ST. ALOYSIUS' COLLEGE
JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)
College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

SYLLABUS

Department of Computer Science

BCA

Academic Curriculum & Syllabus

Programme Level	UG
Academic Session	2026-2027
Department	cs

PROGRAM OUTCOMES

PO1. Apply knowledge of computer applications, programming, mathematics, and information technology to solve real-world problems using appropriate computational approaches.

PO2. Analyze complex problems, develop logical and innovative solutions, and apply computational thinking to address societal and professional challenges.

PO3. Design, develop, test, and maintain software applications using modern technologies, tools, databases, and sustainable development practices.

PO4. Demonstrate effective communication, collaboration, ethical responsibility, leadership, professional values, and sensitivity towards societal and environmental needs.

PO5. Develop an attitude of lifelong learning, creativity, innovation, entrepreneurship, and adaptability to emerging technologies for continuous personal and professional development.

Syllabus Book

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SYLLABUS

Department	Department of Computer Science	**Program**	BCA
Level	UG	**Semester**	I
Course Code		**Course Type**	Major
Paper	I	**Course Title**	Computer Architecture
Credit	6	**Session**	2026-2027

Course Outcomes

CO1. Understand the basic structure, operation and characteristics of digital computer.

CO2. Design simple combinational digital circuits based on given parameters.

CO3. Apply and design circuits using logic gates.

CO4. Know the contributions of Indians in the field of computer architecture and related technologies.

UNIT 1	Content	Duration
1	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
2	Memory: Primary and Secondary memory (RAM, ROM), Storage devices (hard drive, optical drive). Fundamentals of Digital Electronics: Decimal, Binary, Octal, Hexadecimal, Number System Conversions, Binary Addition, Complement (1's, 2's, 9's and 10's) in decimal, Additive method of subtraction in binary, Computer codes: BCD, ASCII, EBCDIC, GRAY, error detection and correction codes: Hamming codes.	12
3	Fixed Point and Floating Point Representation of Numbers, Logic Gates, truth tables, Boolean Algebra, Boolean Function, K-Map Simplification, and 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
4	Basic Computer Organization: Instruction codes, Computer Registers, Instruction Cycles, Instruction formats, Addressing modes, and Instruction codes. Processor and Control Unit: General Register Organization, Stack Organization, Interrupts. Introductory concept of RISC, CISC, advantages and disadvantages of both.	12
5	Pipelining: concept of pipelining, introduction to Pipelined data path control – Handling Data hazards & Control hazards Data Transfer Schemes - Program Control, Interrupt, DMA Transfer, I/O Processor. Memory Hierarchy, Main memory, Auxiliary memory, Cache Memory, Associative Memory, Virtual Memory, Memory Mapping.	12

Assessment Scheme

Component	Credit	Internal	External	Total

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Theory	4	30	70	100
Practical	2	30	70	100
Total	**6**			**200**

Practical List

P1. PART-1 (Computer Fundamentals)

P2. Various parts of a Computer

P3. Identify various parts inside the CPU like motherboard, SMPS, Ports, Buses, IC chip, Processor, HDD, RAM.

P4. Identify various I/O devices

P5. PART-II (Digital Electronics)

P6. Verification and interpretation of truth table for AND gate

P7. Verification and interpretation of truth table for OR gate

P8. Verification and interpretation of truth table for NOT gate

P9. Verification and interpretation of truth table for NAND gate

P10. Verification and interpretation of truth table for NOR gate

P11. Solve a basic Boolean Algebra Expression using Logic Gates.

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

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SYLLABUS

Department	Department of Computer Science	**Program**	BCA
Level	UG	**Semester**	I
Course Code		**Course Type**	Minor
Paper	NA	**Course Title**	Mathematical Foundations To Computer Science
Credit	4	**Session**	2026-2027

Course Outcomes

CO1. Perform key operations for image processing, computer graphics, and data analysis.

CO2. Solve linear systems that arise in cryptography, game development, and AI algorithms.

CO3. Use matrices in machine learning models for efficient data manipulation and optimization.

CO4. Implement algorithms that involve graph theory, network flow analysis, and dynamic systems.

CO5. Construct truth tables for logical expressions

CO6. test statements for logical equivalence and represent mathematical statements in the language of predicate language.

CO7. Using the appropriate set theoretic concepts, thinking process, tools and techniques in the solution to various conceptual or real-world problems.

UNIT 0	Content	Duration
1	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.	10
2	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.	10
3	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.	10
4	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.	10

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Component	Credit	Internal	External	Total
Theory	4	30	70	100

Reference 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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