet that receives 3 numeric values as input from the user and then display the larges number on the screen.
15.WAP to read data from the inputted text file name and print its content on the console.
16.WAP to merge two files into third file.
17.WAP to delete duplicate lines in text file.
18.WAP to implement fileinputstream class to read binary data from any image file.

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DST-FIST Supported & STAR College Scheme by DBT

Faculty of Science

Bachelor of Computer Application

B.CA. IV Semester

Paper-Minor

System Analysis and Engineering

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Gain in depth knowledge of basic understanding of system characteristics, system design, and its development processes.	U, A
CO 2	Student will learn how a system is designed in a systematic and phased manner, starting from requirement analysis to system implementation and maintenance.	U
CO 3	To gain the knowledge of how Analysis, Design, Implementation, Testingand Maintenance processes are conducted in a software project.	U
CO 4	Ability to apply software engineering principles and techniques. Toproduce efficient, reliable, robust and cost-effective software solutions.	U, Analyze
CO 5	Students will be able to choose appropriate process model depending onthe user requirements	Analyze
CO 6	Students will be able perform various life cycle activities like Analysis,Design, Implementation, Testing and Maintenance	Analyze

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	40	60	**100**
Total	**4**	**100**		

Evaluation Scheme

	Marks	
	Internal	**External**
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)

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DST-FIST Supported & STAR College Scheme by DBT

BCA IV Semester **Paper-Minor**

System Analysis and Engineering

Theory

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs. **Maximum Marks:** 60

Units	Topics	No. of Lectures
I	System Analysis and Design - Overview: Systems Analysis, SystemsDesign, What is a System? Constraints of a System, Properties of a System, Elements of a System, Types of Systems, Systems Models.	12
II	System Development Life Cycle: Phases of SDLC, Life Cycle of System Analysis and Design, Role of System Analyst, Attributes of a Systems Analyst. System Planning: Requirements Determination, Information Gathering Techniques.	12
III	Structured Analysis: Structured Analysis Tools, Data Flow Diagrams (DFD), Decision Trees, Decision Tables, Components of a Decision Table. System Design: Inputs and Outputs for System Design, Types of System Design.	12
IV	Software Characteristics, Components and Applications. Software Engineering - A Layered Technology. Software Process Models [Linear Sequential Model, Prototype and RAD Model]. Evolutionary Software Process Models [Waterfall Model, Incremental Model and Spiral Model].	12
V	S/W Quality Assurance: Quality Concepts, SQA activities, S/W Reviews, Formal Technical Reviews. S/W Testing Techniques: White and Black Box Testing, Basic Path Testing, Unit Testing, Integration Testing, Validation Testing, System Testing.	12

Text Books:

1.Java A Complete reference by Herbert Schildt, Mc Graw hill publication
2.Thinking in Java (3rd edition) Bruce Eckel, Prentice Hall
3.The Java Language Specification, Java SE 8, Cay S. Horstmann, Gary Cornell, PrenticeHall
4.Core Java an Integrated Approach (Black Book), Dr. R. Nageswara Rao, Prentice Hall

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Faculty of Science

Bachelor of Computer Application (B.C.A.)

SUBJECT: BCA

B.CA. IV Semester

Paper-Elective I

BLOCK CHAIN TECHNOLOGY

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	To understand the concepts of blockchain technology.	U, A
CO 2	To understand the consensus and hyper-ledger fabric in blockchain technology.State the basic concepts of blockchain.	K
CO 3	Paraphrase the list of consensus and Demonstrate and interpret the working of Hyperledger Fabric	U
CO 4	Implement SDK composer tool and explain the Digital identity for the government.	U, Analyze
CO 5	To understand the concepts of blockchain technology	U

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	40	60	**100**
Total	**4**	**100**		

Evaluation Scheme

	Marks	
	Internal	**External**
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)

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B.CA. IV Semester **Paper-Elective I**

BLOCK CHAIN TECHNOLOGY

Theory

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs. **Maximum Marks:** 60

Units	Topics	No. of Lectures
I	History: Digital Money to Distributed Ledgers -Design Primitives: Protocols, Security, Consensus, Permissions, Privacy-: Blockchain Architecture and Design-Basic crypto primitives: Hash, Signature Hash chain to Blockchain-Basic consensus mechanisms.	15
II	Requirements for the consensus protocols-Proof of Work (PoW)- Scalability aspects of Blockchain consensus protocols: Permissioned Block chains-Design goals-Consensus protocols for Permissioned Blockchains.	15
III	Decomposing the consensus process-Hyper ledger fabric components- Chain code Design and Implementation: Hyper ledger Fabric II:- Beyond Chain code: fabric SDK and Front End-Hyper ledger Composer tool.	15
IV	Blockchain in Financial Software and Systems (FSS): -Settlements, - KYC, -Capital markets-Insurance Blockchain in trade/supply chain: Provenance of goods, visibility, trade/supply chain finance, invoice management/discounting. Blockchain Cryptography: Privacy and Security on Blockchain.	15

Textbooks:

1.Mark Gates, ―Block chain: Ultimate guide to understanding block chain, bit coin, crypto currencies, smartcontracts and the future of money‖, Wise Fox Publishing and Mark Gates 2017.

2.Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O'Dowd, Venkatraman Ramakrishna,

3.Hands-On Block chain with Hyper ledger: Building decentralized applications with Hyperledger Fabric and Composer‖, 2018.

4.Bahga, Vijay Madisetti, ―Block chain Applications: A Hands-On Approach‖, Arshdeep Bahga, Vijay Madisetti publishers 2017.

Reference books:

1.Andreas Antonopoulos, ―Mastering Bitcoin: Unlocking Digital Crypto currencies‖, O'Reilly Media, Inc. 2014.

2.Melanie Swa, ―Block chain ‖,O'Reilly Media 2014

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Faculty of Science

Bachelor of Computer Application

B.CA. IV Semester

Paper-Elective II

REACT JS

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Understanding JavaScript Basics and DOM Manipulation.	R, U
CO 2	Implementing JavaScript Features for User Interaction	A
CO 3	Exploring and Using React for UI Development	U, A
CO 4	Developing React Components and Managing State	A, E
CO 5	Managing Events and Dynamic Data in React	A, C

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	3	40	60	**100**
Practical	1	40	60	**100**
Total	**4**	**200**		

Evaluation Scheme

	Marks	
	Internal	**External**
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)

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B.CA. IV Semester **Paper-Elective II**

REACT JS

Theory

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs. **Maximum Marks:** 60

Units	Topics	No. of Lectures
I	Introduction to JavaScript, External javascript, Javascript Variable, global variable, control statements, Array, Date, Math, popup boxes, Document Object Model, Document Objects: getElementById, GetElementsByClassName(),getElementsByName(), getElementsByTagNames(), innerHTML property, innerText property, form validations.	15
II	Introduction to React: What is React, Why React, React version history, Anatomy of react project, Running the app, Debugging first react app. Templating using JSX: Working with React. createElement, Expressions, using logical operators, specifying attributes, Specifying children, Fragments.	15
III	About Components: Significance of component architecture, Types of components, Functional, Class based, Pure, Component Composition Working with state and props: What is state and its significance, Read state and set state, Passing data to component using props, Validating props using propTypes, Supplying default values to props using default Props.	15
I V	Rendering lists: Using react key prop, Using map function to iterate on arrays to generate elements, Event handling in React: Understanding React event system, Understanding Synthetic event, Passing arguments to event handlers. Working with forms.	15

Textbooks:

1.ReactJS by Example - Building Modern Web Applications with React

2.React Js for Beginners A Comprehensive Beginner's Guide to ReactJS By Emma William · 2021

3.HTML & CSS, the complete reference, fifth edition, Thomas A Powell.

Reference Books:

1. React and React Native A Complete Hands-on Guide to Modern Web and Mobile Development with React.js By Adam Boduch, Roy Derks · 2020
2. Quickstart Step-By-Step Guide to Learning React Javascript Library (React. Js, Reactjs, Learning React JS, React Javascript, React Programming) By Lionel Lopez · 2017

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B.CA. IV Semester **Paper-Elective II**

REACT JS

List of Practical

No. of Lab Practical (in hours per week): 2 Hrs. per week

Suggestive List of Practical

1.Build Search filter in React
2.Creating a simple counter
3.Display a list
4.Build Accordion
5.Image Slider
6.Create a Checklist
7.Simple Login form
8.Multi-Page navigation using React Router

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Faculty of Science

Bachelor of Computer Application (B.C.A.)

Semester: V

Paper: Core

Subject: Programming with Python

CO. No.	Course Outcomes	Cognitive Level
CO 1	Understand Python's fundamentals and development environments, including installation, data types, variables, operators, and input/output operations.	U, R
CO 2	Master Python's control structures, data collections, and functions, including conditional and loop statements, strings, lists, tuples, sets, dictionaries, and higher-order functions.	U, R, Ap
CO 3	Understand the importance of modular programming, creating and using predefined and user-defined modules and packages, and file and directory handling in Python.	U, Ap, C
CO 4	Comprehend procedural vs. object-oriented programming, OOP principles (encapsulation, abstraction, polymorphism, inheritance), inner classes, and exception handling.	An, Ap, C
CO 5	Learn multithreading and multiprocessing in Python, thread lifecycle methods, synchronization, and Numpy, Pandas, and Matplotlib for data handling and plotting.	U, Ap, C

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	40	60	**100**
Practical	2	40	60	**100**
Total	**6**	**200**		

Evaluation Scheme

	Marks	
	Internal	**External**
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)

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Reaccredited 'A++ 'Grade by NAAC(CGPA:3.58/4.00)

College with Potential for Excellence by UGC

DST-FIST Supported & STAR College Scheme by DBT

BCA V Semester **Paper: Core**

Subject: Programming with Python

Content of the Course

Theory

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs. **Maximum Marks:** 60

Units	Topics	No. of Lectures
I	What is Python? WHY PYTHON? History, Features - Dynamic, Interpreted, Object-oriented, Embeddable, Extensible, Large standard libraries, Free and Open source. Download &Python Installation Process in Windows, Unix, Linux, and Mac, Online Python IDLE, Python Realtime IDEs like Spyder, Jupyter Notebook, PyCharm. Rodeo, Visual Studio Code, ATOM, PyDev, etc., Data Types and Variables, Numbers, Operators Comments in Python. Input-output operation in Python, str.format().	10
II	Control Statements: Conditional control statements - if, If-else, lf-elseif-else, Loop control statements- for, while, Data Structure & Collection: - String, List, Tuple, Set, Dictionary, Comparison of List, Tuple, and Set, Function in Python, types of function in Python, map, reduce, filter function. Lamda Function.	10
III	Importance of modular programming. What is a module? Types of Modules: Pre-defined, User-defined. A user defines module creation, Date-time, math modules, organizing Python projects into packages, Types of packages – predefined, user-defined. Package	10
IV	Procedural v/s Object-oriented programming, Principles of OOP - Encapsulation, Abstraction (Data Hiding), Polymorphism, Inheritance.. Exception handling and types of errors, try, except, finally, raise, and Need to Custom exceptions.	15
V	Introduction of Numpy: Numpy and its operations,, Pandas data frame and its operations, Data Visualization using MatPlotLib, GUI programming in Python, using Tkinter library, root, Tk() function, mainloop(), pack(), widgets in tkinter: label, entry, command buttons, check-button, radio-button,scale, scroll-bar, geometry(), design a gui window form.	15

References

Text Books:

1.Mark Lutz, Learning Python

2.Tony Gaddis, Starting Out with Python

3.Kenneth A. Lambert, Fundamentals of Python

4.James Payne, Beginning Python using Python 2.6 and Python

Reference Books:

1.Python Crash Course: A Hands-On, Project-Based Introduction to Programming Edition Eric Matthes.

2.The Python Language Reference Manual (version 3.2), Guido van Rossum, Drake, Jr. (Editor), ISBN: 1906966141, Network Theory Ltd, 120 pages

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DST-FIST Supported & STAR College Scheme by DBT

Bachelor of Computer Application (BCA) **Subject: Programming with Python**

V Semester **Paper: Core**

List of Practical

1. Write a program to demonstrate different number data types in Python.
2. Write a program to perform different arithmetic Operations on numbers in Python.
3. Write a program to create, concatenate print a string and access a sub-string from a given string.
4. Write a Python script to print the current date in the following format a. "Fri Oct 11
5. Write a program to create, append, and remove lists in Python.
6. Write a program demonstrating working with tuples in Python.
7. Write a program demonstrating working with dictionaries in Python.
8. Write a Python program to find the largest of three numbers.
9. Write a Python program to construct the following pattern, using a nested for loop

   *

   *

   * *

   * * *

   **

   *

   *
10. Write a Python script that prints primenumberslessthan20.
11. Write a Python program to define a module to find Fibonacci Numbers and import the module to another program.
12. Write a Python program to define a module and import a specific function in that module to another program.
13. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.
14. Write a Python class to convert an integer to a Roman numeral.
15. Write a Python class to reverse a string word by word.

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DST-FIST Supported & STAR College Scheme by DBT

Faculty of Science

Bachelor of Computer Application (B.C.A.)

Semester: V

Paper: DSE-I

Subject: Statistics and R Programming

Course Outcomes

CO	Course Outcomes	Cognitive Level
CO 1	Develop a comprehensive understanding of descriptive statistics, including data classification, tabulation, and graphic representation.	U, R
CO 2	Gain proficiency in correlation and regression analysis techniques and their applications in statistical modelling.	U, R, Ap
CO 3	Acquire a solid foundation in probability theory and probability distributions, and apply these concepts to real-world scenarios.	U, Ap, C
CO 4	Enhance skills in data visualization and statistical analysis using R, including hypothesis testing and linear regression.	An, Ap, C
CO 5	Understand the significance of eigenvalues and eigenvectors in data analysis and machine learning, and apply eigenvalue decomposition techniques using R.	U, Ap, C

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	40	60	**100**
Practical	2	40	60	**100**
Total	**6**	**200**		

Evaluation Scheme

	Marks	
	Internal	**External**
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)

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DST-FIST Supported & STAR College Scheme by DBT

BCA V Semester **Paper: DSE-I**

Subject: Statistics and R Programming

Content of the Course

Theory

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs. **Maximum Marks:** 60

Units	Topics	No. of Lectures
Unit-I	**Descriptive Statistics** Sampling Techniques – Data Classification – Tabulation – Frequency and graphic Representation – Averages (Objectives, Requisites), Types of Averages (Simple Arithmetic Mean, Median, Mode), Moments - Skewness and Kurtosis.	**10**
Unit-II	**Correlation and Regression** Scatter Diagram – Karl Pearson's Correlation Coefficient – (Actual mean – Assumed mean – Step deviation – Direct method) – Rank Correlation Coefficient – (Two variables – more than two variables – ranks are same) – Regression Coefficients – (Deviations taken from arithmetic mean – Deviations taken from assumed mean).	**10**
Unit-III	**Statistical Inference** Hypothesis Testing, Estimation, Test of Significance for large samples (Standard Error of Mean), Test of Significance for small samples (t and Z test), Chi-square test (Goodness of Fit), Variance Ratio test (F-test), Kruskal-Wallis test (H-test)	**10**
Unit-IV	**Data Visualization and Statistical Analysis in R** **Basic Plotting:** Creating histograms, bar plots, box plots, pie charts, dot charts, density plot, strip charts, stem-and-leaf plots and scatter plots using base R. **Statistical Analysis in R:** Implementing descriptive statistics, hypothesis testing (ANOVA – ONE way – TWO way) and linear regression analysis using R.	**15**
Unit-V	**Eigenvalues and Eigenvectors:** Calculating eigenvalues and eigenvectors (2X2 matrix), their significance in data analysis and machine learning, application of eigenvalue decomposition in R.	**15**

Text Books:

1.Statistical Methods by S.P. Gupta
2.Introductory Statistics with R by Peter Dalgaard
3.The R Book by Michael J. Crawley

Reference Books:

1.Statistical Methods" by N.G. Das
2.Statistical Analysis Handbook" by Dr. Michael J. De Smith
3.R for Data Science" by Hadley Wickham and Garrett Grolemun

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DST-FIST Supported & STAR College Scheme by DBT

Bachelor of Computer Application (BCA) **Subject: Statistics and R Programming**

V Semester **Paper: DSE-I**

List of Practical

1. Write an R program to import a CSV file named students.csv that contains student names, ages, and marks. Display the contents of the file, and show the structure and summary of the dataset.
2. WAP in R to perform t-test.
3. WAP in R to perform Chi-square test.
4. WAP in R to perform One Way ANOVA.
5. WAP in R to perform Two Way ANOVA.
6. WAP in R to create basic plots (histogram, bar plot, box plot, scatter plot).
7. WAP in R to perform correlation analysis.
8. WAP in R to perform linear regression analysis.
9. WAP in R to manipulate and clean a dataset (subsetting, filtering, merging).
10. WAP in R to calculate eigenvalues and eigenvectors of a matrix.

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DST-FIST Supported & STAR College Scheme by DBT

Faculty of Science

Bachelor of Computer Application (B.C.A.)

Semester: V

Paper: DSE-II

Subject: Cloud Computing

CO. No.	Course Outcomes	Cognitive Level
CO 1	Analyze the trade-offs between deploying applications in the cloud and over the local infrastructure.	U, R
CO 2	Compare the advantages and disadvantages of various cloud computing plateforms.	U, R, Ap
CO 3	Program data-intensive parallel applications in the cloud.	U, Ap, C
CO 4	Analyze the underlying cloud technologies and software's performance, scalability and availability.	An, Ap, C
CO 5	Solve a real-world problem using cloud computing through group collaboration.	U, Ap, C

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	40	60	**100**
Practical	2	40	60	**100**
Total	**6**	**200**		

Evaluation Scheme

	Marks	
	Internal	**External**
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)

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College with Potential for Excellence by UGC
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BCA V Semester **Paper: DSE-II**

Subject: Cloud Computing

Content of the Course

Theory

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs. **Maximum Marks:** 60

Units	Topics	No. of Lectures
Unit-I	Cloud Computing Fundamental: Cloud Computing definition, Private, Public and Hybrid cloud types, IaaS, PaaS, SaaS, Benefits and challenges of cloud computing, public vs private clouds.	**10**
Unit-II	Basics of Service Management in Cloud Computing, Data Management in Cloud Computing. Cloud Computing Architecture: Cloud Reference Model, Layer and Types of clouds, Architectural design of compute and storage clouds.	**10**
Unit-III	Overview of cloud Management and Virtualization: Fundamental concept of compute, storage, networking, desktop and application virtualization, role of virtualization in enabling the cloud virtualization benefits, server virtualization, block and file level storage virtualization.	**10**
Unit-IV	Cloud Security: Cloud Information security fundamentals, Cloud security services, Design principles, Secure Cloud Software requirements, Policy Implementation, Cloud Computing Security Challenges, Virtualization security management, Cloud Computing security architecture.	**15**
Unit-V	Market based management of Clouds, Federated Cloud/ Inter cloud: Characteristics and Definition, Cloud Federation Stack, Third Party cloud services.	**15**

Text Books:

1.A. Srinivasan, J. Suresh, Cloud Computing
2.Gautam Shroff, Enterprise Cloud Computing Technology Architecture Application
3.Kumar Saurabh- Cloud Computing

Reference Books:

1.Dimitris N. Chorafas – Cloud Computing Strategies
2.Buyya, Selvi – Mastering Cloud Computing
3.Krutz, Vnes – Cloud Security

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Bachelor of Computer Application (BCA) **Subject: Cloud Computing**

V Semester **Paper: DSE-II**

List of Practical

1. Download and Install Virtual Machine (Virtual Box, VMware, and KVM)
2. Installing Virtual Machine
3. Controlling Virtual Machine (Start, restart, power off)
4. Editing Virtual Machine Hardware
5. Creating and Using Image Snapshots
6. Importing and Exporting Virtual Machine Images
7. Accessing Linux Command Line
8. Managing Files from the Command Line
9. Creating, Viewing, and Editing Text Files
10. Installing and Updating Software Packages

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Faculty of Science

Bachelor of Computer Application (BCA)

VI Semester

Paper-Core

SUBJECT: Data Science using Python

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Understanding of the need for data science, its benefits and uses and data pre-processing .	U, A
CO 2	Apply association, classification and clustering techniques to analyse and interpret data.	K,U
CO 3	Execute a variety of data analysis tasks using Python, specifically utilizing libraries like Pandas and Numpy.	U
CO 4	Apply and analyse various data science algorithms.	U, A
CO 5	Understand and implement NLP and data science libraries	U

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	40	60	**100**
Practical	2	40	60	**100**
Total	**6**	**200**		

Evaluation Scheme

	Marks	
	Internal	**External**
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)

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BCA VI Semester **Paper: Core**

Subject: Data Science using Python

Content of the Course

Theory

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs. **Maximum Marks:** 60

Units	Topics	No. of Lectures
I	Introduction to Data Science & data mining: Concept and definition, KDD process and its steps, Types of data in data science, Data Science functionalities: Introduction to ML and its types Preparing Data, Data Preprocessing and its Needs, Data Cleaning, Data Integration and Transformation, Data Normalization, Data Reduction, Principal Component Analysis (PCA), Discretization and Concept Hierarchy Generation.	12
II	Association Rule Mining: Basic Concept of Support and Confidence, Apriori Algorithms for mining frequent item-sets. Improving accuracy of Apriori Algorithm FP-Growth algorithm. Classification and Prediction: Decision Tree Induction, Bayesian Classification, K-Nearest Neighbor, Rule Based Classification.	12
III	Classification by Back propagation: Neural Network, ANN and SVM, Classifier Accuracy: Confusion Matrix, Precision, Recall and F1-score Cluster Analysis: Introduction, Partitioning Methods: K-means, Hierarchical Methods: Agglomerative Clustering, Density-Based Methods DBSCAN, Outlier Analysis. Cluster Model accuracy.	12
IV	Data analysis using Python- pandas, importing and reading a CSV sheet, basic exploration of data, Handling missing values, null values,data frames(concatenating, merging, join), correlation and regression in python, Data-science library scikit, Datasets in scikit-learn ,Splitting data (`train_test_split`), cross-fold validation.	12
V	Introduction to deep learning, transformer based models, NLP based models, spaCy, BERT for transformer model, differentiate between spaCy model and BERT, Introduction to Generative AI and Large Language Model (LLM), TensorFlow library, Reinforcement learning .	12

References

Textbooks:

Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber Harcourt, India.
Eric Matthes, Python Crash Course: A Hands-On, Project-Based Introduction to Programming (2nd Edition)
Zed A. ShawLearn Python the Hard Way: 3rd Edition
John M. ZellePython Programming: An Introduction to Computer Science (3rd Edition)

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DST-FIST Supported & STAR College Scheme by DBT

Bachelor of Computer Application

Subject: Data Science using Python

VI Semester **Paper: Core**

List of Practical

1. Calculate the mean, mode, median, standard deviation, variance, covariance, and correlation of a given dataset.
2. Identify and handle missing or Null values using functions like isnull(), fillna(), or dropna().
3. Perform Linear Regression on Datasets.
4. Use NumPy functions for creating and performing mathematical operations on arrays.
5. Perform Naïve Bayes Classification on dataset
6. Perform Decision tree classification on data-sets.
7. Perform K-Means and agglomerative clustering on iris datasets
8. Perform spaCy model on text data.
9. Design a mini project on "Prediction of the disease using Classification model".
10. Compare two clustering algorithm on same dataset and measure the accuracy of the clustering model.

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Faculty of Science

Bachelor of Computer Application

VI Semester

Paper- DSE-I

Subject: Advance Java

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	To understand the concepts and features of object-oriented programming.	U, K
CO 2	To examine key aspects of Java Standard API library such as util, io, applets, and swings. GUI-based controls.	K,U, Apply
CO 3	To learn Java's exception handling mechanism, multithreading, packages, and interfaces.	U, K
CO 4	To develop skills in internet programming using applets and swings.	U, Analyze
CO 5	To develop skills of client-side scripting. To familiarize the student with client-server architecture and development of web applications using Java technologies.	U, Analyze Apply

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	3	40	60	**100**
Practical	1	40	60	**100**
Total	**4**	**200**		

Evaluation Scheme

	Marks	
	Internal	**External**
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)

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BCA VI Semester **Paper: DSE-I**

Subject: Advance Java

Content of the Course

Theory

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs. **Maximum Marks:** 60

Units	Topics	No. of Lectures
I	Introduction of Java, Applet Class: Life Cycle of an Applet. The Applet Tag and their attributes, Passing Parameter to an Applet, Graphics in Applet. AWT: Event Handling: Event Handling Mechanism, the Delegation Event Model, Event Classes, Sources of Events, Event Listener Interfaces.	12
II	AWT controls, Adapter Classes, Layout Managers, and Menus. Swings: JButton, JLabeL JTextField, JTextArea, JPasswordField, JCheckBox, JRadioButton, JComboBox, JTable. Jl.ist, JScrollBar, JMenuItem & JMenu, JPopupMenu , JCheckBoxMenuItem , JTree , JTabbedPane , JPanel , JFrame, JScrollPane.	12
III	Java Database Connectivity (JDBC): Introduction, JDBC Driver, DB Connectivity steps, Connectivity with Oracle. MySQL and MS Access, Connection Interface. Statement Interface, ResultSet Interface, Prepared Statement.	12
IV	Servlet: Servlet API, Servlet interface. Generic Servlet class, Http Servlet class, Life Cycle of a Servlet, Servlet Request Interface, Request Dispatcher interface. Servlet Config Interface, Servlet Context Interface, cookies, hidden form field. Http Session. Data Access with Servlets: Connecting to a Database. Retrieving Data.	12
V	JSP Overview: JSP- Life Cycle: JSP Compilation, JSP initialization. JSP Execution, JSP Cleanup. JSP Syntax: The Scripilet, JSP Declarations, JSP Expression, JSP Comments, JSP Directives, JSP Actions, JSP Implicit Objects, Control Flow Statements, decision-making statements, Loop Statements, JSP Operators, JSP Literals, JSP Directives, JSP- Client Request: The HttpServIetRequest Object, HTTP Header Request Example. JSP- Server Response: The HttpServletResponse Object, HTTP Header Response Example. JSP Form Processing: GET method, POST method, Reading Form Data using JSP.	12

References

Text Books:

- The Complete Reference: Java 2 - 5Ed, Herbert Schildt, Tata McGraw-Hill Publishing Company Limited.
- Java Servlet Programming Bible. S. Rajagopalan, R. Rajamani, R. Krishnaswamy, and S. Vijendran, WILEY Dreamtech India Pvt. Lmt.
- The Complete Reference: Java 2 - 5Ed, Herbert Schildt, Tata McGraw - Hill Publishing Company Limited.

Reference Books:

- Java Examples in a Nutshell - by David Flanagan
- The Java AW T Reference by John Zukowski Publisher: O'Reilly & Associates, Inc.
- The Java Class Libraries: An Annotated Reference by Patrick Chan, Rosanna Lee Publisher: Addison-Wesley

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Bachelor of Computer Application (BCA) **Subject: Advance Java**

VI Semester **Paper: DSE-I**

List of Practical

1. WAP to demonstrate object cloning.
2. WAP to demonstrate the use of super keyword.
3. WAP to demonstrate the use of this keyword.
4. WAP to demonstrate the use of inner class.
5. WAP to demonstrate the use of static keyword.
6. WAP to demonstrate multiple inheritances using the interface.
7. WAP to run multiple threads at a time.
8. WAP to demonstrate use of user-defined Package.
9. WAP to demonstrate thread synchronization.
10. WAP to demonstrate Layout managers.
11. WAP to demonstrate adapter classes.
12. WAP to create registration form with proper layout.

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Faculty of Science

Bachelor of Computer Application (B.C.A.)

Semester: VI

Paper: DSE-I

Subject: PHP and MySQL

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Develop a strong foundation in HTML, CSS, and JavaScript, enabling students to create and style dynamic web pages with text, links, tables, images, forms, and interactive elements.	U, R
CO 2	Gain proficiency in PHP, including its history, characteristics, installation, configuration, and language basics. Students can handle data types, variables, expressions, operators, control flow, and string manipulation effectively.	U, R, Ap
CO 3	Acquire skills in working with complex data structures such as arrays and multidimensional arrays. Understand and apply functions, object-oriented programming concepts (classes, objects, inheritance, polymorphism), and develop the ability to handle file operations and database access using PHP.	U, Ap, C
CO 4	Learn to set up web pages with PHP to handle various form elements and master file operations, including creating, reading, writing, renaming, deleting files, and managing file information.	An, Ap, C
CO 5	Master PHP for database access, including connecting to MySQL, creating databases and tables, and performing essential operations like inserting, updating, deleting, and selecting data.	U, Ap, C

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	40	60	**100**
Practical	2	40	60	**100**
Total	**6**	**200**		

Evaluation Scheme

	Marks	
	Internal	**External**
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)

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DST-FIST Supported & STAR College Scheme by DBT

BCA VI Semester **Paper: DSE-I**

Subject: PHP and MySQL

Content of the Course

Theory

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs. **Maximum Marks:** 60

Units	Topics	No. of Lectures
I	Overview of HTML, Working with Text, Link, Table, Image, Forms, Input. Introduction of cascading style sheet, selector, inline, internal, external CSS, CSS in text, image. Overview of JavaScript, Variables, Operators, Control flow statements, Popup Boxes, Functions, Events, Windows and Document Objects, Array.	10
II	A Brief History of PHP, PHP Characteristics, Installing and Configuring PHP on Windows, PHP Language Basics: Lexical Structure, Data Types, Variables, Expressions and Operators, Decision Statements, Flow Control Statements, Embedding PHP in Web Pages. Strings: String Constants, Printing Strings, Accessing Individual Characters, String Handling Functions: length, Word count, string position, reverse, replace.	10
III	Arrays: Indexed Arrays, Associative Arrays, Identifying Elements of an Array, Storing Data in Arrays, Multidimensional Arrays, extracting multiple values, converting between arrays and variables, Traversing Arrays, Sorting. Functions: Calling a Function, defining a Function, Variable Scope, Function Parameters, Return Values, Variable Functions, Anonymous Functions. Object Oriented Programming Concepts: Classes, Objects, Member Functions, Encapsulations, Inheritance, and Polymorphism.	10
IV	Form Handling in PHP: Setting Up Web Pages to Communicate with PHP, Handling Text Fields, Text Areas, Check Boxes, Radio Buttons, List Boxes, Password Controls, Hidden Controls, Image Maps. File Handling: Working with files and directories, File Open and Read, File Create and Write, Reading and writing Character in file, reading entire file, Rename and Delete File, getting Information of files, ownership and permissions.	15
V	Database Access: Using PHP to access a database. Introduction to MySql, Connect and create database, create tables, insert, update, delete, select.	15

References

Text Books:

1.Programming PHP by Rasmus Lerdorf and Kevin Tatroe, O'Reilly Publications

2.Beginning PHP5 by Wrox Publication

3.HTML 5, Black Book by DreamTech Press

Reference Books:

1.Mastering PHP: BPB Publication

2.PHP 5.1 for beginners by Evan Bayross and Sharman Shah, SPD Publications

3.PHP 5.2 The Complete Reference by Steven Holzner, McGraw Hill Edition 2008.

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Bachelor of Computer Application (BCA) **Subject: PHP and MySQL**

VI Semester **Paper: DSE-I**

List of Practical

1. Write HTML codes for displaying images and demonstrate hyperlinking.
2. Create a Feedback Form Using Form Handling.
3. Write a code for design menu system using list tag.
4. Apply CSS formatting to create page.
5. Write a PHP script to display a Welcome message.
6. Write a PHP script to demonstrate use of arithmetic operators, comparison operators, and logical operators.
7. Write a PHP script to set the type of variable using type casting.
8. Write PHP Script to print the Fibonacci series.
9. Write PHP Script to generate results and display grades.
10. Write PHP Script to find the maximum number out of three given numbers.
11. Write PHP Script using two-dimensional arrays such as the addition of two 2×2 matrices.
12. Write PHP Script for FOR EACH loop execution.
13. Write PHP script Using the user-defined function.
14. Write PHP script to demonstrate use of string function.
15. Write PHP script to demonstrate use of date/time function and Math functions.
16. Write a program to read input data, from table and display all this information in tabular form on output screen.
17. Write a program to manipulate data and display all this information in table format.
18. Create form to search data.
19. Develop small PHP application(s) using forms and database with updated and delete options.
20. Open and Read a file.

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DST-FIST Supported & STAR College Scheme by DBT

Faculty of Science

Bachelor of Computer Application (B.C.A.)

VI Semester

Paper-DSE-II

Subject: Web Technology using .NET

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Understand basics of Internet, World Wide Web(WWW), Client server Computing.	U, A
CO 2	Have Knowledge of various web browsers, familiarize with Java scripting, Client-side scripting language, Web server Architecture, Database Connectivity (DBC)	K
CO 3	Have knowledge of HTML, it's essential tags, Attributes, Text styles, Links to External Documents and different sections of a HTMLpage.	U
CO 4	Develop skills to generate HTML and have knowledge of Java Script and style sheets	U, Analyze
CO 5	Have knowledge of Objects, Methods, Events and Functions and various types of text, styles	U

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	3	40	60	**100**
Practical	1	40	60	**100**
Total	**4**	**200**		

Evaluation Scheme

	Marks	
	Internal	**External**
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)

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BCA VI Semester **Paper: DSE-II**

Subject: Web Technology using .NET

Content of the Course

Theory

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs. **Maximum Marks:** 60

Units	Topics	No. of Lectures
I	**Topics Basics** of **Internet and Web:** The basics of Internet, World Wide Web, Web page, Home Page, Web site, Static, Dynamic and Active web page, Client server computing concepts, Web Browser, Client-Side Scripting, Server-Side Scripting, Introduction to HTML, Tags and Attributes.	10
II	**Introduction to Style Sheet-** Types, Selector, properties. **Introduction to JavaScript-** variable, operators, function, events, Array, Strings, Dialog Boxes.	10
III	**Introduction to .NET**- .NET Framework, .NET Architecture, CLR, the Just-in-Time Compiler, Garbage collection. .NET Framework class library.	10
IV	**Introduction to ASP.NET**- ASP.NET Page Life Cycle, Coding Model, Web forms, Web form controls, server controls, client controls, web forms, coding Models, Controls: TextBox, Label,Hyperlink, Button, DropDownList, ListBox, CheckBox, RadioButton, FileUpload, Validators,Masterpage.	15
V	**ASP.NET Navigation Controls:** SiteMapPath, MenuControl, TreeView **Working With Database-** Architecture of ADO.NET, Connected and Disconnected Database. Connection Class, Command Class, Data Adapter Class, and Dataset Class. Insert, Update, Delete commands and Accessing the data from database. Data Controls: FromView, GridView etc.	15

References

Text Books:

1. Web Technologies — Black Book — DreamTech Press
2. Beginning HTML, XHTML, CSS and Javascript by John Duckett

Reference Books:

- HTML, XHTML and CSS Bible, 5th edition, Willey India-Steven M. Schafer
- Java EE and HTML-5 Enterprise Application Development (Oracle Press) by John Brock, Arun Gupta, Geertjan Wielenga.

Web Links:

- Internet technology course by NPTEL< nptel.ac.in>courses,
- www.udemy.com

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Bachelor of Computer Application (BCA) **Subject: Web Technology using .NET**

VI Semester **Paper: DSE-II**

List of Practical

1. Create a web form for addition of two numbers.
2. Create a web form for Simple Interest.
3. Create a web form for Factorial.
4. Create a web form for Prime number.
5. Create a web form for matching the value of two textboxes.
6. Create a web form for Calculator.
7. Create a web form for to demonstrate the session.
8. Create a web form with one list box and three check boxes named php, java, c respectively. On check and uncheck name of the check box should be added and removed to and from the list box.
9. Create a web form with one Drop Down List and demonstrate addition of items at first and last position. Show deletion also.
10. Demonstrate File Upload control.
11. Demonstrate Validation Controls.
12. Insert user data to Database through web form.
13. Create a sample college website and use Masterpage and Menu control.
14. Create Student Registration Form and corresponding database. Fetch the data into Grid View Control.

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DST-FIST Supported & STAR College Scheme by DBT

Faculty of Science

Bachelor of Computer Application (BCA)

VI semester

Paper-DSE-II

Subject: Text Mining using NLP

Course Outcomes

No.	Course Outcomes	Cognitive Level
CO 1	Analyze and apply morphological analysis techniques such as lemmatization, finite automata, and finite state transducers.	U, A
CO 2	Perform Part-of-Speech (POS) tagging using rule-based and stochastic methods, and understand sequence labelling with HMM and Maximum Entropy models.	K
CO 3	Understand lexical semantics and perform word sense disambiguation using various approaches including dictionary-based methods and WordNet.	U
CO 4	Apply selection restrictions and word similarity techniques using thesaurus and distributional methods for improved pragmatics and word sense disambiguation.	U, An
CO 5	Conduct discourse analysis, including anaphora and coreference resolution, and utilize lexical resources such as Penn Treebank, WordNet, and FrameNet.	U

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	3	40	60	**100**
Practical	1	40	60	**100**
Total	**4**	**200**		

Evaluation Scheme

	Marks	
	Internal	**External**
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)

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DST-FIST Supported & STAR College Scheme by DBT

BCA VI Semester **Paper: DSE-II**

Subject: Text Mining using NLP

Content of the Course

Theory

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs. **Maximum Marks:** 60

Units	Topics	No. of Lectures
I	History of NLP, Generic NLP system, levels of NLP, Knowledge in language processing, Ambiguity in Natural language, stages in NLP, challenges of NLP,	10
II	Morphology analysis –survey of English Morphology, Inflectional morphology & Derivational morphology, Lemmatization, Regular expression, finite automata, finite state transducers (FST), Morphological parsing with FST, Lexicon free FST Porter stemmer. N –Grams- N-gram language model, Self-learning topics: N-gram for	15
III	Part-Of-Speech tagging (POS)- Tag set for English (Penn Treebank), Rule-based POS tagging, Stochastic POS tagging, Issues –Multiple tags & words, Unknown words. Introduction to CFG, Sequence labeling: Hidden Markov Model (HMM),	10
IV	PRAGMATICS Selectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.	10
V	Text summarization- LEXRANK, Optimization-based approaches for summarization, Summarization evaluation, Text classification. Sentiment Analysis introduction, Sentiment Analysis - Affective lexicons, Learning affective lexicons, Computing with affective lexicons, Aspect-based sentiment analysis.	15

TEXTBOOKS:

- Daniel Jurafsky, James H. Martin, "Speech and Language Processing: An Introduction to NaturalLanguageProcessing, Computational Linguistics and Speech", Pearson Publication, 2014.
- Steven Bird, Ewan Klein and Edward Loper, "Natural Language Processing with Python, First Edition,O'Reilly Media, 2009.

REFERENCE BOOK:

- Breck Baldwin, "Language Processing with Java and LingPipe Cookbook", Atlantic Publisher, 2015.
- Richard M Reese, "Natural Language Processing with Java", O'Reilly Media, 2015.

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DST-FIST Supported & STAR College Scheme by DBT

Bachelor of Computer Application (BCA) **Subject: Text Mining using NLP**

VI Semester **Paper: DSE-II**

List of Practical

1. Design and implement an NLP pipeline that performs tokenization, lemmatization, POS tagging, and named entity recognition on a given text corpus.
2. Develop a morphological parser using finite state transducers (FST) for English words, and demonstrate its ability to handle inflectional and derivational morphology.
3. Construct an N-gram language model for a given text corpus and use it to perform tasks such as next-word prediction and spelling correction.
4. Implement rule-based and stochastic POS tagging on a sample text, and evaluate the accuracy of each method using the Penn Treebank tag set.
5. Train a Hidden Markov Model (HMM) for POS tagging and use it to tag a new text. Compare its performance with a Maximum Entropy model.
6. Implement a word sense disambiguation system using dictionary-based and supervised learning approaches. Evaluate the system on a set of ambiguous sentences.
7. Use WordNet to explore relationships among lexemes (homonymy, polysemy, synonymy, hyponymy) and implement a robust word sense disambiguation algorithm.
8. Perform discourse segmentation and anaphora resolution using Hobbs and Centering algorithms on a given text. Analyze the coherence and reference phenomena in the discourse.
9. Implement a text summarization system using LEXRANK or an optimization-based approach. Evaluate the summarization quality using standard evaluation metrics.
10. Develop an aspect-based sentiment analysis system that uses affective lexicons to analyze customer reviews. Implement the system and evaluate its accuracy on a given dataset.