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college of arts & commerce
EDUCATION EMPOWERS

RSET. Campus, S.V.Road,
Malad (West), Mumbai – 400 064
Tel No. : 022 45207766
Web: www.sarafcollege.org
gsgc@rajasthani.org.in

**Name of The Programme: Bachelor of Science(Information Technology)**

## Programme Outcomes:

| | |
|---|---|
| **PO 1** | Attain a strong foundation in programming, software development, and IT principles. |
| **PO 2** | Apply technical skills ethically and responsibly in the IT industry |
| **PO 3** | Develop communication, research, analytical, and leadership abilities for career advancement. |
| **PO 4** | Understand and integrate new IT advancements to address global challenges and opportunities. |
| **PO 5** | Demonstrate leadership, teamwork, and a commitment to sustainable and ethical IT practices. |

## Programme Specific Outcomes:

| | |
|---|---|
| **PSO 1** | Demonstrate expertise in programming languages, software engineering, and system design. |
| **PSO 2** | Apply knowledge of computer networks, databases, and cybersecurity to solve real-world IT problems. |
| **PSO 3** | Plan, develop, and manage IT projects using analytical and problem-solving skills. |
| **PSO 4** | Integrate AI, cloud computing, IoT, and other advanced technologies into innovative IT solutions. |
| **PSO 5** | Exhibit ethical behavior, effective communication, and teamwork in diverse professional settings. |

**Programme coordinator** **Dr. Lipi Mukherjee** **Dr. Ashwat Desai**

**Vice Principal(SFD)** **Principal**

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## COURSE OUTCOME

**Name of The Programme: Bachelor of Science(Information Technology)**

## FY BSCIT (SEM I)

### Programming Principles with C

**After completing the course, the learner will be able to:**

| | |
|---|---|
| **CO1** | Learn the history, structure, and compilation process of C programs, including algorithms, data types, and preprocessor directives. |
| **CO 2** | Apply conditional statements, loops, and various operators to implement logic in programs effectively |
| **CO 3** | Utilize user-defined and built-in functions, recursion, and scope rules to create well-structured C programs. |
| **CO 4** | Use pointers for array manipulation, dynamic memory allocation, and function arguments for efficient programming. |
| **CO 5** | Work with structures, unions, file operations, and command-line arguments for data storage and management. |

### Digital Logic and Applications

**After completing the course, the learner will be able to:**

| | |
|---|---|
| **CO1** | Learn binary, octal, and hexadecimal number systems, conversions, and logic gates (AND, OR, NOT, NAND, NOR, XOR, XNOR). |
| **CO 2** | Use Boolean theorems and minimization techniques (K-map, Quine-McCluskey) to optimize digital circuits. |
| **CO 3** | Develop circuits like multiplexers, demultiplexers, encoders, and decoders based on Boolean logic. |
| **CO 4** | Understand latches, flip-flops, registers, and counters for designing memory and timing devices. |
| **CO 5** | Learn about Arithmetic Logic Units (ALUs), binary multiplication algorithms, and real-world digital system implementations. |

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## Fundamentals of Database Management Systems

**After completing the course, the learner will be able to:**

| | |
|---|---|
| **CO1** | Learn relational model, constraints, and relational algebra for effective database design. |
| **CO 2** | Use ER and Enhanced ER diagrams to structure and design databases efficiently. |
| **CO 3** | Utilize functional dependencies and normalization methods to optimize database structure. |
| **CO 4** | Perform complex queries, use triggers, views, and indexing for data retrieval and manipulation. |
| **CO 5** | Ensure database integrity with transactions, concurrency techniques, and recovery mechanisms. |

## Computational Logic and Discrete Structure

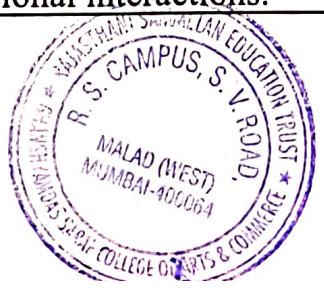
**After completing the course, the learner will be able to:**

| | |
|---|---|
| **CO1** | Understand Venn diagrams, set operations, relations, and their applications in computer science. |
| **CO 2** | Learn function types, algorithmic complexity, and probability concepts in computational logic. |
| **CO 3** | Implement permutations, combinations, recurrence relations, and the Pigeonhole principle for problem-solving. |
| **CO 4** | Explore graph algorithms, trees, and shortest path problems like Dijkstra and Warshall's algorithm. |
| **CO 5** | Learn tree traversal techniques, binary search trees, heaps, and ordered sets for efficient data processing. |

## Technical Communication Skills

**After completing the course, the learner will be able to:**

| | |
|---|---|
| **CO1** | Understand verbal, non-verbal, and technical communication to convey ideas clearly. |
| **CO 2** | Learn to write emails, business letters, memos, reports, and proposals with clarity and precision. |
| **CO 3** | Utilize presentation techniques, audience analysis, and visual aids for impactful delivery. |
| **CO 4** | Develop active listening skills, teamwork, and confidence in professional interactions. |



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| | |
|---|---|
| CO 5 | Understand workplace ethics, corporate communication strategies, and the role of MIS in decision-making. |

## FYBSCIT (Sem II)

### Object Oriented Programming with C++

**After completing the course, the learner will be able to:**

| | |
|---|---|
| CO1 | Learn object-oriented concepts like classes, objects, polymorphism, inheritance, and their role in software development. |
| CO 2 | Gain hands-on experience with C++ syntax, operators, expressions, and structured programming techniques. |
| CO 3 | Apply OOP principles such as encapsulation, constructors/destructors, operator overloading, and function overloading. |
| CO 4 | Utilize inheritance, virtual functions, file handling, templates, and exception handling for robust software development. |
| CO 5 | Leverage STL components, string manipulation, and modern C++ enhancements for efficient programming. |

### Fundamentals of Micro Processor and Microcontrollers

**After completing the course, the learner will be able to:**

| | |
|---|---|
| CO1 | Understand microprocessor and microcontroller architecture, their memory interfacing, and applications. |
| CO 2 | Develop assembly language programming skills, including writing, assembling, and debugging programs. |
| CO 3 | Interface peripherals with microprocessors and microcontrollers, including input/output devices and memory modules. |
| CO 4 | Explore embedded systems and 8051 microcontroller programming using embedded C. |
| CO 5 | Design and develop embedded applications, selecting microcontrollers, developing firmware, and understanding industry trends. |

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## Web Applications Development

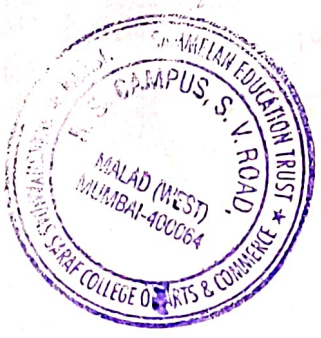
**After completing the course, the learner will be able to:**

| | |
|---|---|
| **CO1** | Gain a strong foundation in Internet technologies, the World Wide Web, and web protocols. |
| **CO 2** | Design and develop responsive web pages using HTML5 and CSS for enhanced user experience. |
| **CO 3** | Implement dynamic functionality with JavaScript, DOM manipulation, and event handling. |
| **CO 4** | Master server-side scripting with PHP, including form handling, validation, and session management. |
| **CO 5** | Integrate PHP with MySQL to build dynamic, data-driven web applications. |

## Numerical Methods

**After completing the course, the learner will be able to:**

| | |
|---|---|
| **CO1** | Develop mathematical models and apply numerical techniques to solve engineering problems while analyzing errors. |
| **CO 2** | Utilize root-finding methods, interpolation techniques, and iterative methods for solving algebraic and transcendental equations. |
| **CO 3** | Implement numerical differentiation and integration techniques, including Trapezoidal and Simpson's rules. |
| **CO 4** | Apply numerical methods for solving differential equations, including Euler's and Runge-Kutta methods, along with regression analysis for data approximation. |
| **CO 5** | Formulate and solve linear programming problems and partial differential equations (PDEs) using numerical techniques. |



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### Green IT

**After completing the course, the learner will be able to:**

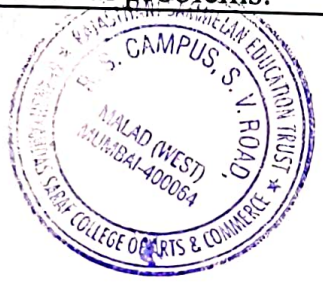
| | |
|---|---|
| **CO1** | Understand the environmental impact of IT, including carbon footprint, power consumption, and e-waste, while exploring regulatory standards and initiatives. |
| **CO 2** | Implement power-saving strategies, cooling optimizations, and virtualization techniques to reduce energy consumption in IT infrastructure. |
| **CO 3** | Explore green computing solutions such as eco-friendly hardware, green cloud computing, and paperless workflows to enhance sustainability. |
| **CO 4** | Evaluate recycling and disposal methods for IT equipment, considering lifecycle management, hardware certification programs, and responsible e-waste handling. |
| **CO 5** | Develop and track sustainable IT strategies, integrating green business processes, supply chain improvements, and continuous environmental assessments. |

## SY BSCIT (SEM III)

### Python Programming

**After completing the course, the learner will be able to:**

| | |
|---|---|
| **CO1** | Understand core Python programming concepts, including data types, control structures, and functions. |
| **CO 2** | Develop small-scale Python projects and contribute to open-source applications. |
| **CO 3** | Utilize Python libraries and frameworks to build efficient and scalable solutions. |
| **CO 4** | Implement file handling, exception handling, and other advanced Python features. |
| **CO 5** | Apply Python programming skills to solve real-world computational problems. |



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**Data Structures**

**After completing the course, the learner will be able to:**

| | |
|---|---|
| CO1 | Understand fundamental data structures such as arrays, linked lists, stacks, and queues. |
| CO 2 | Implement searching and sorting algorithms efficiently. |
| CO 3 | Apply trees, graphs, and hash tables for problem-solving. |
| CO 4 | Analyze time and space complexity for optimized programming solutions. |
| CO 5 | Develop real-world applications using appropriate data structures. |

**Computer Networks**

**After completing the course, the learner will be able to:**

| | |
|---|---|
| CO1 | Understand network architecture, protocols, and models. |
| CO 2 | Analyze data transmission techniques and error control mechanisms. |
| CO 3 | Configure IP addressing and subnetting for efficient network design. |
| CO 4 | Evaluate network security principles and risk mitigation techniques. |
| CO 5 | Implement basic networking configurations and troubleshooting methods. |

**Database Management Systems**

**After completing the course, the learner will be able to:**

| | |
|---|---|
| CO1 | Understand database concepts, architecture, and data models. |
| CO 2 | Design and implement relational databases using Entity-Relationship (ER) models and normalization techniques. |
| CO 3 | Construct SQL queries for data retrieval, manipulation, and transactions. |
| CO 4 | Implement indexing and optimization techniques for performance enhancement. |
| CO 5 | Apply database security and backup mechanisms for data integrity. |

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## Applied Mathematics

**After completing the course, the learner will be able to:**

| | |
|---|---|
| **CO1** | Apply mathematical techniques in computational problem-solving. |
| **CO 2** | Understand matrix algebra, differentiation, and integration concepts. |
| **CO 3** | Solve linear equations and probability-based problems in IT applications. |
| **CO 4** | Utilize mathematical models for data analysis and decision-making. |
| **CO 5** | Implement numerical methods for scientific computing. |

## SY BSCIT (SEM IV)

### Core Java

**After completing the course, the learner will be able to:**

| | |
|---|---|
| **CO1** | Understand object-oriented programming concepts in Java. |
| **CO 2** | Develop Java applications using classes, objects, and exception handling. |
| **CO 3** | Implement multithreading, file handling, and database connectivity in Java. |
| **CO 4** | Utilize Java frameworks and APIs for enterprise application development. |
| **CO 5** | Create GUI-based applications using Java Swing and JavaFX. |

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## Introduction to Embedded Systems

**After completing the course, the learner will be able to:**

| | |
|---|---|
| **CO1** | Understand the fundamentals of embedded systems and microcontrollers. |
| **CO 2** | Analyze the architecture and components of embedded systems. |
| **CO 3** | Develop simple programs for embedded applications. |
| **CO 4** | Interface sensors and actuators with embedded hardware. |
| **CO 5** | Apply embedded system concepts in real-world applications like IoT. |

## Computer Oriented Statistical Techniques

**After completing the course, the learner will be able to:**

| | |
|---|---|
| **CO1** | Understand basic statistical concepts and probability distributions. |
| **CO 2** | Apply statistical methods for data analysis and interpretation. |
| **CO 3** | Use regression and correlation techniques for prediction models. |
| **CO 4** | Implement statistical techniques using programming tools. |
| **CO 5** | Analyze datasets using hypothesis testing and inferential statistics. |

## Software Engineering

**After completing the course, the learner will be able to:**

| | |
|---|---|
| **CO1** | Understand software development life cycle (SDLC) models. |
| **CO 2** | Apply software design principles and development methodologies. |
| **CO 3** | Perform requirement analysis, software testing, and quality assurance. |
| **CO 4** | Utilize project management techniques for software development. |

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| | |
|---|---|
| CO 5 | Develop software solutions following industry best practices. |

## Computer Graphics and Animation

**After completing the course, the learner will be able to:**

| | |
|---|---|
| CO1 | Gain a comprehensive understanding of computer graphics concepts, including display devices, I/O devices, and storage technologies like CRT, LCD, and video controllers. |
| CO 2 | Implement key algorithms for scan conversion, line/polygon clipping, and curve drawing, such as DDA, Bresenham, Midpoint, and clipping algorithms. |
| CO 3 | Apply 2D transformations like translation, rotation, scaling, and reflection using homogeneous coordinates and matrices. |
| CO 4 | Represent and manipulate curves and surfaces, including Bezier, B-spline, and cubic splines for 3D modeling. |
| CO 5 | Develop real-time graphics and interactive 2D/3D environments for games, simulations, and visual effects. |

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# TY BSCIT (SEM V)

## Software Project Management

**After completing the course, the learner will be able to:**

| | |
|---|---|
| **CO1** | Understand project management methodologies, planning, and risk assessment. |
| **CO 2** | Apply cost estimation, scheduling, and resource management techniques. |
| **CO 3** | Utilize project monitoring tools to track software development progress. |
| **CO 4** | Implement Agile, Scrum, and traditional project management approaches. |
| **CO 5** | Develop leadership and team management skills for software projects. |

## Internet of Things

**After completing the course, the learner will be able to:**

| | |
|---|---|
| **CO1** | Understand IoT architecture, protocols, and communication models. |
| **CO 2** | Interface sensors, actuators, and microcontrollers for IoT applications. |
| **CO 3** | Implement data collection, processing, and cloud integration in IoT systems. |
| **CO 4** | Develop secure and scalable IoT solutions for real-world applications. |
| **CO 5** | Explore IoT applications in healthcare, smart cities, and automation. |

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## Advanced Web Programming

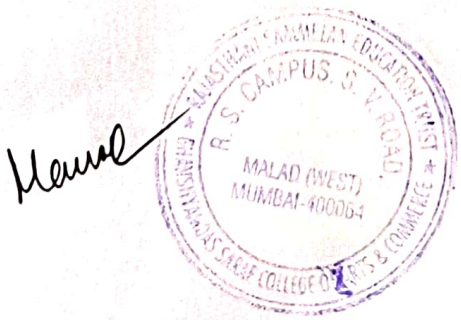
**After completing the course, the learner will be able to:**

| | |
|---|---|
| **CO1** | Develop dynamic and responsive web applications using modern frameworks. |
| **CO 2** | Implement server-side and client-side scripting for enhanced functionality. |
| **CO 3** | Integrate databases, APIs, and security measures in web applications. |
| **CO 4** | Optimize web performance using caching, compression, and load balancing. |
| **CO 5** | Explore emerging trends in web technologies, including PWAs and WebSockets. |

## Artificial Intelligence

**After completing the course, the learner will be able to:**

| | |
|---|---|
| **CO1** | Understand fundamental AI concepts, search algorithms, and problem-solving techniques. |
| **CO 2** | Apply machine learning algorithms for classification, prediction, and clustering. |
| **CO 3** | Implement natural language processing (NLP) and neural networks. |
| **CO 4** | Develop AI-driven applications using Python, TensorFlow, and related frameworks. |
| **CO 5** | Analyze ethical considerations and societal impacts of AI technologies. |



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### Enterprise Java

**After completing the course, the learner will be able to:**

| | |
|---|---|
| CO1 | Develop scalable and secure enterprise applications using Java EE. |
| CO 2 | Implement servlets, JSP, and JDBC for web-based applications. |
| CO 3 | Utilize frameworks like Spring, Hibernate, and RESTful web services. |
| CO 4 | Apply multithreading, security, and transaction management techniques. |
| CO 5 | Design and deploy enterprise-level applications with cloud integration. |

## TY BSCIT (SEM VI)

### Software Quality Assurance

**After completing the course, the learner will be able to:**

| | |
|---|---|
| CO1 | Understand software testing principles, methodologies, and automation tools. |
| CO 2 | Implement test cases, defect tracking, and debugging techniques. |
| CO 3 | Apply quality standards like ISO, CMMI, and Six Sigma in software development. |
| CO 4 | Analyze software reliability, performance, and usability metrics. |
| CO 5 | Ensure software security, maintainability, and compliance with industry standards. |

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## Security in Computing

**After completing the course, the learner will be able to:**

| | |
|---|---|
| CO1 | Understand cybersecurity principles, cryptography, and risk management. |
| CO 2 | Implement authentication, access control, and network security measures. |
| CO 3 | Detect and prevent security threats, vulnerabilities, and cyberattacks. |
| CO 4 | Apply ethical hacking and penetration testing techniques. |
| CO 5 | Ensure data protection and compliance with security regulations. |

## Business Intelligence

**After completing the course, the learner will be able to:**

| | |
|---|---|
| CO1 | Understand BI concepts, data warehousing, and ETL processes. |
| CO 2 | Use data visualization and analytics tools for decision-making. |
| CO 3 | Apply predictive analytics and data mining techniques. |
| CO 4 | Implement BI solutions for business process optimization. |
| CO 5 | Explore the role of BI in digital transformation and strategic planning. |

## Principles of Geographic Information Systems

**After completing the course, the learner will be able to:**

| | |
|---|---|
| CO1 | Understand GIS fundamentals, spatial data, and geospatial analysis techniques. |
| CO 2 | Utilize GIS software for mapping, visualization, and decision support. |
| CO 3 | Apply GIS in urban planning, environmental management, and |

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| | |
|---|---|
| | disaster response. |
| **CO 4** | Integrate GIS with database management and remote sensing technologies. |
| **CO 5** | Develop GIS-based applications for real-world problem-solving. |

## IT Service Management

**After completing the course, the learner will be able to:**

| | |
|---|---|
| **CO1** | Understand ITSM frameworks like ITIL, COBIT, and ISO 20000. |
| **CO 2** | Apply incident, problem, and change management practices. |
| **CO 3** | Optimize IT services for efficiency, reliability, and customer satisfaction. |
| **CO 4** | Implement service lifecycle management and SLA-based support models. |
| **CO 5** | Align ITSM strategies with business objectives and digital transformation. |

**Programme coordinator** **Dr. Lipi Mukherjee** **Dr. Ashwat Desai**

**Vice Principal(SFD)** **Principal**

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