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**St. Xavier's College (Autonomous), Mumbai**  
**Department of Information Technology**

**Programme: B.Sc. Information Technology**

***Programme Specific Outcomes (PSOs) for B.Sc. Information Technology***

<b>Sr. No.</b>	<b>On completing B.Sc. Information Technology, the student will be able to:</b>
PSO 1	Gain an understanding in various areas of information technology for higher studies and research.
PSO 2	Acquire analytical and problem solving skills, in order to solve real world problems.
PSO 3	Communicate technical concepts and designs to all kinds of audience.
PSO 4	Work as part of a team with constant collaboration and communication in order to build projects.
PSO 5	Create or apply modern tools and techniques to analyse concepts being applied to the system and/or data which is available.
PSO 6	Read programming language documentation and create/modify new/existing systems to generate useful products.
PSO 7	Develop competent technical writing skills for information technology-related concepts.
PSO 8	Develop database programming skill.
PSO 9	Acquire the skill of developing predicting model and clustering model.
PSO 10	Acquire the skill of data visualization.
PSO 11	Possess the basic knowledge of digital logic.



## Course Outcomes (COs): B.Sc. Information Technology

### Semester I

**Course Title: Professional Communication Skills**

**Course Code: SITS0101**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Have confidence during communications and public speaking through practical training.	2, 9	U, R, E, C
CO 2	Develop delivery skills for presentations, debates, group discussions etc.	2, 9	U, R, E, C
CO 3	Improve written communications via emails, letters, memos, reports etc.	2, 9	U, R, E, C
CO 4	Improve overall corporate communications skills and etiquette, combining theory and practical aspects, and incorporate fundamental concepts in day-to-day communication.	2, 9	U, R, E, C

**Course Title: Applied Mathematics – I**

**Course Code: SITS0102**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Solve system of linear equations and find eigenvalues/vectors of matrix to diagonalise it.	2, 9	U, An, Ap, C
CO 2	Apply mean value theorems, intermediate value theorem and Taylor's theorem.	2, 9	U, An, Ap, C
CO 3	Logically analyze multivariable calculus concepts to find partial/directional derivatives and extreme values of $f(x,y)$ .	2, 9	U, An, Ap, C
CO 4	Solve differential equations of various types such as exact, non-exact, linear, with constant coefficients.	2, 9	U, An, Ap, C
CO 5	Write algorithms and draw flow charts of these concepts/methods to achieve skill development and creativity.	2, 9	U, An, Ap, C



**Course Title: Digital Electronics**  
**Course Code: SITS0103**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Have a thorough understanding of the fundamental concepts and techniques used in digital electronics.	1, 5, 11	U, R, An, Ap, C
CO 2	Understand various number systems, their conversions and application in digital design.	1, 5, 11	U, R, An, Ap, C
CO 3	Understand, analyse and design various combinational and sequential circuits.	1, 5, 11	U, R, An, Ap, C
CO 4	Develop the skill to build and troubleshoot digital circuits.	1, 5, 11	U, R, An, Ap, C

**Course Title: Art of Programming**  
**Course Code: SITS0104**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understand the methodology to be applied to find solutions to a problem.	2, 3, 4	U, R, An, Ap, C
CO 2	Formulate algorithms for simple and complex programs.	2, 3, 4	U, R, An, Ap, C
CO 3	Write C programs to implement the algorithms.	2, 3, 4	U, R, An, Ap, C
CO 4	Understand memory management at a basic level with the help of data types.	2, 3, 4	U, R, An, Ap, C



**Course Title: Data Communication and Network Standards**  
**Course Code: SITS0105**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understand the basics of networking (from understanding what is data, and how we can transfer data from source to destination using various protocols for data transmission).	2, 3, 4, 5	U, R, Ap, An
CO 2	Learn about various protocols used in communication.	2, 3, 4, 5	U, R, Ap, An
CO 3	Know various types of data signals, modes of transmission, switching, routing, information encoding, IPV4 and IPV6 protocols, conversion from analog to digital or vice versa.	2, 3, 4, 5	U, R, Ap, An
CO 4	Design a computer network.	2, 3, 4, 5	U, R, Ap, An

**Course Title: The Art of Programming and Digital Electronics**  
**Course Code: SITS01PR**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Write basic programs, debug errors and troubleshoot; map algorithms to programs.	2, 3
CO 2	Provide a meaningful interaction with the program user and generate a useful output.	6, 7



## Semester II

**Course Title: Computer Graphics**

**Course Code: SITS0201**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understand and analyse the basic graphics algorithms for drawing geometric objects.	1, 2, 3, 4, 6	U, R, An, Ap, C
CO 2	Recognize the coordinate elements to display graphic images to given specifications.	1, 2, 3, 4, 6	U, R, An, Ap, C
CO 3	Gain understanding of surfaces and filling attributes for different geometric objects.	1, 2, 3, 4, 6	U, R, An, Ap, C
CO 4	Understand 2D transformations and apply graphic transformations using a programming language.	1, 2, 3, 4, 6	U, R, An, Ap, C
CO 5	Explore different graphic programming languages to build a meaningful animation/game.	1, 2, 3, 4, 6	U, R, An, Ap, C
CO 6	Do illustration of clipping.	1, 2, 3, 4, 6	U, R, An, Ap, C
CO 7	Understand the concepts of 3D graphics.	1, 2, 3, 4, 6	U, R, An, Ap, C

**Course Title: Applied Mathematics – II**

**Course Code: SITS0202**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Logically analyse concepts of complex variable functions and evaluate integrals by Cauchy's integral formula and Cauchy's residue theorem.	9, 11	An, Ap, E
CO 2	Understand properties of Laplace Transform to solve differential equations.	9, 11	An, Ap, E
CO 3	Evaluate integrals by Gamma and Beta functions and differentiation under integral sign.	9, 11	An, Ap, E
CO 4	Apply various tests like Comparison test and its limit form, Condensation test, Leibnitz test, Ratio test, Root test to check convergence of given infinite series.	9, 11	An, Ap, E
CO 5	Write algorithms and draw flow charts of these concepts/methods for skill development and creativity.	9, 11	An, Ap, E



**Course Title: Microprocessor and Microcontroller**  
**Course Code: SITS0203**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Apply digital electronics in microprocessors.	1, 5	U, R, An, Ap, C
CO 2	Understand detailed structure of microprocessor.	1, 5	U, R, An, Ap, C
CO 3	Learn to program the microprocessor.	1, 5	U, R, An, Ap, C
CO 4	Have detailed knowledge of microcontroller.	1, 5	U, R, An, Ap, C
CO 5	Program the microcontroller ports.	1, 5	U, R, An, Ap, C

**Course Title: Descriptive Statistics**  
**Course Code: SITS0204**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understand the basic concepts of statistics in order to apply in data analytics.	2	U, Ap, An, E
CO 2	Understand the concept of statistical survey and collection of data.	2	U, Ap, An, E
CO 3	Understand basic concepts of measures of central tendency.	2	U, Ap, An, E
CO 4	Understand basic concepts of measures of dispersion and skewness.	2	U, Ap, An, E



**Course Title: Programming in C++**  
**Course Code: SITS0205**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Learn from the basic programming concept what is a variable, and how to declare a variable to complex programming concepts such as loops, arrays, pointers, functions, classes, objects, encapsulation and inheritance.	2, 3, 4, 5, 6	U, R, An, Ap, C
CO 2	Create programming modules using the principles of OOPs, and design a working software product using the same.	2, 3, 4, 5, 6	U, R, An, Ap, C
CO 3	Acquire the skill of C++ programming.	2, 3, 4, 5, 6	U, R, An, Ap, C
CO 4	Acquire the skill of analyzing the problem statement.	2, 3, 4, 5, 6	U, R, An, Ap, C

**Course Title: Introduction to C++ Programing, Computer Graphics, Microprocessors and Controllers**  
**Course Code: SITS02PR**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Analyze the problem statement/ case studies; write programs using the principle of OOPS; implement basic computer graphics algorithms.	2, 3, 4
CO 2	Program the microprocessor and the microcontroller ports.	5, 6



### Semester III

**Course Title: Discrete Mathematics**

**Course Code: SITS0301**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Develop the skill of logical reasoning.	2	U, Ap, An, E
CO 2	Develop the skill of data modelling.	2	U, Ap, An, E
CO 3	Understand the concept of graphs.	2	U, Ap, An, E
CO 4	Understand the concept of automaton.	2	U, Ap, An, E

**Course Title: Web Designing and Programming**

**Course Code: SITS0302**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understand the benefits of a website in different domains.	1, 2, 3, 4	U, R, An, Ap, C
CO 2	Understand the significance of making a website inclusive.	1, 2, 3, 4	U, R, An, Ap, C
CO 3	Utilise client-side scripting to make web pages interactive.	1, 2, 3, 4	U, R, An, Ap, C
CO 4	Design user interface with different elements that help ease in navigation.	1, 2, 3, 4	U, R, An, Ap, C
CO 5	Pass data between client and server.	1, 2, 3, 4	U, R, An, Ap, C
CO 6	Develop web pages with database.	1, 2, 3, 4	U, R, An, Ap, C
CO 7	Become web developers by building a group project.	1, 2, 3, 4	U, R, An, Ap, C





**Course Title: Database Management System and Concepts**  
**Course Code: SITS0303**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understanding the basic concepts of database systems.	2, 5, 8	U, Ap, An
CO 2	Acquire the skill of using MSSQL server.	2, 5, 8	U, Ap, An
CO 3	Acquire the skill of 'Oracle' programing.	2, 5, 8	U, Ap, An
CO 4	Acquire the skill of database programing.	2, 5, 8	U, Ap, An

**Course Title: OOPS with Java**  
**Course Code: SITS0304**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Learn Java language fundamentals.	1, 4, 6, 7	U, R, An, Ap, C
CO 2	Debug the errors.	1, 4, 6, 7	U, R, An, Ap, C
CO 3	Apply the fundamentals learnt.	1, 4, 6, 7	U, R, An, Ap, C
CO 4	Carry out assignments.	1, 4, 6, 7	U, R, An, Ap, C

**Course Title: Embedded Systems**  
**Course Code: SITS0305**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understand the basic architecture and various hardware components of 8051 microcontroller; build an embedded system based on the 8051 microcontroller family.	2, 4, 5, 6	U, R, An, Ap, C
CO 2	Design an embedded system to perform a particular task.	2, 4, 5, 6	U, R, An, Ap, C
CO 3	Design IOT devices.	2, 4, 5, 6	U, R, An, Ap, C
CO 4	Design newer circuits with machine-critical systems.	2, 4, 5, 6	U, R, An, Ap, C



**Course Title: Database Systems and Embedded System**  
**Course Code: SITS03PR1**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Design an embedded system to perform a particular task.	2, 4
CO 2	Acquire the skill of database programming using MS SQL Server and Oracle.	5, 6, 8

**Course Title: OOPS with Java and Web Designing**  
**Course Code: SITS03PR2**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Design a website keeping aesthetics in mind.	2, 4
CO 2	Develop the skill of Java programming.	5, 6



### Semester IV

#### Course Title: Software Engineering

Course Code: SITS0401

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Define software, understand the nature of software, software process and software engineering in practice; understand and compare various process models.	2, 3, 4, 6, 7	U, An, Ap, C
CO 2	Discuss the requirements, analyse and design the various requirement models.	2, 3, 4, 6, 7	U, An, Ap, C
CO 3	Understand quality concepts, software quality assurance, tasks; understand the strategies and types of testing.	2, 3, 4, 6, 7	U, An, Ap, C
CO 4	Analyse various object-oriented methodologies and UML.	2, 3, 4, 6, 7	U, An, Ap, C

#### Course Title: Modern Operating System

Course Code: SITS0402

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understand the mechanism involved in building an operating system, and understanding the fundamentals of modern operating system.	2, 4, 5, 6	U, R, An, Ap
CO 2	Learn types of resource management, resource utilisation and resource allocation done by the operating system on resources such as processor, memory, disk, files etc.	2, 4, 5, 6	U, R, An, Ap
CO 3	Get an exposure to distributed operating system and types of distributed systems.	2, 4, 5, 6	U, R, An, Ap
CO 4	Work on linux operating system through console programming.	2, 4, 5, 6	U, R, An, Ap



**Course Title: Mobile Application Development**  
**Course Code: SITS0403**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understand the market value and importance of android OS and the need of inclusive applications.	1, 2, 4, 6	U, An, Ap, C
CO 2	Understand the contribution of the android development tools to application development.	1, 2, 4, 6	U, An, Ap, C
CO 3	Utilise android lifecycle in programs.	1, 2, 4, 6	U, An, Ap, C
CO 4	Design user interface with different layouts and fragments.	1, 2, 4, 6	U, An, Ap, C
CO 5	Pass data between activities/applications with implicit and explicit intents.	1, 2, 4, 6	U, An, Ap, C
CO 6	Develop applications with database and map concepts.	1, 2, 4, 6	U, An, Ap, C
CO 7	Become android developers by building a group project.	1, 2, 4, 6	U, An, Ap, C

**Course Title: Data Structure with Java**  
**Course Code: SITS0404**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understand the role of complexity in developing application.	1, 5, 6, 7	U, An, Ap, C
CO 2	Understand various sorting algorithms.	1, 5, 6, 7	U, An, Ap, C
CO 3	Learn linked list and trees, and its application.	1, 5, 6, 7	U, An, Ap, C
CO 4	Apply the various sorting algorithms.	1, 5, 6, 7	U, An, Ap, C



**Course Title: Statistical Techniques and Operation Research**  
**Course Code: SITS0405**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Develop the skill of optimization.	2	U, Ap, An
CO 2	Understanding the basic concepts of statistics in order to apply in data analytics.	2	U, Ap, An
CO 3	Understand the concept of theoretical distribution.	2	U, Ap, An
CO 4	Acquire the skill of linear programming.	2	U, Ap, An

**Course Title: MOS and Mobile Application Development**  
**Course Code: SITS04PR1**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Develop the skill of android programming with SQLite database.	2, 4
CO 2	Work on linux operating system through console programming.	5, 6

**Course Title: Statistics and Data Structures**  
**Course Code: SITS04PR2**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Learn application of Data Structure.	3
CO 2	Acquire the skill of R programming.	10



### Semester V

#### Course Title: Network Security and Internet Technology

Course Code: SITS0501

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Decipher various ciphers, cryptography techniques, cryptic algorithms, digital signature etc.	2, 3, 4, 5, 6	U, R, An, Ap
CO 2	Understand about the various threats on the internet that the network can be vulnerable to, along with the security measures taken to combat the same.	2, 3, 4, 5, 6	U, R, An, Ap
CO 3	Have in-depth knowledge about antiviruse programs, firewalls, IDS, security of emails via SMIME and PGP.	2, 3, 4, 5, 6	U, R, An, Ap
CO 4	Have a knowledge of socket programming and the technique of accessing remote objects through RMI.	2, 3, 4, 5, 6	U, R, An, Ap

#### Course Title: C# and ASP.net

Course Code: SITS0502

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Learn language fundamentals.	1, 2, 4, 7	U, Ap, An, C
CO 2	Solve real time problems using technology.	1, 2, 4, 7	U, Ap, An, C
CO 3	Develop the skill of creating reports using crystal reports.	1, 2, 4, 7	U, Ap, An, C
CO 4	Carry out assignments.	1, 2, 4, 7	U, Ap, An, C



**Course Title: Data Warehousing and Data Mining**  
**Course Code: SITS0503**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understand the basic concepts of data warehousing.	2, 9	U, Ap, An, E
CO 2	Develop the skill of data modelling.	2, 9	U, Ap, An, E
CO 3	Develop the skill of developing predicting model.	2, 9	U, Ap, An, E
CO 4	Acquire the skill of clustering model in real life.	2, 9	U, Ap, An, E

**Course Title: E-Commerce And ERP**  
**Course Code: SITS0504**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understand how the e-commerce transaction is done.	1, 2, 3, 4	R, U, An, Ap
CO 2	Understand the components of e-commerce.	1, 2, 3, 4	R, U, An, Ap
CO 3	Understand the principles of ERP.	1, 2, 3, 4	R, U, An, Ap
CO 4	Understand various business models.	1, 2, 3, 4	R, U, An, Ap

**Course Title: Introduction to Artificial Intelligence**  
**Course Code: SITS0505**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Have a basic exposure to the field of artificial intelligence.	1, 2, 7	U, An, Ap, C
CO 2	Understand the underlying concepts employed in currently used artificial intelligence applications.	1, 2, 7	U, An, Ap, C
CO 3	Acquire the skill of Python programming.	1, 2, 7	U, An, Ap, C
CO 4	Acquire the basic skills of machine learning.	1, 2, 7	U, An, Ap, C



**Course Title: C# and ASP.net and Introduction to Artificial Intelligence**  
**Course Code: SITS05PR1**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Implement artificial intelligence concepts using Python or any other suitable programming language.	2, 5, 6
CO 2	Acquire the skill of C# and Asp.net programming.	7

**Course Title: Network Security and Data warehousing**  
**Course Code: SITS05PR2**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Understand data mining classification, data mining clustering and data mining association rule generation.	2, 4, 9
CO 2	Use the techniques to protect the network from various attacks on the internet.	5





## Semester VI

### Course Title: Big Data and Cloud Computing

Course Code: SITS0601

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understand the basic concepts of 'big data'.	2, 5, 6, 8, 9	U, Ap, An
CO 2	Understand big data technologies.	2, 5, 6, 8, 9	U, Ap, An
CO 3	Understand the fundamentals of cloud computing, various architectures and applications that implement cloud computing.	2, 5, 6, 8, 9	U, Ap, An
CO 4	Understand the concept of virtualization and be able to use virtualized environments to host applications.	2, 5, 6, 8, 9	U, Ap, An
CO 5	Understand cloud storage, hosting and security features.	2, 5, 6, 8, 9	U, Ap, An

### Course Title: Image Processing and Deep Learning

Course Code: SITS0602

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Solve real life problems which cannot be solved by pure programming alone.	1, 2, 3, 6	U, An, Ap, C
CO 2	Apply advanced neural network architectures to unstructured data.	1, 2, 3, 6	U, An, Ap, C
CO 3	Understand the importance of image processing.	1, 2, 3, 6	U, An, Ap, C
CO 4	Understand signal processing and its importance.	1, 2, 3, 6	U, An, Ap, C



**Course Title: Advanced Java**  
**Course Code: SITS0603**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Apply the java skills learnt.	1, 5, 6, 7	U, An, Ap
CO 2	Grasp the advanced feature of language.	1, 5, 6, 7	U, An, Ap
CO 3	Understand why Java used as middleware.	1, 5, 6, 7	U, An, Ap
CO 4	Learn new technologies like 'spring' and 'hibernate.'	1, 5, 6, 7	U, An, Ap

**Course Title: Software Testing**  
**Course Code: SITS0604**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Develop the skill of software testing.	5, 6, 7	U, Ap, An
CO 2	Develop the skill of analysing and deciding which testing technique to use for the project undertaken.	5, 6, 7	U, Ap, An
CO 3	Learn advanced concepts of black box testing.	5, 6, 7	U, Ap, An
CO 4	Learn advanced concepts of white box testing.	5, 6, 7	U, Ap, An

**Course Title: Project, Scientific Communication Skills**  
**Course Code: SITS0605**

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understand different phases of software development life cycle.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	U, An, Ap, C, E
CO 2	Solve real-life problem.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	U, An, Ap, C, E
CO 3	Acquire the skill of software testing.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	U, An, Ap, C, E
CO 4	Acquire the skill of software engineering.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	U, An, Ap, C, E



**Course Title: Big Data Visualization and Advance Java**

**Course Code: SITS06PR**

<b>Sr. No.</b>	<b>On completing the course, the student will be able to:</b>	<b>PSOs addressed</b>
CO 1	Apply Java skills to solve programming problems.	10
CO 2	Acquire the skill of using Tableau, Mongoddb and R.	1, 4