P.E. Society's Modern College of Arts, Science & Commerce
(Autonomous) Ganeshkhind, Pune-16.

Three Year B.Sc. Degree Program in Computer Science

(Faculty of Science & Technology)

S.Y.B.Sc. (Computer Science)

Choice Based Credit System Syllabus To be implemented as per NEP-2023 from Academic Year 2024-2025

Title of the Course: B. Sc. (Computer Science)
Preamble:

The B. Sc. (Computer Science) course is a systematically designed three year degree program under the faculty of Science and Technology. The objective of the course is to prepare students to java undertake careers involving problem solving using computer science and technologies, or to pursue advanced studies and research in computer science. The syllabus which comprises Computer Science subject along with that of the three allied subjects (Mathematics, Electronics and Statistics) covers the foundational aspects of computing sciences and also develops the requisite professional skills and problem solving abilities using computing sciences.

Introduction:
At the first year of under-graduation, the basic foundations of two important skills required for software development are laid. A course in problem solving and programming along with a course in database fundamentals forms the preliminary skill set for solving computational problems. The practical courses are designed to supplement the theoretical training in the year. Along with Computer Science, the two theoretical and one practical course each in Statistics, Mathematics and Electronics help in building a strong foundation. Career Advancement courses are introduced in both semesters to cover additional areas of Computer Science.

At the second year of under-graduation, computational problem solving skills are further strengthened by a course in Data structures. Software engineering concepts that are required for project design are also introduced. Essential concepts of computer networking are also introduced this year. The practical course included in both semesters complements the theory courses.

At the third year of under-graduation, all the subjects are designed to fulfill core Computer Science requirements as well as meet the needs of the software industry. Theory courses are adequately supplemented by hands-on practical courses. Skill Enhancement courses enable the students to acquire additional value-added skills.

Objectives:

- To develop problem solving abilities using a computer.
- To build the necessary skill set and analytical abilities for developing computer based solutions for real life problems.
- To train students in professional skills related to the Software Industry.
- To prepare the necessary knowledge base for research and development in Computer Science.
- To help students build-up a successful career in Computer Science and to produce entrepreneurs who can innovate and develop software products.

Semester -III S.Y. BSc (Computer Science)						
Course Code	Course Title	Credits		Evaluation		
		TH	PR	CIE	ESE	Total
COM23101	Object Oriented programming using C++	4	-	40	60	100
COM23102	Data Communication & Computer Networks	2	-	20	30	50
COM23103	Object Oriented using C++ Practical	-	2	20	30	50
COM23405	Software Engineering	2	-	20	30	50
COM23606	Field Project	-	2	20	30	50
CELE 23201	Digital Communication	2	-	20	30	50
CELE 23202	Practicals on Communication & Networking	-	2	20	30	50
OE	From Arts/Commerce Baskets	2	-	20	30	50
	English	2	-	20	30	50
	NSS/NCC/Health & Wellness	2	-	20	30	50
Total		16	6	220	330	550

Semester -IV S.Y. BSc (Computer Science)						
Course Code	Course Title	Credits		Evaluation		
		TH	PR	CIE	ESE	Total
COM24101	Object Oriented Programming Using Java	2	-	40	60	100
COM24102	Internet Technologies- (HTML & CSS & PHP)	2	-	20	30	50
COM24103	JAVA Lab	-	2	20	30	50
COM24605	Community Engagement Project	-	2	20	30	50
CELE 24201	System on Chip Programming	2	-	20	30	50
CELE 24202	Practicals on Raspberry Pi	-	2	20	30	50
OE	From Arts / Commerce Basket	-	2	20	30	50
CMAT24401	Mathematical Techniques using Python	2	-	20	30	50
	English	2	-	20	30	50
	NSS/NCC/Health & Wellness	2	-	20	30	50
	Total	18	4	220	330	550

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 S.Y.B.Sc. (Computer Science) Semester- III		
Course Code : **COM23101**	**Course Name : Object Oriented Programming using C++**	**Total Lectures :** **(60 Hours)**
Teaching Scheme : **4 hrs/week**	**Examination Scheme :** **CIE : 40 Marks** **ESE : 60 Marks**	**No. of Credits :** **4**
Course Prerequisites :	**Student should have basic knowledge of :** ● Knowledge of C Programming Language.	
Course Objectives :	● Acquire an understanding of basic object oriented concepts and the issues involved in effective class design. ● Write C++ programs that use object oriented concepts such as information hiding, constructors, destructors, inheritance etc.	
Course Outcomes :	**After successfully completing this course, students will be able to :** ● To learn the syntax and semantics of the C++ programming language. ● To learn how to design C++ classes for code reuse. ● To learn how to implement copy constructors and class member functions. ● To understand the concept of data abstraction and encapsulation.	
Chapter	**Course Contents**	**No. of Lectures**
1	**Introduction** ● Object oriented concepts. ● Features, advantages and Applications of OOPS. ● Data types, new operators and keywords, using namespace concepts. ● Introduction to Reference variables, Managing console I/O ● Usage of 'this' pointer. ● Classes, Objects and C++ stream classes. ● Access specifiers and manipulators. ● Defining Data members and Member functions. ● Array of objects	12
2	**Function in C++** ● Call by reference, Return by reference ● Function overloading and default arguments ● Inline function ● Static class members ● Friend Concept – Function, Class	12
3	**Constructors and Destructor** ● Types of constructors ● Memory allocation (new and delete) ● Destructor	5

4	**Operator Overloading** ● Overloading Relational and Arithmetic operators ● Overloading using friend function & Member Function ● Overloading insertion and extraction operator	5
5	**Inheritance** ● Types of inheritance with examples ● Constructors and destructor in derived classes ● Virtual base classes, Virtual functions and Pure virtual function ● Abstract base classes	8
6	**Working with files** ● File operations – Text files, Binary files ● File stream class and methods ● File updation with random access	8
7	**Templates** ● Introduction to templates ● Class templates, function templates and overloading of function templates ● Templates with multiple parameters	6
8	**Exception Handling in C++** ● try, catch and throw primitives ● types of exception with examples	4

Sr. No.	Title of the Book	Author/s	Publication
1	Object Oriented Programming with C++	E. Balagurusamy	
2	Object Oriented Programming with C++	Robert Lafore	
3	Object Oriented Modeling and Design	James Rumbough	
4	The Complete Reference C++	Herbert Schildt	
5	Let us C++ by	Yashwant Kanitkar	
6	Mastering C++	Venugopal, T Ravishankar, Rajkumar	THM Publication
7	Trouble free C++	Hari Mohan Pandey	ANE Publication

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 S.Y.B.Sc. (Computer Science) Year- II Semester- III		
Course Code: **COM23102**	**Course Name:Data Communication & Computer Networks**	**Total Lectures:** **30 Hours**
Teaching Scheme: **2 hrs/week**	**Examination Scheme:** **CIE: 20 Marks** **ESE: 30 Marks**	**No. of Credits:** **2**
Course Prerequisites:	**Student should have basic knowledge of:** ● Principles of Digital ● Electronics Communication Principles	
Course Objectives:	● To prepare students with basic networking concepts: data communication, protocols and standards, various topologies and applications of networks.	
Course Outcomes:	● Have a good understanding of the OSI and TCP/IP Reference Models and in particular have a good knowledge of Layers. ● Understand the working of various protocols. ● Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies	
Chapter	**Course Contents**	**No. of Lectures**
1	**Introduction to Networks and Network Models** ● Data communication, components, data representation ● Networks, network criteria, network types - LAN, WAN, Switching, The Internet, Accessing the Internet ● Network Software- Protocol hierarchies, Design Issues of the layer, Connection Oriented and Connectionless Services, ● Reference models - OSI Reference Models, TCP/IP Reference model, Connection devices in different layers, Comparison of OSI and TCP/IP Reference Models	4
2	**Lower Layers** ● Communication at the physical layer, data rate limits - Noiseless channel (Nyquist bit rate), noisy channel (Shannon capacity), Performance - bandwidth, throughput, latency, bandwidth-delay product, jitter ● Design issues of Data Link Layer, Services - Framing, flow control, error control, congestion control, Link layer addressing	8

	• Framing Methods - Character Count, Flag bytes with Byte Stuffing, Flags bits with Bit Stuffing, Physical Layer Coding Violations • The Channel allocation problem, Static and dynamic allocation, Media Access Methods - Taxonomy of multiple-access protocols • Switching and TCP/IP layers, Types - circuit switching, packet switching and message switching • Wired LANs - Standard Ethernet characteristics, Addressing, Access method, implementation, Fast and Gigabit Ethernet • Wireless LANs - Architectural comparison, Characteristics, Access control, IEEE 802.11architecture, Physical layer, MAC sublayer, Bluetooth architecture, Layers	
3	**Network Layer** • Network layer services - Packetizing, Routing and forwarding, other services • Open and closed loop congestion control • IPv4 addressing- Address space, classful addressing, Subnetting, Supernetting, classless addressing, Network address resolution (NAT) • Forwarding of IP packets- based on destination address, based on label • Network Layer Protocols- Internet Protocol (IP), IPv4 datagram format, Fragmentation, options • Mobile IP-addressing, agents, Three phases • Next Generation IP- IPv6 address representation, address space, address types, IPv6 protocol, packet format, extension header, Difference between IPv4 and IPv6 • Routing - General idea, Algorithms - Distance vector routing, link state routing, path- vector routing	10
4	**Transport Layer** • Transport layer Services- Process-to-process communication, Addressing, Encapsulation and decapsulation, Multiplexing and demultiplexing, Flow control, Pushing or pulling, Flow control, Buffers, Sequence numbers, Acknowledgements, sliding window, congestion control • Connectionless and Connection-oriented service, Port numbers • Transport layer protocols- User datagram protocol, user datagram, UDP services • Transmission Control Protocol - TCP Services, TCP Features, TCP Segment format, three-way handshake for connection establishment and termination, State transition diagram, windows in TCP.	8

Sr. No.	Title of the Book	Author/s	Publication

1	Computer Networks	Andrew S. Tanenbaum	5th Edition, Pearson Education
2	Data Communication and Networking	Behrouz Fourouzan,	5th Edition, McGraw Hill Pvt. Ltd.

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 S.Y.B.Sc. (Computer Science) Semester- III		
Course Code : COM23103	**Course Name : Object Oriented Programming using C++ Practical**	**Total Practicals : (30 Hours)**
Teaching Scheme : 4 hrs/week	**Examination Scheme : CIE : 20 Marks ESE : 30 Marks**	**No. of Credits : 2**
Course Prerequisites :	**Student should have basic knowledge of :** ● Knowledge of C Programming Language.	
Course Objectives :	● Acquire an understanding of basic object-oriented concepts and the issues involved in effective class design. ● Write C++ programs that use object-oriented concepts such as information hiding, constructors, destructors, inheritance etc.	
Course Outcomes :	After successfully completing this course, students will be able to: ● To learn the syntax and semantics of the C++ programming language. ● To learn how to design C++ classes for code reuse. ● To learn how to implement copy constructors and class member functions. ● To understand the concept of data abstraction and encapsulation.	
Sr. No.	**Assignments**	
1	Class , Object and Methods Implementation.	
2	Constructor : Copy Constructor, Default Constructor, Parameterized Constructor.	
3	Memory Allocation : new and delete operators , dynamic constructor.	
4	Inline function, friend function, default argument.	
5	Function Overloading.	
6	Operator Overloading.	
7	Inheritance: Single, Multiple, Multilevel, Hierarchy.	

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 S.Y.B.Sc. (Computer Science) Year- II Semester- III		
Course Code: COM23405	**Course Name: Software Engineering**	**Total Lectures: 30 Hours**
Teaching Scheme: 2 hrs/week	**Examination Scheme:** **CIE: 20 Marks** **ESE: 30 Marks**	**No. of Credits: 2**
Course Prerequisites :	**Student should have basic knowledge of:** ● ER Modeling	
Course Objectives:	● To get knowledge and understanding of software engineering discipline. ● To learn analysis and design principles for software project development.	
Course Outcomes:	On completion of the course, student will be able to- ● Compare and choose a process model for a software project development. ● Identify requirements, analyze and prepare models. ● Prepare the SRS, Design document, Project plan of a given software system	
Chapter	**Course Contents**	**No. of Lectures**
1	**Introduction To Software Engineering and Process Models** ● Definition of Software ● Nature of Software Engineering ● Changing nature of software ● Software Process ○ The Process Framework ○ Umbrella Activities ○ Process Adaptation ● Generic Process Model ● Prescriptive Process Models ○ The Waterfall Model ○ Incremental Process Models ○ Evolutionary Process Models ○ Concurrent Models ○ The Unified Process	8
2	**Agile Development** ● What is Agility? ● Agile Process ● Agility Principle ● The Politics Of Agile Development ● Human Factors ● Extreme Programming(XP)	5

	• XP Values • XP Process • Industrial XP • Adaptive Software Development(ASD) • Scrum • Dynamic System Development Model (DSDM) • Agile Unified Process (AUP)	
3	**Requirements Analysis** • Requirement Elicitation • Software Requirement Specification(SRS) • Developing Use Cases (UML) • Building the Analysis Model • Elements of the Analysis Model • Analysis Pattern • Agile Requirement Engineering • Negotiating Requirements • Validating Requirements	7
4	**Requirements Modeling** • Introduction to UML • Structural Modeling • Use case model • Class model • Behavioral Modeling • Sequence model • Activity model • Communication or Collaboration model • Architectural Modeling • Component model • Artifact model • Deployment model	10

Sr. No.	Title of the Book	Author/s	Publication
1	Software Engineering : A Practitioner's Approach	Roger S. Pressman, McGraw hill(Eighth Edition	ISBN-13: 978-0-07-802212-8, ISBN-10: -07-802212-6
2	The Unified Modeling Language Reference Manual	James Rambaugh, Ivar Jacobson, Grady Booch	ISBN 0-201-30998-X

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 S.Y.B.Sc. (Computer Science) Semester- III		
Course Code : **COM23606**	**Course Name : Field Project**	**Total Lectures :** **(30 Hours)**
Teaching Scheme : **4 hrs/week**	**Examination Scheme :** **CIE : 20 Marks** **ESE : 30 Marks**	**No. of Credits :** **2**
Course Prerequisites :	**Student should have basic knowledge of :** ● programming languages like Python or R, data analysis libraries, and data visualization tools. ● data cleaning and preprocessing.	
Course Objectives :	● To get knowledge of data collection and preparation. ● To understand data exploration and descriptive analysis. ● To learn how to design data using visualization tools. ● To get knowledge of data reporting and presentation. ● To learn how to implement and deploy the model.	
Course Outcomes :	**After successfully completing this course, students will be able to :** ● discover valuable insights and make informed decisions, solve problems, or optimize processes. ● make the data more understandable and accessible using visual representations of data, such as charts, graphs, and dashboards. ● generate reports by communicating the results to stakeholders, management, or clients.	
Chapter	**List of Assignments**	
1	Assignment on Excel - I	
2	Assignment on Excel - II	
3	Assignment on SQL - I	
4	Assignment on SQL - II	
5	Assignment on Python - I	
6	Assignment on Python - II	
7	Assignment on Visualization Tool (Power BI/Tableau) - I	
8	Assignment on Visualization Tool (Power BI/Tableau) - II	
9	Case Study - I	
10	Case Study - II	

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 S.Y.B.Sc. (Computer Science) Semester- IV		
Course Code : **COM24101**	**Course Name : Object Oriented Programming Using Java**	**Total Lectures :** **(30 Hours)**
Teaching Scheme : **2 hrs/week**	**Examination Scheme :** **CIE : 20 Marks** **ESE : 30 Marks**	**No. of Credits :** **2**
Course Prerequisites :	**Student should have basic knowledge of :** ● Knowledge of C, CPP Programming language.	
Course Objectives :	● To learn Object Oriented Programming language ● To study various java programming concepts like Interface, File and Exception Handling etc.	
Course Outcomes :	**After successfully completing this course, students will be able to :** ● Understand the concept of classes, objects, packages and Collections.	
Chapter	**Course Contents**	**No. of Lectures**
1	**Introduction** ● Object Oriented Programming Concepts ● A short history of Java Features OR Buzzwords of Java ● Java Environment ● Simple Java Program Java Tools – jdb, javap, javadoc ● Types of Comments ● Data Types ● Final Variable ● Declaring 1D, 2D Array ● Accepting Input (Command Line Arguments, BufferedReader, Scanner)	6
2	**Objects and Classes** ● Defining your own classes ● Access Specifiers (public, protected, private, default) ● Array of Objects ● Constructors, Overloading Constructors and Use of 'this' keyword ● static block, static fields And methods ● Predefined Classes o Object Class, Methods (equals(), toString(),hashcode(), getClass())	7

	○ String Class And StringBuffer Class,Formatting String data using format() method ● Creating , Accessing And Using Packages Wrapper Classes	
3	**Inheritance and Interface** ● Inheritance Basics (extends Keyword) and Types of Inheritance ● Superclass, Subclass and use of Super Keyword ● Method Overriding and runtime polymorphism ● Use of final keyword related to method and class ● Use of abstract class and abstract methods ● Defining and Implementing Interfaces ● Runtime polymorphism using interface ● Concept of Marker and Functional Interfaces	6
4	**Exception and File Handling** ● Dealing with errors ● Exception class ● Checked And Unchecked Exception ● Catching Exceptions ● Multiple Catch Block and Nested try block ● Creating User Defined Exception	6
5	**File Handling** ● Introduction to Files And Streams ● Input-OutputStream : FileInput/OutputStream, BufferedInput/OutputStream, DataInput/OutputStream ● Reader-Writer : FileReader/Writer, BufferedReader/Writer, InputStreamReader, OutputStreamWriter	5

Sr. No.	Title of the Book	Author/s
1	Complete reference Java	Herbert Schildt(5th edition)
2	. Java 2 programming black books	Steven Horlzner
3	Programming with Java , A primer , Fourth Edition	E. Balagurusamy
4	Core Java Volume-I-Fundamentals, Eighth Edition	Cay S. Horstmann, Gary Cornell, Prentice Hall, Sun Microsystems Pres

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 S.Y. B.Sc. (Computer Science) Sem - IV		
Course Code:	**Course Name: Optimization Techniques**	**Total Lectures: 30 Hours**
Teaching Scheme: 2 hrs/week	**Examination Scheme: CIE: 20 Marks ESE: 30 Marks**	**No. of Credits: 2**
Course Prerequisites:	**Student should have basic knowledge** of: • basic knowledge of linear algebra & vector calculus and ordinary differential equations. • Familiarity with numerical computing	
Course Objectives:	**To Prepare student to think about** • Introduction to optimization techniques using both linear and non-linear programming.	
Course Outcomes:	**After successfully completing this course, students will be able to:** • understand minima/maxima problems in the optimization framework. • Learn efficient computational procedures to solve optimization problems	
Chapter	**Course Contents**	**No. of Lectures**
1	**Mathematical preliminaries** • Linear algebra and matrices • Vector space, eigen analysis • Elements of probability theory • Elementary multivariable calculus	6
2	**Linear Programming** • Introduction to linear programming model • Simplex method • Duality • Karmarkar's method	8
3	**Dual problems** • Relation between primal and dual problems – Dual simplex method	8
4	**Transportation model** • Starting solutions. North West corner Rule • lowest cost method -Vogel's approximation method • Transportation algorithms –Assignment problem	8

	● Hungarian Method.	

References:

Sr. No.	Title of the Book	Author/s	Publication
1	An introduction to Optimization	Edwin P K Chong, Stainslaw Zak	Willey
2	Nonlinear Programming	Dimitri Bertsekas	Athena Scientific

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 S.Y.B.Sc. (Computer Science) Semester- IV		
Course Code : **NP23-CS-222**	**Course Name : Internet Technologies- (HTML & CSS & PHP)**	**Total Lectures :** **(30 Hours)**
Teaching Scheme : **2 hrs/week**	**Examination Scheme :** **CIE : 20 Marks** **ESE : 30 Marks**	**No. of Credits :** **2**
Course Prerequisites :	**Student should have basic knowledge of :** ● HTML basics for form designing	
Course Objectives :	● To Design dynamic and interactive Web pages. ● To Learn Core-PHP, Server Side Scripting Language ● To Learn PHP-Database handling	
Course Outcomes :	**After successfully completing this course, students will be able to :** ● On completion of the course, student will be able to– Understand how to develop dynamic and interactive Web Page	
Chapter	**Course Contents**	**No. of Lectures**
1	**Web Design Principles** ● Basic principles involved in developing a web site, planning process, Five Golden rules of web, ● designing, Designing navigation bar, Page design, Home Page Layout, Design Concept. Basics ni ● Web Design: Brief History of Internet, What is World Wide Web, Why create a website, Web Standards.	2
2	**Introduction to HTML** ● What is HTML, ● HTML Documents, ● Basic structure of an HTML document, ● creating an HTML document, ● Markup Tags, HeadingParagraphs, Line Breaks, and HTML Tags	10
3	**Elements of HTML** ● Introduction to elements of HTML, ● HTML Tags and Attributes like Text, Lists, Tables and Frames, Hyperlinks, Images and Multimedia, ● Forms and controls.	8
4	**CSS** ● CSS colors, backgrounds, borders, margins, padding, ● height, width, box model, outline, text, ● fonts, icons, links, lists, tables	3
5	**Introduction to PHP** ● Defining and calling a function ● Default parameters ● Variable parameters, Missing parameters ● Variable function, Anonymous function ● Types of strings in PHP ● Printing functions ● Encoding and escaping ● Comparing strings	7

	● Manipulating and searching strings ● Regular expressions	

Sr. No.	Title of the Book	Author/s	Publication
1	HTML, XHTML and CSS Bible (5th Edn.)	Steven M. Schafer	Wiley India
2	Beginning HTML, XHTML, CSS	John Duckett	Wiley India
3	HTML and CSS the complete reference	Thomas Powell	-
4	Programming PHP	By Rasmus Lerdorf and Kevin Tatroe,	O'Reilly publication
5	Beginning PHP 5	-	Wrox publication

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 S.Y.B.Sc. (Computer Science) Semester- IV		
Course Code : **COM24103**	**Course Name : Lab on JAVA & PHP**	**Total Practical:** **(30 Hours)**
Teaching Scheme : **4 hrs/week**	**Examination Scheme :** **CIE : 20 Marks** **ESE : 30 Marks**	**No. of Credits :** **2**
Course Prerequisites :	**Student should have basic knowledge of :** ● Knowledge of C,CPP Programming Language.	
Course Objectives :	● Bringing uniformity in the way courses are conducted across different colleges. ● Continuous assessment of the students.	
Course Outcomes :	After successfully completing this course, students will be able to: ● Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs. ● Read and make elementary modifications to Java programs that solve real-world problems. ● Validate input in a Java program.	
Sr. No.	**Assignments**	
1	**Java Tools and IDE, Simple java programs** ● Introduction to the java environment ● Use of java tools like java, javac, jdb and javadoc ● Defining simple classes and creating objects.	
2	**Array of Objects and Packages** ● Defining a class. ● Creating an array of objects. ● Creating a package.	
3	**Inheritance and Interfaces** : ● To implement inheritance in java. ● To define abstract classes. ● To define and use interfaces and Functional Interface.	
4	**Exception And File Handling** ● Demonstrate Exception Handling Mechanism in Java. ● Use of try, catch, throw, throws ,finally blocks ● Defining User defined Exception classes. ● Creation of files and demonstration of I-O operations	
5	**Assignment 5 :** HTML and HTML5	
6	**Assignment 6 :** CSS, Box Model, Navigation Bar	

7	**Assignment 7 :** Function and String
8	**Assignment 8 :** Arrays

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 S.Y.B.Sc. (Computer Science) Semester- IV		
Course Code : **COM24605**	**Course Name : Community Engagement Project**	**Total Lectures :** **(30 Hours)**
Teaching Scheme : **4 hrs/week**	**Examination Scheme :** **CIE : 20 Marks** **ESE : 30 Marks**	**No. of Credits :** **2**
Course Prerequisites :	**Student should have basic knowledge of :** ● Basic Knowledge of Software Engineering concepts, UML.	
Course Objectives :	● To build the proper format documentation of the project.	
Course Outcomes :	● Compare and choose a process model for a software project development. ● Identify requirements, analyze and prepare models. ● Prepare the SRS, Design document, Project plan of a given software system.	
Chapter	**List of Assignments**	
1	**Introduction** ● Motivation ● Problem statement ● Purpose/objective and goals ● Literature /Survey ● Project scope and limitations	
2	**System Analysis** ● Existing systems ● Scope and limitations of existing systems ● Project perspective, features ● Stakeholders ● Requirement analysis ● Functional requirements, performance requirements, security requirements etc.	
3	**System Design** ● Design constraints ● System Model: UML diagrams ● Data Model ● User interfaces	
4	**Implementation details** ● Software/hardware specifications	
5	**Outputs and Reports and Testing** Test Plan, Black Box Testing or Data Validation Test Cases, White Box Testing or Functional Validation Test cases and results	

6	**Conclusion and Recommendations Future Scope**
7	**Bibliography and References**