Re-Accredited 'B++' 2.86 CGPA by NAAC
VEER NARMAD SOUTH GUJARAT UNIVERSITY
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
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ક્રમાંક :ઓથો./પરિપત્ર/૧૨૨૬૨/૨૦૨૫
તા.૧૭/૦૫/૨૦૨૫

પ્રતિ,
વડાશ્રી,
જે.પી.દાવર ઈન્સ્ટીટયૂટ ઓફ ઈન્ફોર્મેશન
સાયન્સ એન્ડ ટેકનોલોજી,
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી,
સુરત.

વિષયઃ– B.Sc.(IT) Sem.-5 & 6 Major, Minor અને SEC નો અભ્યાસક્રમ અંગે.

સુજ્ઞશ્રી,

સવિનય જણાવવાનું કે, શૈક્ષણિક વર્ષ–૨૦૨૫–૨૬ થી અમલમાં આવનાર M.Sc.(IT)પાંચ વર્ષીય ઈન્ટીગ્રેટેડ અભ્યાસક્રમનાં B.Sc.(IT) Sem.-5 & 6 Major, Minor અને SEC નો પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ અભ્યાસક્રમ ઈન્ફોર્મેશન એન્ડ કોમ્યુનિકેશન ટેકનોલોજી વિષયની અભ્યાસ સમિતિના ચેરમેનશ્રીએ અભ્યાસ સમિતિવતી મંજૂર કરી કોમ્પ્યુટર સાયન્સ વિદ્યાશાખાને કરેલ ભલામણ સ્વીકારી કોમ્પ્યુટર સાયન્સ વિદ્યાશાખા તથા કોમ્પ્યુટર સાયન્સ વિષયની અભ્યાસ સમિતિની સંયુકત તા.૩૦/૦૪/૨૦૨૫ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૦ થી કરેલ ભલામણ સ્વીકારી એકેડેમિક કાઉન્સિલની તા.૦૫/૦૫/૨૦૨૫ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૫૫ થી મંજુર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

બિડાણઃ ઉપર મુજબ

કુલસચિવ વતી

પ્રતિ,
૧) ઈ.ચા.ડીનશ્રી, કોમ્પ્યુટર સાયન્સ વિદ્યાશાખા.
૨) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
.....તરફ જાણ તેમજ અમલ સારૂ.

Veer Narmad South Gujarat University, Surat

Program Structure: T. Y. B. Sc. (I. T.) / M. Sc. (I .T.) (SEM – 5 and SEM – 6)

(w.e.f. Academic Year June, 2025-2026)

Bachelor of Science in Information Technology (B. Sc. (I. T.)) – Three Year Program

Bachelor of Science in Information Technology (B.Sc. (I.T.) (Hon.)) – Four Year Integrated Program

Master of Science in Information Technology (M.Sc. (I.T.)) – Five Year Integrated Program

SEMESTER – 5

Course Code	Course Title	Course Category	Level of Course	Course Credits	Teaching Hours/week		University Exam Type	Exam Duration	External Marks	Internal Marks	Total Marks
				Th. + Pra.	Theory	Practical/ Fieldwork /Project/ Internship					
501	Web Development using PHP	Major Course	300-399 Higher Level	4	4	0	Theory/ Written	2 Hrs	50	50	100
502	Advance Relational Database Management System	Major Course	300-399 Higher Level	4	4	0	Theory/ Written	2 Hrs	50	50	100
503	Practical – 5	Major Course	300-399 Higher Level	4	0	8	Practical	4 Hrs	50	50	100
504	Software Engineering	Minor Course	300-399 Higher Level	4	4	0	Theory/ Written	2 Hrs	50	50	100
505	Operating System	Minor Course	300-399 Higher Level	4	4	0	Theory/ Written	2 Hrs	50	50	100
506	Elective 1 : iOS Application Development Elective 2 :Android Application Development Elective 3 : One Course of Minimum 2 credits approved by IIT/NIT and Department/College on SWAYAM Platform	Skill Enhancement Course	-	2	2	0	Practical	2 Hrs	25	25	50
Total				**22**	**18**	**8**					**550**

Veer Narmad South Gujarat University, Surat

Program Structure: T. Y. B. Sc. (I. T.) / M. Sc. (I .T.) (SEM – 5 and SEM – 6)

(w.e.f. Academic Year June, 2025-2026)

Bachelor of Science in Information Technology (B. Sc. (I. T.)) – Three Year Program

Bachelor of Science in Information Technology (B.Sc. (I.T.) (Hon.)) – Four Year Integrated Program

Master of Science in Information Technology (M.Sc. (I.T.)) – Five Year Integrated Program

SEMESTER – 6

Course Code	Course Title	Course Category	Level of Course	Course Credits	Teaching Hours/week		University Exam Type	Exam Duration	External Marks	Internal Marks	Total Marks
				Th. + Pra.	Theory	Practical/ Fieldwork /Project/ Internship					
601	Java	Major Course	400-499 Advanced Level	4	4	0	Theory/ Written	2 Hrs	50	50	100
602	ASP .NET Core MVC using C#	Major Course	400-499 Advanced Level	4	4	0	Theory/ Written	2 Hrs	50	50	100
603	Practical-6	Major Course	400-499 Advanced Level	4	0	8	Practical	4 Hrs	50	50	100
604	Fundamentals of Cloud Computing	Minor Course	400-499 Advanced Level	4	4	0	Theory/ Written	2 Hrs	50	50	100
605	Functional IT Business Communication	Ability Enhancement Course	400-499 Advanced Level	2	2	0	Theory/ Written	1 Hrs	25	25	50
606	Internship	Major Course	400-499 Advanced Level	4	0	Internship	Viva Voce	-	50	50	100
Total				**22**	**14**	**8**					**550**

P. Y. B. Sc. (I. T.)

Veer Narmad South Gujarat University, Surat

Program Structure: T. Y. B. Sc. (I. T.) / M. Sc. (I .T.) (SEM – 5 and SEM – 6)

(w.e.f. Academic Year June, 2025-2026)

Bachelor of Science in Information Technology (B. Sc. (I. T.)) – Three Year Program

Bachelor of Science in Information Technology (B.Sc. (I.T.) (Hon.)) – Four Year Integrated Program

Master of Science in Information Technology (M.Sc. (I.T.)) – Five Year Integrated Program

Practical:

- Batch Size – 30 Maximum (Desirable). Maximum 45 students can be accommodated in a batch. Separate batches should be considered if the student strength exceeds 45 numbers.

Skill Enhancement Course: As per NEP (National Education Policy-2020), it is mandatory for students to select a 2 credit skill enhancement course out of the choices given by the college/institute.

Value Added Course: As per NEP (National Education Policy-2020), it is mandatory for students to select a 2 credit Value Added Course out of the choices given by the college/institute.

P. Y Desai

Veer Narmad South Gujarat University, Surat

Program Structure: T. Y. B. Sc. (I. T.) / M. Sc. (I .T.) (SEM – 5 and SEM – 6)

(w.e.f. Academic Year June, 2025-2026)

Bachelor of Science in Information Technology (B. Sc. (I. T.)) – Three Year Program

Bachelor of Science in Information Technology (B.Sc. (I.T.) (Hon.)) – Four Year Integrated Program

Master of Science in Information Technology (M.Sc. (I.T.)) – Five Year Integrated Program

Name of Program	Master of Science (Information Technology)
Abbreviation	M.Sc. (I.T.)
Eligibility	H S C / Equivalent Examination from Science Stream (A / B / AB Group) or Vocational Stream or General Stream (Commerce) with English as one of the subject.
Objective of Program	The objective of the program is to transform students into I.T. professionals by providing them advanced technical knowledge and outstanding placement in reputed I.T. companies.
Program Outcome	**PO1 : Fundamental Knowledge Enrichment** Program trains students with the core computer science and Information Technology (IT) knowledge domains. It also makes students capable of using core concepts in the conceptualization of domain specific application development. **PO2 : Critical Thinking Development** The program develops the skills of critical thinking, problem solving, evaluative learning of various techniques, and understanding the essence of the problem. **PO3 : Advanced Emerging Technology Awareness** The program trains students with the latest technologies that is being used in the industry. The continuous syllabi review adds value to the program for the outgoing students and make them ready to face challenging demands of the industry. **PO4 : Advanced Tools Usage** The program teaches the students to apply the advanced tools to solve real world problems. **PO5 : Nurturing Project Planning and Management Capabilities** The program trains students for designing and conceptualizing the software architecture, planning and managing the product development process of complex and live software projects. It also makes students understand the decision making for selection of an appropriate project management capabilities. **PO6 : Real World Problem / Project Development** Real world project provides the candidates exposure to work in the challenging and demanding environment of the industry. The project development training makes students employable and industry ready. **PO7 : Team Work and Leadership Development** Trains students to work in a team and also to take leadership of the of the project management team.
Program Specific Outcomes	**PSO1**: Students will learn to develop and strengthen the fundamental concepts that are required to solve complex programming problems. **PSO2**: Students will develop the ability to identify, formulate and design solutions to face computational challenges. **PSO3**: Students will be able to apply software engineering concepts to solve real world problems. **PSO4**: Students will be able to learn emerging technologies and apply them for the development of Web applications, Mobile application, Desktop application, etc. **PSO5**: Students will develop necessary Entrepreneur and Technical skills to start their own business in I.T domain.
Mapping between POs and PSOs	
Medium of Instruction	English
Program Passing Rules	**As per University rules**

	PSO1	PSO2	PSO3	PSO4	PSO5
PO1	■				
PO2	■	■			
PO3				■	■
PO4				■	■
PO5			■		■
PO6			■		■
PO7			■		■

Subject Code [2511001105010001]

B.Sc. (I.T.) 5th Semester

Course : 501 : Web Development using PHP

Course Code	501
Course Title	Web Development using PHP
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2025
Purpose of Course	This course provides a practical approach for web application development using open source web technologies PHP, MySQL, Apache and frameworks.
Course Objective	To make students understand the significance of open source technology, MVC architecture, and develop web applications using open source language and framework.
Pre-requisite	Object Oriented Fundamentals, Web Technology Fundamentals
Course Out come	CO1 : Apply fundamental concepts of PHP programming, including language constructs, control structures, session handling, and database connectivity, to develop interactive web applications. CO2 : Analyze object-oriented programming features in PHP such as classes, inheritance, and built-in library functions to enhance code reusability and maintainability in dynamic web development. CO3 : Evaluate security threats like SQL injection and session fixation, and implement security measures such as CAPTCHA, parameterized queries, and authentication techniques to secure web applications.
Mapping between COs with PSOs	

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1					
CO2					
CO3					

Course Content	**Unit : 1 : Open Source Web Technology and PHP Language Basics** 1.1 PHP Language Characteristics, Features and Extensions 1.2 Language Constructs, Variables, Declarations and Types, Constants 1.3 Use of Operators and Control Structures 1.4 Arrays, Functions and References 1.5 PHP Configuration Directives of php.ini file 1.6 Super Global Arrays 1.7 Handling Session, Cookies, Form Data, File Uploads, Server Data, Server Environment 1.8 Handling Form Data Using JavaScript **Unit : 2 : Object Oriented and Advanced Features of PHP** 2.1 Classes and Objects 2.2 Use Of Constructors, Destructors, Inheritance 2.3 Serialization, Magic Methods 2.4 Built-In Library Functions and Library Classes: String, Array, Mathematics, Graphics Library, File System, Date and Time, Files and Directory, XML, PDF, HTTP, Network, PHP Options and Information, ZIP File

	Unit : 3 : Security Threats and Remedies 3.1 Securing Request Data 3.2 Using CAPTCHA 3.3 Session Fixation Attack and Remedy 3.4 SQL Injection Attack and Prevention **Unit : 4 : PHP Integration with Databases** 4.1 MySQL Server and MySQL Client, Databases, Tables 4.2 Working with PhpMyAdmin 4.3 mysqli, PDO, Develop REST API for CRUD operations, Handling JSON data in PHP **Unit : 5 : Web Development Add-ons** 5.1 Installing and managing packages using composer 5.2 Introduction to PHP based web application frameworks and Libraries 5.3 AJAX, JavaScript Frameworks and Libraries 5.4 Using JavaScript frameworks functions for using REST API for CRUD operations 5.5 Version control systems, git, github.com and git commands
Reference Book	1. Web Development using PHP and jQuery - Dr. Payal Joshi Dr. Dhaval Joshi - Notion Press (April 29, 2023) 2. Programming PHP - Rasmus Lerdorf, Kevin Tatroe - O'Reilly 3. PHP Cookbook - David Sklar, Adam Trachtenberg - O'Reilly 4. Learning PHP, MySQL & JavaScript: With jQuery, CSS & HTML5 (Learning Php, Mysql, Javascript, Css & Html5) 4th Edition by Robin Nixon Publisher: O'Reilly Media; 4 edition (December 14, 2014) 5. PHP and MySQL Web Development (5th Edition) (Developer's Library) 5th Edition by Luke Welling Publisher: Addison-Wesley Professional; 5 edition (September 30, 2016) 6. Modern PHP: New Features and Good Practices 1st Edition by Josh Lockhart O'Reilly Media; 1 edition (March 1, 2015) 7. PHP Cookbook: Solutions & Examples for PHP Programmers 3rd Edition by David Sklar (Author), Adam Trachtenberg (Author) Publisher: O'Reilly Media; 3 edition (July 25, 2014) 8. NoSQL For Dummies 1st Edition by Adam Fowler Publisher: For Dummies; 1 edition (February 24, 2015) 9. Learning from jQuery Paperback – 19 Mar 2013 by Callum Macrae Publisher: Shroff/O'Reilly; First edition (19 March 2013) 10. Mastering jQuery Paperback – Import, 30 May 2015 by Alex Libby Publisher: Packt Publishing Limited (30 May 2015) 11. PHP, MySQL, & JavaScript All-in-One For Dummies by Richard Blum, John Wiley & Sons, 10-Apr-2018 12. PHP Programming | The Complete Guide | 2022 Paperback – 1 January 2022 by A. Adams (Author)
Teaching Methodology	Lectures, Discussion, Independent Study, Seminars and Assignment

P.Y Joga

Subject Code [2511001105020001]

B.Sc. (I.T.) 5th Semester

Course : 502 : Advance Relational Database Management System

Course Code	502
Course Title	Advance Relational Database Management System
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2025
Purpose of Course	To impart knowledge of Database Architecture and PL/SQL programming.
Course Objective	This course provides knowledge about Oracle Database Architecture and Oracle PL/SQL programming concepts.
Course Outcomes	CO1 : Explain the Oracle database architecture, including physical, logical, and instance components, to understand data storage, memory management, and processing mechanisms. CO2 : Develop PL/SQL programs using cursors, procedures, functions, packages, and triggers to implement complex database functionalities and automate database operations. CO3 : Analyze and implement transaction control mechanisms, locking strategies, indexing techniques, and user management to optimize database performance and security.
Mapping between COs with PSOs	
Prerequisite	DBMS, SQL
Course Content	**Unit : 1 : Overview of Oracle Architecture** 1.1 Oracle Physical Architecture 1.1.1 Data Files 1.1.2 Control Files 1.1.3 Redo log Files 1.1.4 Archive Files 1.2 Oracle Instance Architecture 1.2.1 SGA 1.2.2 Database buffer 1.2.3 Redo log buffer 1.2.4 Shared Pool 1.2.5 Library Cache 1.2.6 PGA 1.2.7 Processes 1.3 Oracle Logical Architecture 1.3.1 Tablespace 1.3.2 Segment 1.3.3 Extent 1.3.4 Oracle Data Block

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1					
CO2					
CO3					

P. M Desai

Unit : 2 : Oracle PL/SQL

2.1 The PL/SQL Block
2.2 Lexical Units: Identifiers, Delimiters, Literals, Comments
2.3 Variables, PL/SQL Types
2.4 Expression, Operators and Control Structures
2.5 Records
2.6 Cursors
- 2.6.1 Definition of Cursor
- 2.6.2 Explicit & Implicit Cursors
- 2.6.3 Cursor for loops
- 2.6.4 Cursor Variables
- 2.6.5 Parameterized Cursor

2.7 Sub Program
- 2.7.1 Procedures
- 2.7.2 Functions
- 2.7.3 Subprogram Creation, Parameter Modes
- 2.7.4 Procedure Versus Functions

2.8 Packages
- 2.8.1 Package Specification
- 2.8.2 Package Body
- 2.8.3 Packages and Scope, Package Objects

2.9 Database Triggers
- 2.9.1 Use of Database Triggers
- 2.9.2 Types of Triggers
- 2.9.3 Creating Triggers
- 2.9.4 Deleting a Trigger

2.10 Error Handling
- 2.10.1 Declaring Exception
- 2.10.2 Raising Exception, Handling Exception
- 2.10.3 Exception Propagation, Scope of Exception

2.11 Sequences & Pseudo columns
- 2.11.1 CURRVAL & NEXTVAL
- 2.11.2 ROWID
- 2.11.3 ROWNUM

Unit : 3 : Transaction Control and Locks

3.1 Transaction Control Statements
- 3.1.1 Commit
- 3.1.2 Save point
- 3.1.3 Rollback

3.2 Locks
- 3.2.1 Types of Locks
- 3.2.2 Levels of Locks

Unit : 4 : Index, User, Role and Profile

4.1 Indexes
- 4.1.1 Simple Index, Composite Index
- 4.1.2 Bitmap Index, Function Based Index
- 4.1.3 Key Compressed Index

P. Y Desai

	4.2 User 4.2.1 Creating User 4.2.2 Types of Users 4.2.3 Privileges 4.2.4 Types of Privileges 4.3 Role 4.3.1 Types of Roles 4.3.2 Role Management 4.4 Profile 4.4.1 Creating Profile 4.4.2 Built in Profile **Unit : 5 : Programming with Collections** 5.1 Nested Tables 5.2 Varying Array 5.3 Record
Reference Book	1. SQL, PL/SQL THE PROGRAMMING LANGUAGE OF ORACLE - 4TH REVISED EDITION - Ivan Bayross - BPB Publications 2. Oracle Database 12c The Complete Reference (Oracle Press) (1st Edition) - Bob Bryla, Kevin Loney - McGraw-Hill Education 3. Oracle Database 12c PL/SQL Programming(Oracle Press) 1st Edition - Michael McLaughlin - McGraw-Hill Education 4. Oracle PL/SQL Language Pocket Reference, 5E - Steven Feurstein, Bill Pribyl, Chip Dawes - O'Reilly 5. Oracle PL/SQL Programming: Covers Versions Through Oracle Database 12c 6th Edition - Steven Feuerstein - O'Reilly Media 6. SQL and PL/SQL for Oracle 11g Black Book, - Dr. P.S. Deshpande – Dreamtech Press 7. Oracle for Beginners - Sharanam Shah & Vaishali Shah - SPD
Teaching Methodology	Lectures, Discussion, Self Study, Seminars, Case Study and Assignment

P. Y Desai

Subject Code [2511001105030001]

B.Sc. (I.T.) 5th Semester

Course : 503 : Practical-5

Course Code	503
Course Title	Practical-5
Credit	4
Teaching per Week	8 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2025
Purpose of Course	To provide practical knowledge of web application development and PL/SQL programming
Course Objective	To prepare students to develop web application using PHP and frameworks and impart knowledge of PL/SQL programming
Prerequisite	Fundamentals of Object Oriented programming & , Web Technologies
Course Out come	CO1: Apply PL/SQL programming concepts to develop database-driven solutions and analyze transaction control mechanisms for efficient database management. CO2: Design and develop dynamic web applications using PHP by integrating database interactions and security best practices. CO3: Evaluate the principles of MVC architecture and implement API-based web applications using modern frameworks.
Mapping between COs with PSOs	
Course Content	● Practical based on Paper No. 501 – Web Development-2 & Paper No. 502– RDBMS. Weightage: 60% based on Paper No 501 & 40% based on Paper 502 **Design database and develop web application based on Bhartiya Gyan Parampara** **Use Cases of Indian knowledge system of Mathematics :** ○ Ancient Indian Arithmetic from Lilavati Samhita by Bhaskarachary-I: ■ Arithmetic rule : Sutra (Verse 1) ■ Multiplication of Large Numbers: Sutra (Verse 5) ■ Division: Sutra (Verse 8): ○ Ancient Algebra and Geometry operations from Lilavati Samhita: ■ Algebra : Sutra (Verse 13) ■ Geometric Relationships: Sutra (Verse 17) ■ Understanding Lilavati Samhita theorem later taught as Pythagorean theorem (Geometry): Sutra (Verse 23) [Implementation of all sutras in computer Lab. Using PHP / Oracle PL/SQL]
Teaching Methodology	Lab Work, Assignment

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1					
CO2					
CO3					

Subject Code [2511001105040001]

B.Sc. (I.T.) 5th Semester

Course : 504 : Software Engineering

Course Code	504
Course Title	Software Engineering
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2025
Purpose of Course	To enable students to understand modeling ,analyzing, designing a system with SE principles.
Course Objective	To give a coherent view of design and analysis intended for the software development process. The course provides comprehensive concepts of software engineering practice that involves various models, analysis models, design concepts, various testing methods, introduction to UML diagrams and basics of agile methodology.
Course Outcomes	CO1: Explain the fundamental concepts of software engineering and demonstrate their application in software development. CO2: Analyze the principles of object-oriented analysis and design to apply them in real-world software modeling. CO3: Evaluate agile software development methodologies and implement agile practices in software projects.
Mapping between COs with PSOs	
Prerequisite	Basics of any programming language

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1					
CO2					
CO3					

Course Content	**Unit : 1 : Fundamentals of Software Engineering** 1.1 The Nature of Software 1.1.1 Defining Software 1.1.2 Software Application Domains 1.1.3 Legacy Software 1.2 The changing nature of software 1.2.1 WebApps 1.2.2 Mobile Applications 1.2.3 Cloud Computing 1.3 Software Engineering 1.3.1 Defining the discipline 1.3.2 The Software Process 1.3.2.1 The umbrella activities 1.3.3 Software Engineering Practice 1.3.4 Software Development Myths 1.4 Process models

	1.4.1 The Waterfall model 1.4.2 The Incremental model 1.4.3 The Prototyping model 1.4.4 Spiral model **Unit : 2 : Requirement Engineering, Requirement Modelling and Design** 2.1 Requirement Engineering 2.1.1 Requirement Inception, elicitation, Elaboration, Negotiation, Specification, Validation, Management 2.1.2 Requirement Elicitation and different techniques 2.1.3 Functional and Non- Functional requirements 2.1.4 Software Requirement Specification 2.2 Requirement Modeling 2.2.1 Requirements Analysis 2.2.2 Functional modelling using DFD 2.2.3 Data Dictionary 2.3 The Design Process 2.3.1 Design concepts 2.3.1 Abstraction 2.3.2 Modularity 2.3.3 Information hiding 2.3 The design model 2.4 Architectural design **Unit : 3 : Object Oriented Analysis and Design** 3.1 Unified Modeling model 3.1.1 UML Diagrams 3.1.1.1 Use Case Diagram 3.1.1.2 Class Diagram 3.1.1.3 Sequence Diagram 3.1.1.4 Swimlane Diagram 3.1.1.5 State chart Diagram 3.2 CASE tools for UML **Unit : 4 : Software Testing** 4.1 Principles of testing 4.2 Verification and Validation 4.3 Introduction to white-box and black-box testing 4.4 Testing types and strategies 4.4.1 Unit Testing 4.4.2 Integration Testing 4.4.3 Validation Testing - 4.4.4 Alpha and Beta Testing 4.4.5 System Testing **Unit : 5: Agile Software Development** 5.1 Agile Fundamentals 5.1.1 Basics and Fundamentals 5.1.2 Extreme Programming 5.1.3 Agile Manefesto 5.1.4 Twelve Practices of XP

P. Y Deshmukh

	5.2 Scrum 5.2.1 Agile and Scrum Principles 5.2.2 Scrum Roles 5.2.3 Product Backlog 5.2.4 Sprint 5.2.5 User stories 5.3 Use of Scrum tools: Trello, Taiga, iceScrum and other tools
Reference Book	1. Software Engineering Practitioner's Approach ,Roger Pressman, Bruce R. Maxim, 9th edition,TMH 2. Fundamentals of software engineering ,Rajib mall, Third edition, PHI 3. An Integrated Approach to Software Engineering, Pankaj Jalote, Narosa 4. The Unified Modeling Language User Guide - Grady Booch, James Rumbaugh, Ivar Jacobson Addison Wesley. 5. Andrew Stellman,& and Jennifer Greene., "Head First Agile: A Brain-Friendly Guide to Agile Principles, Ideas, and Real-World Practices. " O'Reilly Media, Inc.", 2017. 6. Ken Schawber, Mike Beedle, Agile Software Development with Scrum, Pearson
Teaching Methodology	Lectures, Discussion, Self Study, Seminars, Case Study and Assignment

Subject Code [2511001105050001]

B.Sc. (I.T.) 5th Semester

Course : 505 : Operating System

Course Code	505
Course Title	Operating System
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2025
Purpose of Course	To impart conceptual knowledge and functioning of Operating System
Course Objective	This course provides knowledge about core concepts of operating system.
Course Outcomes	CO1: Explain the fundamental concepts, structures, and types of operating systems, and analyze their role in managing hardware and software resources. CO2: Apply process scheduling, memory management, and file system techniques to optimize system performance and evaluate their implementation in different operating systems. CO3: Analyze device management strategies, disk scheduling techniques, and I/O operations to design efficient storage and retrieval mechanisms.
Mapping between COs with PSOs	
Prerequisite	Basic knowledge of Computer organization, data structures and computer programming

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1					
CO2					
CO3					

Course Content	**Unit : 1: Operating System Concepts** 1.1 Evolution of Operating System 1.2 Needs of an Operating System 1.3 Elements of an Operating System 1.4 Types of O.S.: Single User & Multi-User, Batch, Multi-Programmed, 1.5 Time-Sharing, Real-Time, Distributed, Parallel, Mobile 1.6 Operating System Structure: Layered System, Microkernel and Virtual Machine 1.7 Booting process of various Operating Systems **Unit : 2 : Process Management** 2.1 Process concept 2.2 Process State Model 2.3 Process Scheduling 2.3.1 Scheduling Criteria 2.3.2 Scheduling algorithms 2.4 Thread and Multithreading

	2.5 Inter-process Communication 2.6 Process Coordination 2.6.1 Critical Section problem 2.6.2 Semaphores 2.7 Deadlocks 2.7.1 Deadlock Characteristics 2.7.2 Deadlock Prevention, Avoidance 2.7.3 Deadlock Detection, Recovery **Unit : 3 : Memory Management** 3.1 The notion of physical and logical address space 3.2 Contiguous allocation 3.3 Non-Contiguous allocation 3.3.1 Paging 3.3.2 Segmentation 3.4 Other Memory Management Schemes: Swapping and Overlays 3.5 Demand Paging & Demand Segmentation 3.6 Allocation of frames & Page Replacement policies 3.7 Implementation in various operating systems **Unit : 4 : File Management** 4.1 File Concept: File Types and File Operation 4.2 Directory Structure 4.3 Directory Implementation 4.4 File-System Implementation 4.5 Allocation Methods 4.6 Free-Space Management 4.7 File-System Mounting, File Sharing and Protection 4.8 Implementation in various operating systems **Unit : 5 : Device Management** 5.1 Device Characteristics 5.2 I/O Hardware 5.3 Application I/O Interface 5.4 Kernel I/O Subsystem 5.5 Streams 5.6 Mass Storage Structure 5.7 Disk Structure 5.8 Disk scheduling 5.9 Disk Management
Reference Book	1. Operating Systems Concepts - Galvin Silberschatz - McGraw Hill 2. Operating Systems - William Stallings – PHI 3. Modern Operating Systems - Andrew S. Tanenbaum - Pearson Edu./PHI 4. Operating System, Dhamdhere, TMH-3rd Edition 5. Unix Shell Programming : Yashwant Kanetkar: 2003 Edition 6. Mastering Linux shell Scripting: Andrew Mallett:2015 edition Packt Publisher
Teaching Methodology	Lectures, Discussion, Self Study, Seminars, Case Study and Assignment

P. Y Deshmukh

Subject Code [2511001105060001]

B.Sc. (I.T.) 5th Semester

Course : 506 Elective 1 : iOS Application Development

Course Code	506 Elective 1 SEC
Course Title	iOS Application Development
Credit	2
Teaching per Week	2 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2025
Purpose of Course	The Purpose of course is to help understanding the components and structure of mobile application development using iOS. The course also provides students with the skills necessary to develop an iOS App from scratch to deploying it on the Apple Store.
Course Outcomes	CO1: Explain the fundamental concepts of Apple-based iOS application development and analyze the iOS ecosystem, including development frameworks and guidelines. CO2: Apply knowledge of various iOS development tools, including Xcode, Swift, and Interface Builder, to develop interactive and user-friendly applications. CO3: Demonstrate the process of deploying and publishing iOS applications on the Apple App Store while ensuring compliance with Apple's guidelines.
Mapping between COs with PSOs	
Pre-requisite	Object Oriented Programming knowledge.
Course Objective	The objective of the course is to impart knowledge of Swift and Apple iOS application Design and Development.

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1					
CO2					
CO3					

Course Content

Unit 1 : Introduction to iOS and Swift Language

1.1 Introduction iOS and iOS Architecture
1.2 Introduction to Xcode IDE
1.3 Setting up Development Environment
1.4 Xcode Development Tools – Storyboard, Interface Builder and Simulator
1.5 Introduction to Swift - Datatypes, Variables, Strings
1.6 Optionals in Swift - Implicit and Explicit
1.7 Collections in Swift - Dictionaries, Arrays, and Sets
1.8 Control Flows and Functions in Swift
1.9 Object Oriented Programming in Swift
1.10 Protocols and Extensions
1.11 Information Property List File and App Permissions

Unit 2 : iOS Design Patterns

2.1 Introduction to UIView, UIWindow and UIViewController
2.2 Model View Controller (MVC) Pattern in Interface Design
2.3 Application Life Cycle and View Controller Life Cycle
2.4 Working with Basic UIElements - UILabel, UIButton, UITextFeild, UIImageView etc.
2.5 IBActions and IBOutlets
2.6 Auto Layout Constraints to create Adaptive UI
2.7 Working with different types of Gestures

Unit 3 : UIControls in iOS

3.1 Navigation Controller and its Usage
3.2 Navigation Techniques - Segue, Push, Pop, Present and Dismiss

	3.3 Working with TableView - Static TableViewController and Dynamic TableView 3.4 Working with PickerView 3.5 Working with UITabBarController ,UIScrollView and UIWebView 3.6 Working with AlertController and its Types **Unit 4 : Working with Data and Location based Services** 4.1 Working with UserDefaults for data persistence 4.2 Data Persistence Techniques - SQlite Framework and Core Data Framework 4.3 Location based Services 4.4 Core Location Services 4.5 CLLocation and CLLocationManager Classes 4.6 MapKit, MapView and MKPointAnnotation 4.7 Publishing iOS App to Apple Store
Reference Book:	1. Swift Programming: The Big Nerd Ranch Guide (2nd Edition) (Big Nerd Ranch Guides) 2nd Edition by Matthew Mathias (Author), John Gallagher (Author) 2. Swift: A Comprehensive Intermediate Guide to Learn and Master the Concept of Swift Programming Kindle Edition by MG Martin (Author) 3. iOS 12 Programming Fundamentals with Swift: Swift, Xcode, and Cocoa Basics 1st Edition by Matt Neuburg (Author) 4. Classic Computer Science Problems in Swift: Essential Techniques for Practicing Programmers 1st Edition by David Kopec 5. iOS Programming: The Big Nerd Ranch Guide, by Christian Keur and Aaron Hillegass 6. Beginning Swift by Rob kerr and Kare Morstol, Packt Publication
Teaching Methodology	Lectures, Discussion, Independent Study, Seminars, Lab Work and Assignment

Subject Code [2511001105060002]

B.Sc. (I.T.) 5th Semester

Course : 506 Elective 2 : Android Application Development

Course Code	506 Elective 2 SEC
Course Title	Android Application Development
Credit	2
Teaching per Week	2 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2025
Purpose of Course	This course helps students to understand android based smart device application development. The course also gives students an idea about various components of Android application development tools.
Course Outcomes	CO1: Explain the fundamental concepts of Android-based mobile application development and analyze the Android ecosystem, including development frameworks and guidelines. CO2: Apply knowledge of various Android development tools, including Android Studio, Java/Kotlin, and UI components, to develop interactive and user-friendly applications. CO3: Demonstrate the process of deploying and publishing Android applications on the Google Play Store while ensuring compliance with Google's policies and best practices.
Mapping between COs with PSOs	
Prerequisite	Object Oriented Programming knowledge
Course Objective	The objective of the course is to provide a thorough introduction to the Android environment, Tools for creating Android applications, The Android approach to structuring applications, Basic user interfaces, and Application life cycles.

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1					
CO2					
CO3					

Course Content	**Unit : 1 : Introduction to Kotlin** 1.1 Kotlin Overview 1.2 Environment setup in Android Studio 1.3 Variables, Data types, Arrays, Array list in Kotlin 1.4 Operators in Kotlin 1.5 Control flowand Looping statements in Kotlin 1.6 Functions and Lambda expressions in Kotlin 1.7 Object Oriented Programming in Kotlin **Unit : 2 : Android Application development** 2.1 Android Application architecture 2.2 AVD, Gradle, Manifest, Resources 2.3 Android Activity and Activity lifecycle 2.4 Android Views and Layouts 2.5 Button, TextView,ImageButton, EditText, CheckBox, ToggleButton, RadioButton, Spinner, etc... 2.6 Event Handling in Kotlin 2.7 User Interactions - Toast, Dialog, Menus - Types of Menus 2.8 List & Views(RecyclerView, Card View, etc...)

	2.9 Intents & Intent Life Cycle - Types of Intentts 2.10 Navigation between screens **Unit : 3 : Working with Data and Background Services** 3.1 Shared preferences 3.2 Working with SQLite database 3.3 Working with Firebase - CRUD operations 3.4 Background Services and its Life cycle 3.5 Broadcast Receivers **Unit : 4 : Working with Google Play Services and API** 4.1 Location Navigation 4.2 Geocoding and Reverse Geocoding Notifications 4.3 Working with Google Maps API 4.4 Working with web Services 4.5 API integration 4.6 Publishing Apps
Reference Book	1. Android Programming with Kotlin for Beginners, by John Horton, Packt publication 2019 2. Learn Kotlin for Android Development by Peter Spath, Apress publication, 2019 3. Head First Kotlin - a brain friendly guide by Dawn Griffiths and David Griffiths, O'Reilly publication 2019 4. Learn Android Studio 3 with Kotlin by Ted Hagos, Apress publication, 2018 5. Kotlin In-Depth by Aleksei Sedunov, BPB publications, 2020 6. Mastering Kotlin by Nate Ebel, Packt publication 2019
Teaching Methodology	Lectures, Discussion, Self Study, Seminars, Case Study and Assignment

P. Y Deva

Subject Code [2511001106010001]

B.Sc. (I.T.) 6th Semester

Course : 601 : Java

Course Code	601
Course Title	Java
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2025
Purpose of Course	To learn the concept of Object oriented programming, threads, graphics, database operation in java.
Course Objective	To introduce the comprehensive concepts of java programming language that includes OOP concepts using core java, desktop based visual designs using swing. At the end of this course, a student will be able to comprehend the fundamental concepts required for the development and design of software systems.
Course Outcomes	CO1: Implement multithreading and input-output (IO) operations in Java to develop efficient and concurrent applications. CO2: Utilize Java Collections Framework and Streams API to perform CRUD operations on databases, ensuring optimized data handling. CO3: Design and develop Graphical User Interfaces (GUI) using Java for interactive applications.
Mapping between COs with PSOs	
Pre-requisite	Object Oriented Concepts of C++

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1					
CO2					
CO3					

Course Content	**Unit : 1 : Java Concepts** 1.1 Introduction to Java and its tool-chain 1.1.1 History of Java 1.1.2 Java Architecture and its Components 1.1.2.1 JDK,JVM,JRE 1.1.3 Java Platforms 1.1.4 Java S E, M E, E E 1.1.5 Java Class File 1.1.6 C++ and Java comparison 1.1.7 Features of java 1.1.8 Installing java development kit 1.1.9 Java compiler and Interpreter 1.1.10 Using CLASSPATH 1.1.11 Use of text editor, IDE

P. Y Bora

1.2 Basics of Java programming
    1.2.1 Understanding main() method
1.3 Fundamentals
    1.3.1 Statements
    1.3.2 Variables and data types
    1.3.3 Primitive data types
    1.3.4 Object Reference Types
        1.3.4.1 Strings
    1.3.5. Arrays- single and multi dimension
    1.3.6. Primitive Wrapper Classes
    1.3.7. Classes
    1.3.8. Objects
    1.3.9. Array of objects
    1.3.10. AutoBoxing and Unboxing
1.4 General Utility Classes
    1.4.1 ArrayList
        1.4.1.1 Accessing with for each Loop
        1.4.1.2 Accessing with iterator
    1.4.2 Vectors
    1.4.3 String
    1.4.4 Math
    1.4.5 Date

Unit : 2: OOPs in JAVA

2.1 Object Oriented Programming in Java
    2.1.1 Inheritance and Polymorphism
    2.1.2 Overloading and Overriding
    2.1.3 Abstract classes
    2.1.4 Static classes
    2.1.5 Final Classes
    2.1.6 Chaining constructor using this() and Super()
    2.1.7 Interfaces
    2.1.8 Garbage Collection
    2.1.9 Lambda Expressions
    2.1.10 Generics

2.2 Packages and Imports
    2.2.1 Package levels
    2.2.2 Creating package
    2.2.3 Importing and Using Packages
    2.2.4 Package and inheritance
    2.2.5 Package and access specifiers
2.3 Exception Handling
    2.3.1 Exception and error classes
    2.3.2 Exception Handling
    2.3.3 Throw statement and throws clause
    2.3.4 Custom exception
2.4 Thread Programming
    2.4.1 Overview of Threads
    2.4.2 Thread Life Cycle
    2.4.3 Creating Thread –Runnable interface

P. Y Desai.

2.4.4 Multithreaded programs
2.4.5 Synchronization
2.4.6 Deadlock
2.4.7 Inter-Thread communication (wait & notify)
2.4.8 Fork and Join
2.4.9 Asynchronous processing

Unit: 3: I/O in JAVA

3.1 Java I/O
- 3.1.1 Files and directories
- 3.1.2 Byte and Character Streams
- 3.1.3 PrintWriter Class
- 3.1.4 Input and Output Streams
- 3.1.5 Random access Files
- 3.1.6 Serialization and Deserialization

3.2 Collections API
- 3.2.1 Collection
- 3.2.2 Java Streams
- 3.2.3 Set-HashSet,TreeSet
- 3.2.4 List-LinkedList
- 3.2.5 Map-HashMap,TreeMap

3.3 Annotations

Unit : 4: GUI Development in Java

4.1 Java Foundation Classes
4.2 Containers
4.3 Components
4.4 Event Handling

Unit : 5 : JDBC Connections

5.1 Working with JDBC APIs
- 5.1.2 Connection
- 2.1.2 Statement
- 5.1.3 Transaction methods
- 5.1.4 Optimized Statements with PreparedStatement and Callable Statement
- 5.1.5 Metadata

Case studies of Vedic Mathematics Sutras in Java :

- Nikhilam Navatashcaramam Dashatah : "All from 9 and the last from 10."
- Ekadhikena Purvena : "By one more than the previous one."
- Udharan : "The extraction."
- Paraavartya : "Transposition and cancellation."
- Shunyam Saamyasamuccaye : "When the sum is the same that sum is zero."
- Anurupyena : "Proportionately."

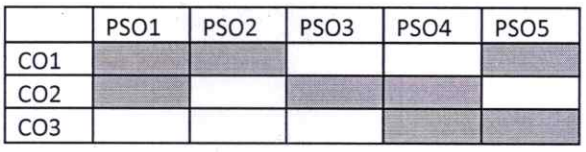
P. Y Deshpande

Reference Book	1. Java Complete Reference, Schildt, Herbert,9th edition,TMH 2. Java Platform, Jaworski, Jamie,Techmedia 3. Head First Java, Sierra, Bates,second edition,,SPD O'Relly 4. Core Java for Beginners, S. Shah, V. Shah 5. Programming with Java, Dr. Kamlendu Kumar Pandey, Dr. Veena Jokhakar, Mr. Ronak Panchal, Onlinegatha.com
Teaching Methodology	Lectures, Discussion, Self Study, Seminars, Case Study and Assignment

Subject Code [2511001106020001]

B.Sc. (I.T.) 6th Semester

Course: 602 ASP.NET Core MVC using C#

Course Code	602
Course Title	ASP.NET Core MVC using C#
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2025
Purpose of Course	This course helps to learn basics programming for web application development using ASP.NET Core and C#.NET Core.
Course Objective	The objective of the course is to impart basic introduction to Microsoft C#.NET language and concepts of web application development technology.
Course Out come	CO1: Apply object-oriented programming (OOP) principles using C#.NET Core to develop efficient and reusable code structures. CO2: Integrate databases with ASP.NET Core MVC applications using C#.NET Core to perform CRUD operations efficiently. CO3: Design and develop web applications using ASP.NET Core MVC architecture in C#.NET Core for scalable and maintainable solutions.
Mapping between COs with PSOs	
Prerequisite	Knowledge of Programming, Object Oriented Programming, Database Management System and Scripting languages like HTML, JavaScript, etc.
Course Content	**Unit : 1 : Introduction to .NET Core and C#** 1.1. .NET Framework 1.1.1 .NET Framework architecture 1.1.2 Common Language Runtime 1.1.3 Common Type System 1.1.4 Common Language Specification 1.1.5 Microsoft Intermediate Language 1.1.6 Framework Class Libraries 1.2. .NET Core 1.2.1 .NET Core Architecture 1.2.2 Difference between .NET Core and .NET Framework 1.2.3 Advantages of .NET Core 1.3. Overview of C#.Net CORE 1.3.1. Assemblies and Namespaces 1.3.2. .NET CORE Assemblies and Libraries 1.3.3. Data Types 1.3.4. Variables and Constants 1.3.5. Operators 1.3.6. Flow Control Statements 1.4. Program Structure 1.5. Application Configuration **Unit : 2 : Object Oriented Programming using C# .NET Core** 2.1. Object Oriented Concepts and Principles

2.2. Classes
- 2.1.1 Design of Class types
- 2.1.2 Sealed Class
- 2.1.3 Abstract Class and Abstract Base Class
- 2.1.4 Partial Class

2.3. Structures
- 2.2.1 Design of Structure type
- 2.2.2 Comparison of Structure type and Class type

2.4. Enumeration
2.5. Importance of special keyword like this, static, etc.
2.6. Access Modifiers
2.7. Inheritance
2.8. Polymorphism
- 2.8.1 Overloading
- 2.8.2 Overriding

2.9. Properties
- 2.9.1 Importance of Property type
- 2.9.2 Read-Only and Write-Only Properties
- 2.9.3 Static Properties

2.10. Interfaces
- 2.10.1 Concept and usage of Interface Type
- 2.10.2 Desiging Custom Interface
- 2.10.3 Importance of Interface
- 2.10.4 Comparing Interface with Abstract Base Class
- 2.10.5 Implementing an Interface
- 2.10.6 Working with built-in Interfaces like IEnumerable, IEnumerator, ICloneable and IComparable

2.11. Exception & Error Handling
2.12. Threads and Multi-Threading
2.13. Nullable Type
2.14. Serialization
2.15. Attributes and Annotations

Unit : 3 : Working with Collections, Delegates and Events

3.1 Collections
- 3.1.1 Introduction to Collections
- 3.1.2 Arrary
- 3.1.3 ArrayList
- 3.1.4 BitArray
- 3.1.5 Stack
- 3.1.6 Queue
- 3.1.7 SortedList
- 3.1.8 Hashtable

3.2 Indexer
- 3.2.1 Defining Indexer
- 3.2.2 Indexing Collection using Different Data Types
- 3.2.3 Advantages over Collections
- 3.2.4 Difference between Indexer and Property Type

3.3 Delegates
- 3.3.1 Defining Delegates
- 3.3.2 Creating and Invoking Delegate
- 3.3.3 Advantages of Delegates
- 3.3.4 Multicasting Delegates
- 3.3.5 Limitations of Multicast Delegates

3.4 Events

3.4.1 Defining Events
3.4.2 Creating Custom Events
3.4.3 Publishing and Subscribing an Event
3.4.4 Raising an Event

Unit : 4 : Programming using ASP.NET Core MVC

4.1. Introduction to ASP.NET Core
4.1.1 Web Forms
4.1.2 Web Pages
4.1.3 MVC
4.2. Two-Tier, Three-Tier and N-Tier Application Architecture
4.3. MVC Architectural Pattern
4.4. URL Routing and Configuration
4.5. Working with Models
4.5.1 Creating Models
4.5.2 Data Access using Models
4.5.3 Managing Temporary Data using Models
4.5.4 Managing Data using ADO.NET
4.5.5 Working with Stored Procedures
4.6. Working with Controllers
4.6.1 Creating a Controller
4.6.2 Role of Controller
4.7. Working with Views
4.7.1 Creating and Rendering a simple View
4.7.2 Custom View with and without Model
4.7.3 Layout View and Partial View
4.7.4 HTML Helper Class, Extension and Strongly Typed Methods
4.7.5 Design of View using CSS
4.7.6 Use of JavaScript and Bootstrap
4.7.7 Working with Razor Pages
4.7.8 Data Validation

Unit : 5 : Web Application Management

5.1 State Management
5.1.1 Application
5.1.2 Session
5.1.3 Cookie
5.1.4 QueryString
5.1.5 TempData, ViewBag and ViewData
5.2 Environment Variables
5.3 Unit Testing of MVC Application
5.4 NuGet Package Manager
5.5 Navigation

Case studies of Vedic Mathematics Sutras in C# .NET :

- Sankalana-Vyavakalanabhyam : "By addition and by subtraction."
- Puranapuranabhyam : "By the completion or non-completion."
- Chalana-Kalana : "By motion or by applying a shift."
- Yavadunam : "Whatever is the deficiency."
- Vyastisamanstih : "The parts and the whole."
- Sesanyan : "The remainder."
- Gunitasamuchyah : "The product of the sum."
- Vistaran : "Expansion."
- Rupan : "Form."
- Chidana : "By splitting."

Reference Book	1. C# and the .NET Platform by Andrew Troelsen : APress 2. C# The Basics by Vijay Mukhi : BPB 3. C# Essentials by Ben Albabari : O'Reilly 4. Professional C# by Simon Robinson : Wrox 5. ADO.NET Programmer's Reference : Wrox. 6. C# The Nuts & Bolts by Akash Sarat & Sonal Mukhi : BPB 7. ASP.NET MVC with Entity Framework and CSS by Lee Naylor : APress 8. Pro ASP.NET Core MVC by Adam Freeman : APress 9. Learning ASP.NET Core MVC Programming by Mugilan T. S. Ragupathi : Packt Publishing Ltd 10. Murach's ASP.NET Core MVC by Mary Delamater, Joel Murach : Mike Murach & Associates, Inc
Teaching Methodology	Lectures, Discussion, Independent Study, Seminars and Assignment

Subject Code [2511001106030001]

B.Sc. (I.T.) 6th Semester

Course : 603 : Practical-6

Course Code	603
Course Title	Practical-6
Credit	4
Teaching per Week	8 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2025
Purpose of Course	To equip students with practical knowledge of Java and .NET technologies
Course Objective	This course aims to provide students with hands-on experience in developing applications using both Java and .NET frameworks
Pre-requisite	Fundamentals of Programming
Course Out come	CO1: Apply object-oriented programming (OOP) principles using Java and C#.NET Core to develop modular and reusable applications. CO2: Design and develop web applications using ASP.NET Core MVC to build scalable and maintainable software solutions. CO3: Implement CRUD operations in Java and ASP.NET Core MVC applications to manage and manipulate data efficiently.
Mapping between COs with PSOs	

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1					
CO2					
CO3					

Course Content	Practical based on Paper No. 601 & Paper No. 602. Weightage: 50% based on Paper No 601 & 50% based on Paper No 602 **Design and develop web application based on Bhartiya Gyan Parampara** **Principles of Mathematics, Geometry and Triangles in Ancient Indian Knowledge:** ○ Principles of Mathematics by Aryabhatt. ■ Principles of Mathematics: Sutra (Verse 1.1) ■ Value of Pi: Sutra (Verse 3.1) ■ Sine Function: Sutra (Verse 3.2) ■ Trigonometric Functions: Sutra (Verse 3.11) ○ Ancient knowledge From the Shulba Sutras (a part of Vedic texts): ■ Construction of a square ■ The original version of current Pythagorean theorem (Sulbha Sutra 1.2) ■ Area of Circle ■ Area of Triangle ○ Ancient knowledge by Brahmgupta : ■ Area of Cyclic Quadrilateral. (Sutra(vere-10)) [Implementation of all sutras in computer Lab. Java / C#]
Teaching Methodology	Lab Work, Assignment

P. M Desai

Subject Code [2511001106040001]

B.Sc. (I.T.) 6th Semester

Course : 604 : Fundamentals of Cloud Computing

Course Code	604
Course Title	Fundamentals of Cloud Computing
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2025
Purpose of Course	This course helps students to understand basic concepts of Cloud Computing and Cloud Architecture.
Course Objective	To impart knowledge of Cloud Computing basic concepts and cloud services.
Course Out come	CO1: Explain different types of computing models and analyze virtualization concepts used in cloud computing. CO2: Describe the fundamental concepts and illustrate the architecture of cloud computing. CO3: Compare cloud computing services, infrastructure, and architecture to evaluate their applications in real-world scenarios.
Mapping between COs with PSOs	
Pre-requisite	Basic concepts of Programming, Operating System and Networking
Course Content	**Unit : 1: Fundamentals to Cloud Computing** 1.1 Need of Cloud Computing 1.2 Evolution of Cloud Computing 1.3 Characteristics of Cloud Computing (Elasticity, Self Provisioning Resources, Billing and Monitoring of Services, Security, etc.) 1.4 Cloud Service Models 1.4.1 Infrastructure as a Service 1.4.2 Platform as a Service 1.4.3 Software as a Service 1.5 Cloud Delivery Models 1.5.1 Private Cloud 1.5.2 Public Cloud 1.5.3 Hybrid Cloud 1.6 Difference Between Traditional Commuting and Cloud Computing 1.7 Issues and Challenges for Cloud Computing **Unit : 2 : Virtualization** 2.1 Introduction of Virtualization 2.2 Need of Virtualization 2.3 Layering and Virtualization 2.4 Virtual Machine 2.5 Virtual Machine Monitors 2.6 Performance and Security Isolation 2.7 Software Fault Isolation 2.8 Types of Virtualization 2.8.1 Full Virtualization and Para Virtualization 2.8.2 Hard Virtualization and Soft Virtualization 2.8.3 Server Virtualization 2.8.4 OS Level Virtualization 2.8.5 Application Level Virtualization 2.8.6 Network Level Virtualization

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1					
CO2					
CO3					

	2.8.7 Desktop Virtualization 2.8.8 Storage Virtualization 2.9 Advantages and Limitations of Virtualization 2.10 Virtualization Tools **Unit : 3 : Cloud Infrastructure and Architecture** 3.1. Cloud Data Center Architecture 3.2. Region 3.3. Availability Zone 3.4. Point of Presence (PoP) 3.5. Conceptual View of Networking in Cloud Computing 3.6. Virtual Private Cloud 3.7. Service Level Agreement 3.8. Cloud Pricing Model 3.9. Identity and Access Management Service 3.10. Cloud Computing Stack 3.10.1 Composability 3.10.2 Infrastructure 3.10.3 Platforms 3.10.4 Applications **Unit : 4 : Basic Cloud Services** 4.1 Compute Services 4.1.1 Introduction to Compute Service 4.1.2 Instance based Compute Service 4.1.3 Server less Compute Service 4.1.4 Application Deployment Service 4.2 Storage Services 4.2.1 Introduction to Storage Service 4.2.2 General Storage Service 4.2.2 Elastic Storage Service 4.2.3 Cold Storage Service 4.3 Database Services 4.3.1 Relational Database Service 4.3.2 No-SQL Database Service 4.3.3 Purpose-Built Database Service 4.4 Network Services 4.5 Security Services **Unit : 5 : Case Studies** Cloud Services offered by AWS / Azure / GCP or any other similar type of Cloud Service provider.
Reference Book	1. Cloud Computing and Virtualization by Dac-Nhuong Le, Raghvendra Kumar, Gia Nhu Nguyen, Jyotir Moy Chatterjee, WILEY 2. Cloud Computing : A Practical Approach by Anthony Velte, Toby Velte, Robert Elsenpeter, Mc Graw Hill 3. Cloud Computing – Black Book by Kailash Jayaswal, Jagannath kallakurchi, Donald Houde, Deven Shah, Dreamtech Press 4. Architecting The Cloud by Michael Kavis, WILEY 5. Cloud Computing for Dummies by Judith Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper, WILEY. 6. Executive's Guide to Cloud Computing by Eric A. Marks, Bob Lozano, WILEY. 7. The Basics of Cloud Computing - Understanding the Fundamentals of Cloud Computing in Theory and Practice by Derrick Rountree, Ileana Catrillo, Elsevier.
Teaching Methodology	Lectures, Discussion, Independent Study, Seminars and Assignment

P.T. Desai

Subject Code [2511001106060001]

B.Sc. (I.T.) 6th Semester

Course : 606 : Internship

Course Code	606
Course Title	Internship
Credit	4
Teaching Per Week	4
Minimum Weeks Per Semester	15 (Including Practical Work, Examination, Preparation, Holidays etc.)
Last Review/Revision	June 2025
Purpose of Course	The purpose of the course is to develop software to solve real world problems.
Course Objective	To train students to develop and implement software projects
Prerequisite	Knowledge of Object Oriented Programming, RDBMS, Web Technology Fundamentals, Software Engineering etc...
Course Out comes	CO1: Design and develop software applications by applying programming concepts and methodologies. CO2: Analyze real-world problems and apply Software Engineering principles to develop effective solutions. CO3: Design and implement database concepts for software applications.
Mapping between COs with PSOs	

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1					
CO2					
CO3					

Course Content	The students are required to develop a project. The students must prepare documentation of the project completed as per the Software Engineering Guidelines. At the end of the semester, the students have to submit their project report in bounded form to the institution. The Project Presentation and Viva – Voce will be conducted as per the University exam schedule. The students have to submit the following reports at the institution: 1. Project Joining Report 2. Project Title Report 3. Progress Report 4. Project Completion Certificate 5. Institution Certificate Non disclosure of Source Code Certificate (In case the student is unable to submit project source code) University appointed examiner(s) may ask to develop some part of the project that is submitted by the student.
Teaching Methodology	Project work either at the Industry or at the Department / College