



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, ઉદ્ધના-મગદલા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.

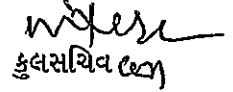
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-: પરિપત્ર :-

યુનિવર્સિટી સંલગ્ન તમામ કોમ્પ્યુટર સાયન્સ વિદ્યાશાખા હેઠળની તમામ કોલેજોના આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૬-૨૭ થી અમલમાં આવનાર T. Y. B.Sc. Computer Application Sem.-5 & 6 નો પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ અભ્યાસક્રમ કોમ્પ્યુટર સાયન્સ વિષયની અભ્યાસ સમિતિની તા.૨૫/૦૩/૨૦૨૬ ની સભાના ઠરાવ ક્રમાંક:૧૪ થી મંજૂર કરી કોમ્પ્યુટર સાયન્સ ફેકલ્ટીને કરેલ ભલામણ કોમ્પ્યુટર સાયન્સ ફેકલ્ટીની તા. ૨૯/૦૪/૨૦૨૬ ની સભાના ઠરાવ ક્રમાંક:૧૧ થી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા.૦૭/૦૫/૨૦૨૬ ની સભાના ઠરાવ ક્રમાંક:૫૨ થી મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

બિડાણ: ઉપર મુજબ

ક્રમાંક:ઓથો./પરિપત્ર/૧૦૦૭૭/૨૦૨૬
તા.૧૨/૦૫/૨૦૨૬


કુલસચિવ

પ્રતિ,

- ૧) યુનિવર્સિટી સંલગ્ન તમામ કોમ્પ્યુટર સાયન્સ કોલેજોના આચાર્યશ્રીઓ.
.....આપશ્રીની કોલેજના સંબંધિત શિક્ષકો/વિદ્યાર્થીને જાણ કરી અમલ કરવા સારું.
- ૨) ઈ.ચા.ડીનશ્રી, કોમ્પ્યુટર સાયન્સ વિદ્યાશાખા.
- ૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
.....તરફ જાણ તેમજ અમલ સારું.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
Program Structure: B.Sc.CA (SEM – 5)
(w.e.f. Academic Year June, 2026-2027)
B.Sc. Computer Application (B.Sc.CA) – Three Year Program

Name of Program	B.Sc. Computer Application (B.Sc.CA)
Program Abbreviation	B.Sc.CA
Duration	3 year of B.Sc.CA degree program with multi-level exit options at 1 st and 2nd Year to obtain Certificate, Diploma and Degree Degree in Computer Application respectively.
Eligibility Criteria	Candidate must have passed standard 12th (H.S.C.) Examination in Science (Any Group) / Commerce / vocational / General stream from Gujarat Higher Secondary Board (G.H.S.E.B.) or any other equivalent board (C.B.S.E. / I.C.S.E. / NIOS etc. which must be approved and possess equivalence certificate from Veer Narmad South Gujarat University) with English as one of the subject. In case of candidates passed out from 12th Board from General Stream; having English as one of the subjects. In case of Students passed out with 12th (H.S.C.) vocational stream, Computer and English must be one of the subject.
Pre-requisite	AS PER UNIVERSITY NORMS
Medium of Instruction	English
Objective of Program	
Program Outcome (PO)	PO1: Ability to analyze a problem, identify and define the Computing requirements appropriate to its solution. PO2: Enhancing the problem solving, logical, reasoning and analysis capabilities of a problem and integrate the ability with the coding using specific computer programming languages. PO3: To generate Understanding regarding the core and fundamental ideas

	<p>about the computer platforms, operating systems, software design concepts, networking concepts and advanced and emerging technologies.</p> <p>PO4: Design, implement and evaluate a computer-based system, processing, component or program to meet desired goal with the help of various programming languages, application software, packages, tools, databases on various platforms.</p> <p>PO5: An ability to apply design and development principles in construction of software systems of varying complexity using various algorithmic principles, modeling, coding and design of computer-based systems.</p> <p>PO6: Prepare the aspiring students to become computer software professionals who can work in corporate/software industry at entry to advanced level as well as independent developers.</p> <p>Overall, the program outcomes aim to produce graduates who are: (a) competent in computer application, development and design. (b) Adapt to changing technology and industry trends. (c) Can make significant contributions to the software applications coding, designing, database managements, testing, deployments and ready to adapt any upcoming technologies.</p>
<p>Program Specific Outcomes (PSO)</p>	<p>PSO1: Developing understanding about the fundamentals of core concepts of logic developments, critical thinking and problem solving capabilities. Emphasis on effective communication.</p> <p>PSO2: Improving analytical and applied concepts using various technologies, coding concepts and implementation of coding to solve the problems.</p> <p>PSO3: Development of team building concepts and working in team with positive approach, enhancing the mindset to contribute as an individual to the team. Improving interpersonal skills.</p> <p>PSO4: Improving student’s Understanding related to technical problems and enhancing their capabilities to address the problems to turn into solutions through various possible ways by enhancing critical thinking ability.</p> <p>PSO5: Develop students to capabilities for self-learning, skill development</p>

Structure of Program (Semester-5)

Course Category	Course Code	Course Title	Marksheet Title in English	Level of Course	Teaching Hours/Week		Exam Duration		Credit		Internal Marks		External Marks		Total Marks	
					TH	PR	TH	PR	TH	PR	TH	PR	TH	PR	TH	PR
					MAJOR	501	Advanced Web Design and Development (Major-01)		400-499 Advanced Courses	2	4	1	2	2	2	25
MAJOR	502	Web Technology: Framework and Services (Major-02)		400-499 Advanced Courses	2	4	1	2	2	2	25	25	25	25	50	50
MAJOR	503	Web Application Development using ASP.NET (Major-03)		400-499 Advanced Courses	2	4	1	2	2	2	25	25	25	25	50	50
MINOR	504	Linux Operating System and Shell Programming (Minor-04)		200-299 Intermediate Level Course	2	4	1	2	2	2	25	25	25	25	50	50
MINOR	505	Network Fundamentals and Internet Technology (Minor-05)		200-299 Intermediate Level Course	4	0	2	0	4	0	50	0	50	0	100	0
		Project-01 (Based on course code: 503)	Project will be developed in group of maximum three students based on approved definition by the concerned faculty members. The project report will be submitted by the students regularly. The final evaluation will be based on Project presentation, E-report and viva-voce.													

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	B.Sc. Computer Application (B.Sc.CA)					
Semester	5					
NCrF Credit Level	5.5					
Course Type	Major					
Course Subtype	Nil					
Subject Type	Discipline Specific					
Course Code	501					
Course Level	400-499 Advanced Courses					
Course Title	Advanced Web Design and Development (Major)					
Credit	Theory:	2	Practical:	2	Total:	4
Effective From	Academic Year : 2026-2027					
Course Outcomes	<p>CO1: Explain modern web development concepts and architectures. (Understand)</p> <p>CO2: Use frontend frameworks to build dynamic user interfaces. (Apply)</p> <p>CO3: Implement backend logic and database operations. (Apply)</p> <p>CO4: Analyze client–server communication using APIs. (Analyze)</p> <p>CO5: Develop a complete web application project. (Create)</p>					
Mapping between Cos and PSOs		PSO 1	PSO 2	PSO 3		
	CO1					
	CO2					
	CO3					
	CO4					
	CO5					
Course Content	<p>Unit 1: Modern Web Development Overview</p> <p>1.1 Single Page Application</p> <p>1.2 Frontend and Backend Development</p> <p>1.3 Introduction to Web Frameworks and APIs</p> <p>1.4 Overview of MERN Stack Development</p> <p> 1.4.1 Overview of Elements (MongoDB, ExpressJS, React and Node)</p> <p> 1.4.2 Concept of NoSQL, Advantages and Features</p> <p> 1.4.3 Managing Collections (Insert, Update, Delete, and Query)</p> <p>1.5 Operators and Aggregation Commands</p> <p>Unit 2: Working with React JS</p> <p>2.1 Overview of React</p> <p>2.2 Understanding Structure of React</p> <p> 2.2.1 Components and Props</p> <p> 2.2.2 Conditional Statements, Operators and List</p>					

	<p>2.2.3 Styling react Components</p> <p>2.2.4 React Class and Events (Event object, Adding event, passign Argument)</p> <p>2.3 Working with Forms</p> <p>2.3.1 Adding and Handling Forms in react JS</p> <p>2.3.2 Form Components</p> <p>2.3.3 Form Validation</p> <p>2.4 Hooks (Concept and Advantages)</p> <p>2.4.1 useState, useEffect, useContext</p> <p>2.4.2 useRef, useReducer, useCallback, useMemo</p> <p>2.4.3 Building Custom hooks</p> <p>Unit 3: Working with Express JS</p> <p>3.1 Introduction to Express JS</p> <p>3.1.1 Express JS vs. Traditional Backend approach</p> <p>3.1.2 Features and Advantage of Express JS</p> <p>3.2 Creating Express Application</p> <p>3.3. Basic Routing Concept</p> <p>3.3.1 HTTP Methods: GET, POST, PUT, DELETE</p> <p>3.3.2 Route Parameters and Query String</p> <p>3.3.3 Separating routes using Express Router</p> <p>Unit 4: Express JS with React and MongoDB</p> <p>4.1 Using Mongoose (Introduction)</p> <p>4.1.1 Defining Schema and Model</p> <p>4.1.2 Performing CRUD operations using Express routes</p> <p>4.2 Connecting Express APIs with React</p> <p>4.2.1 Using fetch / axios for API calls</p> <p>4.2.2 Data flow between React and Express</p> <p>4.3 Deployment and Testing of React Application</p>
Reference Books	<p>1. Learning React – Alex Banks & Eve Porcello</p> <p>2. Full-Stack Web Development with React – Eric Bush</p> <p>3. Web Development with Node and Express – Ethan Brown</p> <p>MongoDB Basics – David Hows</p>
Teaching Methodology	<p>Classroom Teaching, Hands-on Lab Sessions, Guided Project Work, Demonstrations, Assignments, and Discussions.</p>
Evaluation Method	<p>Internal Assessment (50%): Attendance, Assignments, Internal Tests, Project Work</p> <p>External Assessment (50%): Theory Examination, Project Demonstration and Viva-Voce</p>

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	B.Sc. Computer Application (B.Sc.CA)								
Semester	5								
NCrF Credit Level	5.5								
Course Type	Major								
Course Subtype	Nil								
Subject Type	Discipline Specific								
Course Code	502								
Course Level	400-499 Advanced Courses								
Course Title	Web Technologies: Frameworks and Services								
Credit	Theory:	2	Practical:	2	Total:	4			
Effective From	Academic Year : 2026-2027								
Course Outcomes	<p>CO1 - Understand the fundamentals of web frameworks, MVC architecture, and client–server concepts used in modern web development.</p> <p>CO2 - Develop basic server-side web applications using appropriate frameworks and handle form data using GET and POST methods.</p> <p>CO3 - Design and implement basic CRUD operations with database connectivity in a web application.</p> <p>CO4 -.Understand the concept of web services and RESTful APIs, and integrate APIs using standard HTTP methods and JSON format.</p> <p>CO5 – Apply basic authentication, security concepts, and deployment steps for web applications in real-world environments.</p>								
Mapping between Cos and PSOs		PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
Course Content	<p>1 Fundamentals of Web Framework</p> <p>1.1 Introduction to Web Framework</p> <p>1.1.1 Understanding the role of PHP in server-side web development</p> <p>1.1.2 History and evolution of PHP</p> <p>1.1.3 Installation and configuration using XAMPP/WAMP</p> <p>1.1.4 Setting up the development environment using Visual Studio Code</p> <p>1.2 Basic PHP Syntax and Variables</p> <p>1.2.1 PHP script structure and tags</p> <p>1.2.2 Declaring and using variables and constants</p>								

1.2.3 Using echo and print statements

1.2.4 Comments and formatting conventions

1.3 Data Types and Operators

1.3.1 Primitive types: string, int, float, Boolean

1.3.2 Arrays and objects

1.3.3 Type casting and type juggling

1.3.4 Operators: arithmetic, logical, comparison, assignment

1.4 Control Structures and Arrays

1.4.1 Conditional statements: if, else, elseif, switch

1.4.2 Looping constructs: for, while, do-while, foreach

1.4.3 Arrays: indexed, associative, multidimensional

1.4.4 Array operations: sort(), asort(), ksort(), array_merge()

1.5 Functions and Form Handling

1.5.1 Creating and invoking user-defined functions

1.5.2 Function parameters and return values

1.5.3 Variable scope: global vs. local

1.5.4 Handling forms with \$_GET and \$_POST

1.5.5 Basic input validation and sanitization

2 Server-Side Web Application Development

2.1 File Handling and Directories

2.1.1 Including files using include and require

2.1.2 File operations: fopen(), fread(), fwrite(), fclose()

2.1.3 File upload using \$_FILES and move_uploaded_file()

2.1.4 File download using PHP headers

2.1.5 Directory operations: opendir(), readdir(), mkdir(), rmdir()

2.2 Forms, Filters, and JSON

2.2.1 Designing and handling HTML forms

2.2.2 Server-side validation techniques

2.2.3 PHP filters: filter_var() and constants

2.2.4 Parsing and generating JSON with json_encode() and json_decode()

2.3 Cookies, Sessions, and Emails

2.3.1 Creating and accessing cookies using setcookie() and \$_COOKIE

2.3.2 Session management with session_start() and \$_SESSION

2.3.3 Sending emails using the mail() function

2.3.4 Email formatting: headers, subject, attachments

2.4 OOP and Exception Handling in PHP

2.4.1 Creating classes and objects

2.4.2 Using constructors and property visibility

2.4.3 Inheritance and method overriding

2.4.4 Exception handling: try, catch, finally, throw

2.4.5 Input validation using regular expressions

3 Web Services and API Integration

3.1 PHP with MySQL/MongoDB

3.1.1 Connecting to databases using mysqli or PDO

3.1.2 Creating databases and tables

3.1.3 Executing CRUD operations: INSERT, SELECT, UPDATE, DELETE

3.1.4 Using clauses: WHERE, ORDER BY, LIMIT

3.2 AJAX for Backend Integration

3.2.1 Introduction to AJAX and asynchronous requests

	<p>3.2.2 Sending AJAX requests to PHP</p> <p>3.2.3 Real-time search functionality</p> <p>3.2.4 JSON data exchange with JavaScript and PHP</p> <p>4 CodeIgniter Framework and MVC Implementation</p> <p>4.1 CodeIgniter Introduction</p> <p>4.1.1 Installing and configuring CodeIgniter (CI4)</p> <p>4.1.2 Understanding MVC architecture in CodeIgniter</p> <p>4.1.3 Creating models, views, and controllers</p> <p>4.1.4 URL routing and default controller setup</p> <p>4.2 Core Features in CodeIgniter</p> <p>4.2.1 Form validation using CI validation library</p> <p>4.2.2 Session management and flashdata</p> <p>4.2.3 Handling file uploads</p> <p>4.2.4 Loading helpers and libraries</p>
Reference Books	<ol style="list-style-type: none"> 1. CodeIgniter 4 User Guide – Official Documentation. 2. RESTful Web APIs – Leonard Richardson and Mike Amundsen. 3. REST API Design Rulebook – Mark Masse. 4. Web Application Development with PHP and MySQL – Luke Welling and Laura Thomson. 5. Learning PHP, MySQL & JavaScript – Robin Nixon. 6. Head First Design Patterns – Eric Freeman and Elisabeth Robson. 7. Designing Web APIs – Brenda Jin, SaurabhSahni and Amir Shevat. 8. Pro PHP MVC – Chris Pitt. 9. Modern Web Development – Paul Deitel and Harvey Deitel. <p>Official online documentation and tutorials related to Web Frameworks and Web Services.</p>
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments
Evaluation Method	<p>50% Internal assessment.</p> <p>-Class attendance, class assignment, home assignment, Unit Tests.</p> <p>50% External assessment.</p> <p>- Theory/Written examination</p>

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	B.Sc. Computer Application (B.Sc.CA)					
Semester	5					
NCrF Credit Level	5.5					
Course Type	Major					
Course Subtype	Nil					
Subject Type	Discipline Specific					
Course Code	503					
Course Level	400-499 Advanced Courses					
Course Title	Web Application Development using ASP.NET(Major)					
Credit	Theory:	2	Practical:	2	Total:	4
Effective From	Academic Year : 2026-2027					
Course Outcomes	<p>CO1: Explain the architecture of ASP.NET, .NET Framework, CLR, and event-driven programming model.</p> <p>CO2: Develop web pages using ASP.NET Web Server Controls, Validation Controls, Login Controls, and Navigation Controls.</p> <p>CO3: Differentiate between client-side and server-side state management techniques and select appropriate methods for various applications.</p> <p>CO4: Implement database connectivity and data manipulation using ADO.NET components.</p> <p>CO5: Apply error handling, configuration settings, and validation mechanisms to enhance security and reliability of web applications.</p> <p>CO6: Design and develop a fully functional database-driven ASP.NET web application integrating state management, data binding, and web services.</p>					
Mapping between Cos and PSOs		PSO 1	PSO 2	PSO 3		
	CO1					
	CO2					
	CO3					
	CO4					
	CO5					
	CO6					
Course Content	<p>Unit-1. Introduction to ASP.NET and its controls</p> <p>1.1 Concepts of ASP.NET</p> <p>1.2 .NET Framework</p> <p>1.3 Compile Code (Code Behind and Inline Code)</p> <p>1.4 Common Language Runtime (CLR)</p> <p>1.5 Event Driven Programming</p> <p>1.6 Web Server Controls</p> <p> TextBox, Button, CheckBox, CheckBoxList, Image, Image Map, Label, Hyperlink, DropDownList, LinkButton, RadioButton, RadioButtonList, BulletedList, FileUpload, ImageButton, MultiView, Placeholder, Panel, AdRotator, Calendar, ListBox</p>					

	<p>1.7 Post Back</p> <p>1.8 Data Binding Controls and Their Events</p> <p> 1.8.1 Grid View</p> <p> 1.8.2 Repeater</p> <p> 1.8.3 Form View</p> <p> 1.8.4 Data List</p> <p>1.9 Validation Controls, Login Controls, Navigation Controls</p> <p>1.10 Master Pages, CSS & Themes</p> <p>Unit 2: Client-Server Communications</p> <p>2.1 Communication with Web Browser</p> <p>2.2 Response, Request and Server Object</p> <p>2.3 State Management</p> <p> 2.3.1 Client Side</p> <p> 2.3.1.1 Cookies</p> <p> 2.3.1.2 Query String</p> <p> 2.3.1.3 View State</p> <p> 2.3.2 Server Side</p> <p> 2.3.2.1 Session</p> <p> 2.3.2.2 Application</p> <p>Unit 3: Database Access</p> <p>3.1 Introduction to ADO.NET</p> <p>3.2 Introduction about Data Provider (Connection, Command, Data Adapter, Data Reader) and Data Set</p> <p>3.3 Database Access using ADO.NET</p> <p>Unit 4: Advance ASP.NET</p> <p>4.1 Web.config</p> <p>4.2 Error Handling</p> <p> 4.2.1 Page Level</p> <p> 4.2.2 Application Level</p> <p>4.3 Web Services</p> <p> 4.3.1 Basics of Web Services</p> <p> 4.3.2 Interacting with web services</p>
Reference Books	<ol style="list-style-type: none"> 1. Beginning ASP.NET 4.5: in C# and VB, ImarSpaanjaars, John Wiley & Sons (Wrox), ISBN: 9781118311806 2. ASP.NET 4.5 Black Book (C# & VB Codes), Kogent Learning Solutions Inc., Wiley India / Dream tech Press, ISBN: 9789351190806 3. ASP.NET Developer's Guide, Greg Buczek, McGraw Hill Education, ISBN: 9780070499171 4. ASP.NET and VB.NET in 30 Days, PratiyushGuleria, BPB Publications, ISBN: 9789355511072 <p>Programming ASP.NET Core, Dino Esposito, PHI Learning / Pearson India, ISBN: 9789388028431</p>
Teaching Methodology	Classroom Teaching, Hands-on Lab Sessions, Guided Project Work, Demonstrations, Assignments, and Discussions.
Evaluation Method	Internal Assessment (50%): Attendance, Assignments, Internal Tests, Project Work External Assessment (50%): Theory Examination, Project Demonstration and Viva-Voce - Theory/Written examination

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	B.Sc. Computer Application (B.Sc.CA)								
Semester	5								
NCrF Credit Level	5.5								
Course Type	MINOR								
Course Subtype	NIL								
Subject Type	Discipline Specific								
Course Code	504								
Course Level	200-299 (Intermediate Level)								
Course Title	Linux Operating System and Shell Programming								
Credit	Theory:	2	Practical:	2	Total:	4			
Effective From	Academic Year : 2026-2027								
Course Outcomes	<p>CO1 - Understand: Explain the structure and components of Linux systems. CO2 - Apply: Use Linux commands for file handling, text processing, and system tasks. CO3 - Create: Write and execute shell scripts to automate operations. CO4 - Analyse: Analyse file types, permissions, and directory structures. CO5 – Apply: Use redirection and pipes to control input/output streams.</p>								
Mapping between Cos and PSOs		PS01	PS02	PS03	PS04	PS05	PS06	PS07	PS08
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
Course Content	<p>Unit 1: Introduction to Linux 1.1 Overview of Operating Systems 1.2 History and Features of Linux 1.3 Linux Architecture (Kernel, Shell, File System) 1.4 Linux Distributions 1.5 Booting Process (Basic Concept) 1.6 Basic Linux Commands 1.6.1. pwd, ls, cd, clear 1.6.2 date, cal, who, uname, man</p> <p>Unit 2:File System Management, File Permissions, Process Management 2.1 Linux File System Structure 2.1.1 Directory Hierarchy & File Types 2.1.2 File and Directory Management Commands – mkdir, rmdir, pwd, cd, tree, ls, cp, mv, rm, cat, more, less, head, tail</p>								

	<p>2.1.3 System Commands – who, whoami, man, echo, date, clear</p> <p>2.1.4 Wildcards and Pattern Matching</p> <p>2.1.5 File Permissions and Ownership – chmod (symbolic and numeric modes), chown, chgrp</p> <p>2.2 Text Processing Commands – head, tail, cut, sort, cmp, tr, uniq, wc, tee</p> <p>2.3 Hard Links and Soft Links</p> <p>2.4 Concept of Processes in Linux</p> <p>2.5 Foreground and Background Jobs – fg, bg, at, batch, crontab</p> <p>2.6 Process Management Commands – ps, top, kill, nice</p> <p>Unit 3 : Shell Scripting in Linux</p> <p>3.1 Creating and Executing Shell Scripts (nano, vi, ./script.sh)</p> <p>3.2 Shell Metacharacters and Operators</p> <p>3.2.1 Filename Expansion (wildcards: *, ?, [])</p> <p>3.2.2 Input/Output Redirection (>, >>, <)</p> <p>3.2.3 Pipes ()</p> <p>3.2.4 Command Substitution (\$(…), …)</p> <p>3.3 Control Flow Structures (if-else, case, for, while, until)</p> <p>3.4 Logical Operators (&&, , !)</p> <p>3.5 test and [] command for Condition Testing (file, numeric, string)</p> <p>3.6 Arithmetic Operations (expr, \$(())</p> <p>Unit 4 : Advanced Text Processing Tools</p> <p>4.1 Introduction to Regular Expressions (Basic and Extended)</p> <p>4.2 Pattern Matching using grep, egrep, and fgrep</p> <p>4.3 Stream Editing with sed (search, replace, line deletion, insertion)</p> <p>[All Units carry Equal Weightage]</p>
Reference Books	<ol style="list-style-type: none"> 1. Operating System: Unix and Linux, Behrouz A. Forouzan and Richard F.Gilberg, Cengage India Pvt. Ltd., ISBN:9788131502980 2. UNIX Concepts and Applications, Sumitabha Das, McGraw Hill Education(India), ISBN:9781259006382 3. Introduction to UNIX and Shell Programming, M. G. Venkateshmurthy, PearsonEducation India, ISBN:9788131704377 4. Linux Programming and Administration, N.B. Venkateswarlu, BPB Publications, ISBN:9788176567813 5. UNIX and Shell Programming, B.A. Forouzan& F. Gilberg, Cengage LearningIndia, ISBN:9788131508050 6. Linux Command Line and Shell Scripting Bible, Richard Blum and ChristineBresnahan, Wiley India Pvt. Ltd., ISBN:9788126562169 7. How Linux Works: What Every Superuser Should Know, Brian Ward, NoStarch Press, ISBN:9781593275679 8. The Linux Programming Interface, Michael Kerrisk, No Starch Press, ISBN:9781593272203 9. Linux Pocket Guide, Daniel J. Barrett, O’Reilly Media, ISBN:9781491927571 10. UNIX and Linux System Administration Handbook, Evi Nemeth, Garth Snyder,Trent R. Hein, Ben Whaley, Dan Mackin, Pearson Education,ISBN:9780134277554
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	<p>50% Internal assessment.</p> <ul style="list-style-type: none"> - Attendance, Class and home Assignment, Unit tests. - Practical exam, viva-voce, E-Journal <p>50% External assessment.</p> <ul style="list-style-type: none"> - Written Theory exam - Practical Exam, viva-voce

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	B.Sc. Computer Application (B.Sc.CA)								
Semester	5								
NCrF Credit Level	5.5								
Course Type	Minor								
Course Subtype	Nil								
Subject Type	Discipline Specific								
Course Code	505								
Course Level	200-299 Intermediate Level Course								
Course Title	Network Fundamentals and Internet Technology								
Credit	Theory:	4	Practical:	-	Total:	4			
Effective From	Academic Year : 2026-2027								
Course Outcomes	<p>CO1 - Describe fundamental concepts of computer networks, types of networks (LAN, MAN, WAN), and various network topologies.</p> <p>CO2 - Explain the architecture and working of Internet and Intranet along with networking devices such as hub, switch, router, modem, and gateway.</p> <p>CO3 - Understand and interpret the OSI model, its layers, and the role of important networking protocols like HTTP, HTTPS, FTP, SSL, and Telnet.</p> <p>CO4 - Apply knowledge of IP addressing, data packets, and communication protocols in basic networking scenarios.</p> <p>CO5 – Explain the working of application layer services including email communication, URL structure, and website access process.</p> <p>CO6 – Compare HTTP and HTTPS and evaluate the importance of secure communication in networking.</p>								
Mapping between Cos and PSOs		PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
	CO6								
Course Content	<p>1. Introduction to Network</p> <p>1.1 Basics of Network</p> <p>1.1.1 Definition of Computer Network</p> <p>1.1.2 Purpose and Advantages of Networking</p> <p>1.2 Types of Networks</p> <p>1.2.1 LAN,WAN and MAN</p>								

	<ul style="list-style-type: none"> 1.3 Network Topologies <ul style="list-style-type: none"> 1.3.1 Bus, Ring, Mesh, Star, Ring 1.3.2 Advantages and disadvantages of each topology 1.4 Terminologies (Intranet, Internet, Unicast, Broadcast, Multicast) 2. Internet Architecture and Networking Devices <ul style="list-style-type: none"> 2.1 Concepts of Internet and Intranet <ul style="list-style-type: none"> 2.1.1 Working of Internet and its architecture 2.1.2 Working of Intranet and its architecture 2.2 Network Devices: Hub, modem, switch, Routers, Gateways, Access point 2.3 Transmission Media: co-axial, UTP, Fiber Optic cable 3. Network Models and Communication Protocols <ul style="list-style-type: none"> 3.1 Concepts and types of MANET (Mobile Ad hoc network) <ul style="list-style-type: none"> 3.1.1 VANET (Vehicular Ad hoc Network) 3.1.2 Smart phone Ad hoc Network (SPANC) 3.1.3 Flying Ad hoc network (FANET) 3.2 concepts of OSI(Open Source Interconnection) layers <ul style="list-style-type: none"> 3.2.1 Types of layers 3.2.2 Introduction of OSI Layers and their purpose: Physical layer, Data link layer and Network Layer, Transport layer and Session Layer. 3.3 Important protocols of Network layers <ul style="list-style-type: none"> 3.3.1 Concepts of Data packets and Datagram 3.3.2 Presentation layer protocols and their purpose <ul style="list-style-type: none"> 3.3.2.1 SSL, HTTP, FTP, Telnet 3.4 Concepts of IP address <ul style="list-style-type: none"> 3.4.1 Basic Structure of IPv4 3.5 Difference between http and https 4. Application Layer Services and Email Communication <ul style="list-style-type: none"> 4.1 Application Layer services <ul style="list-style-type: none"> 4.1.1 Concepts of email 4.1.2 Working of email account and services 4.1.3 Component of Email 4.1.4 URL and URL types (Absolute, Relative) 4.2 Case study of email: <ul style="list-style-type: none"> 4.2.1 From sender to receiver (Mailer, Mail Server, Mailbox) 4.2.2 Functionality and use of protocols at different layers 4.3 Case study of locating Website <ul style="list-style-type: none"> 4.3.1 URL and locating URL 4.3.2 Steps and protocols involved in accessing URL 4.3.3 Concepts of search engine and purpose.
Reference Books	<ol style="list-style-type: none"> 1. Computer Networks, Andrew S. Tanenbaum, Pearson, ISBN: 9780132126953 2. Computer Networking: A Top-Down Approach, James F. Kurose & Keith W. Ross, Pearson, ISBN: 9780133594140 3. Data Communications and Networking, Behrouz A. Forouzan, McGraw-Hill Education, ISBN: 9780071326285 4. Computer Networking: Principles, Protocols and Practice, Olivier Bonaventure, Self-published, ISBN: 9780994000403 5. Computer Networks: A Systems Approach, Larry L. Peterson & Bruce S. Davie, Elsevier, ISBN: 9780123850591 6. Networking: A Beginner's Guide, Bruce Hallberg, McGraw-Hill Education, ISBN: 9780072226786

	<p>7. Data and Computer Communications, William Stallings, Pearson, ISBN: 9780133506488</p> <p>8. Computer Networks and Internets, Douglas E. Comer, Pearson, ISBN: 9780136067416</p> <p>9. Network Warrior, Gary A. Donahue, O'Reilly Media, ISBN: 9781449387866</p> <p>High-Performance Browser Networking, IlyaGrigorik, O'Reilly Media, ISBN: 9781449344760</p>
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	<p>50% Internal assessment.</p> <p>-Class attendance, class assignment, home assignment, Unit Tests.</p> <p>50% External assessment.</p> <p>- Theory/Written examination</p>

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	B.Sc. Computer Application (B.Sc.CA)					
Semester	5					
NCrF Credit Level	5.5					
Course Type	SEC					
Course Subtype	Nil					
Subject Type	Discipline Specific					
Course Code	506					
Course Level	200-299 Intermediate Level Course					
Course Title	SEC: Career Readiness and Placement Skills					
Credit	Theory:	4	Practical:	-	Total:	4
Effective From	Academic Year : 2026-2027					
Course Objective	To prepare students for successful placements by developing essential career skills, including resume writing, interview techniques (both technical and HR), effective communication, and the ability to present academic or personal projects confidently and professionally					
Course Content	<p>Unit 1: Resume Building and Portfolio Preparation</p> <ul style="list-style-type: none"> • Structuring a Technical Resume Key sections (Objective, Technical Skills, Projects, Internships, and Certifications), formatting guidelines, and ATS (Applicant Tracking Systems) - friendly practices. • Creating a Professional Online Presence Optimizing LinkedIn for networking and job search; showcasing code, contributions, and repositories on GitHub. • Project Portfolio Development and Presentation Documenting software projects with proper use of version control (e.g., Git), writing project summaries, linking live demos or repositories. • Identifying and Avoiding Common Resume Pitfalls Avoiding generic content, inconsistent formatting, and misrepresentation of skills or experiences. <p>Unit 2: Aptitude, Logical Reasoning, and Group Discussions</p> <ul style="list-style-type: none"> • Fundamentals of Quantitative Aptitude Time and work, percentages, profit and loss, ratio and proportion, number systems, data interpretation—key for technical aptitude tests. • Logical Reasoning Techniques and Practice Pattern recognition, series completion, puzzles, coding-decoding, and 					

	<p>analytical thinking exercises.</p> <ul style="list-style-type: none"> • Verbal Aptitude for Placement Reading comprehension, sentence correction, synonyms-antonyms, para jumbles, and email writing with focus on technical communication. • Group Discussion (GD) Skills GD formats in IT placements, strategies for effective participation, evaluating arguments, mock GDs on technical and current topics. <p>Unit 3: Technical Interview Preparation</p> <ul style="list-style-type: none"> • Fundamentals of Technical Assessment Key concepts from Data Structures (arrays, linked lists, stacks, queues, trees, graphs), Algorithms (sorting, searching, recursion, time complexity), Object-Oriented Programming (OOP) principles, Database Management Systems (DBMS), Operating Systems (OS) fundamentals, and Computer Networks (CN) basics. • Coding Optimization/ Optimized Programming Techniques Hands-on coding through platforms like LeetCode, HackerRank, or CodeChef—covering pattern-based questions, technical test preparation, and debugging skills. • Common Technical Interview Questions and Preparation Techniques Real-world examples and standard technical questions related to programming logic, problem-solving approaches, and conceptual clarity. • Introduction to System Design Basics of system architecture, scalability, client-server model, APIs, and component-based design thinking, tailored for entry-level interviews. <p>Unit 4: Professional Communication and Interview Skills / Interpersonal Skills and Interview Techniques</p> <ul style="list-style-type: none"> • Professional Self-Introduction Techniques Crafting a concise and professional elevator pitch highlighting technical skills, academic background, and project experience. • Common Interview Questions and Effective Responses Preparing for frequently asked behavioral and technical questions with structured and impactful answers. • Non-Verbal Communication Understanding the impact of body language, eye contact, gestures, tone, and active listening during interviews and professional interactions. • Negotiation Techniques for Job Offers and Workplace Etiquette Learning how to navigate discussions on employment terms and practicing appropriate behavior in corporate environments.
Reference Books	<ul style="list-style-type: none"> • Cracking the Coding Interview – Gayle Laakmann McDowell • Quantitative Aptitude for Competitive Examinations – R.S. Aggarwal • Objective General English – S. P. Bakshi • Soft Skills: Personality Development for Life Success – Prashant Sharma
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	<p>50% Internal assessment. -Class attendance, class assignment, home assignment, Unit Tests.</p> <p>50% External assessment. - Theory/Written examination</p>

Structure of Program (Semester-6)

Course Category	Course Code	Course Title	Marksheet Title in English	Level of Course	Teaching Hours/Week		Exam Duration		Credit		Internal Marks		External Marks		Total Marks	
					TH	PR	TH	PR	TH	PR	TH	PR	TH	PR	TH	PR
MAJOR	601	Data Analytics using Python		400-499 Advanced Courses	2	4	1	2	2	2	25	25	25	25	50	50
MAJOR	602	Full Stack Application Development		400-499 Advanced Courses	2	4	1	2	2	2	25	25	25	25	50	50
MAJOR	603	Project		400-499 Advanced Courses	4		-	-	4		50		50		100	
MINOR	604	Digital Commerce and Cyber Security		200-299 Intermediate level	4	-	2	-	4	-	50	-	50	-	100	-
AEC	605	Project and Interview Presentation Soft Skills[Ability Enhancement Course](AEC)		100-199 Foundation Course	2	-	-	-	2	-	25	-	25	-	50	-
Internship	606	Internship		400-499 Advanced Course	4		-	-	4		50		50		100	

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Sc. Computer Application (B.Sc.CA)								
Semester	6								
NCrF Credit Level	5.5								
Course Type	Major								
Course Subtype	Nil								
Subject Type	Discipline Specific								
Course Code	601								
Course Level	400-499 Advanced Courses								
Course Title	Data Analytics using Python								
Credit	Theory:	2	Practical:	2	Total:	4			
Effective From	Academic Year : 2026-2027								
Course Outcomes	<p>CO1: Understanding – Explain key concepts of Exploratory Data Analysis, including univariate, bivariate, and multivariate techniques, and describe data distributions. CO2: Applying – Use Python libraries like Pandas and NumPy to perform and automate exploratory data analysis on various datasets. CO3: Analyzing – Analyze relationships between variables using regression techniques, and interpret covariance and correlation in datasets. CO4: Understanding & Applying – Describe the types and benefits of Machine Learning, and apply basic ML lifecycle steps to real-world problems. CO5: Evaluating – Evaluate supervised learning models using loss functions such as MSE and MAE, and assess issues like overfitting and underfitting.</p>								
Mapping between Cos and PSOs		PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
Course Content	<p>Unit – 1: Fundamentals of Data Analytics 1.1 Exploratory Data Analysis (EDA) 1.1.1 Types of Exploratory Data Analysis 1.1.2 Univariate Analysis 1.1.3 Bivariate Analysis 1.1.4 Multivariate Analysis 1.1.5 Handling Missing Data and Outliers 1.2 Understanding the Data 1.2.2 Qualitative Data: Non-numerical (Nominal and Ordinal) 1.3 Spread of Data 1.3.1 Normal Distribution 1.3.2 Skewed Distribution 1.3.3 Skewness and Kurtosis</p> <p>Unit – 2: Automate EDA (Exploratory Data Analysis) 2.1 Python Libraries to Automate Exploratory Data Analysis</p>								

	<ul style="list-style-type: none"> 2.1.1 Pandas and NumPy 2.2 Regression <ul style="list-style-type: none"> 2.2.1 Characteristics of Regression 2.2.2 Dependent and Independent Variables 2.2.3 Covariance and Correlation 2.3 Machine Learning Basics <ul style="list-style-type: none"> 2.3.1 Concepts of Machine Learning 2.3.2 Understanding Machine Learning 2.3.3 Benefits of Machine Learning 2.3.4 Machine Learning Lifecycle 2.4 Types of Machine Learning <ul style="list-style-type: none"> 2.4.1 Supervised and Unsupervised Learning 2.4.2 Applications of ML in Real-World Scenarios <p>Unit – 3: Understanding Supervised Learning</p> <ul style="list-style-type: none"> 3.1 Overview of Supervised Learning <ul style="list-style-type: none"> 3.1.1 Concepts of Supervised Learning 3.1.2 Difference between Classification and Regression 3.2 Basic Terminologies <ul style="list-style-type: none"> 3.2.1 Dataset, Features, Labels 3.2.2 Training Data, Test Data, Validation Data 3.2.3 Overfitting, Underfitting 3.3 Loss Functions <ul style="list-style-type: none"> 3.3.1 Mean Squared Error (MSE) <ul style="list-style-type: none"> 3.3.1.1 Definition of MSE 3.3.1.2 Computing MSE and its Properties 3.3.2 Mean Absolute Error (MAE) <ul style="list-style-type: none"> 3.3.2.1 Definition of MAE 3.3.2.2 Computing MAE and its Properties 3.3.3 Understanding Regression and R² <p>Unit-4:Advanced Supervised Learning Techniques – Classification and Regression</p> <ul style="list-style-type: none"> 4.1 Decision Tree Algorithms <ul style="list-style-type: none"> 4.1.1 Fundamental Concepts and Working Mechanism of Decision Trees 4.1.2 Splitting Criteria: Gini Impurity, Entropy, and Information Gain 4.1.3 Tree Complexity, Overfitting, and Pruning Techniques 4.2 Linear Regression Models <ul style="list-style-type: none"> 4.2.1 Introduction to Regression Analysis and Model Assumptions 4.2.2 Simple Linear Regression Model 4.2.3 Multiple Linear Regression Model 4.2.4 Practical Application: Predicting Continuous Outcomes using Python 4.3 K-Nearest Neighbors (KNN) Algorithm <ul style="list-style-type: none"> 4.3.1 Distance Measurement Techniques (Euclidean and Manhattan Metrics) 4.3.2 Selection of Optimal Value of K 4.3.3 Advantages and Limitations of KNN Algorithm 4.4 Support Vector Machines (SVM) <ul style="list-style-type: none"> 4.4.1 Concept of Hyperplanes and Margin Maximization 4.4.2 Linear and Non-Linear Classification Techniques 4.4.3 Kernel Functions and Common Kernels (RBF, Polynomial) 4.4.4 Strengths and Limitations of SVM <p>[Implementation of all sutras of Unit-4 in computer Lab. Using C/Python/Any Prog. Language] [Students will submit E-Document for Project report. One internal guide will be allocated for every ten groups.</p>
Reference Books	<ul style="list-style-type: none"> 1) Data Analytics Using Python, Bharti Motwani, Wiley India Pvt. Ltd., ISBN: 978-93-87034-42-0 2) Data Science and Analytics, V. K. Jain, Khanna Publishing House, ISBN: 978-93-86173-66-3

	<p>3) Data Analytics with Python, R. N. Prasad, Seema Acharya, Wiley India Pvt. Ltd., ISBN: 978-81-265-9337-4</p> <p>4) Foundations of Data Science, Avrim Blum, John Hopcroft, Ravindran Kannan, Universities Press (India) Pvt. Ltd., ISBN: 978-93-86279-47-1</p> <p>5) Python for Data Analysis, Reema Thareja, Oxford University Press India, ISBN: 978-0-19-948017-1</p> <p>6) Python for Data Analysis, Wes McKinney, O'Reilly Media, ISBN: 978-1-491-95766-0</p> <p>7) Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, Aurélien Géron, O'Reilly Media, ISBN: 978-1-492-03264-1</p> <p>8) Data Science from Scratch: First Principles with Python, Joel Grus, O'Reilly Media, ISBN: 978-1-491-91205-8</p> <p>9) An Introduction to Statistical Learning, Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, Springer, ISBN: 978-1-4614-7138-7</p> <p>10) Think Stats: Exploratory Data Analysis in Python, Allen B. Downey, O'Reilly Media, ISBN: 978-1-449-39416-6</p>
Teaching Methodology	ClassWork,Discussion,Presentation,Self-Study,Seminarsand/orAssignments
Evaluation Method	<p>50% Internal assessment.</p> <ul style="list-style-type: none"> - Attendance, Class and home Assignment, Unit tests. - Internal project presentation and demonstration, project documentation. <p>50% External assessment.</p> <ul style="list-style-type: none"> - Theory/written examination - Project presentation and demonstration, viva-voce and e-project report.

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Sc. Computer Application (B.Sc.CA)								
Semester	6								
NCrF Credit Level	5.5								
Course Type	Major								
Course Subtype	Nil								
Subject Type	Discipline Specific								
Course Code	603								
Course Level	400-499 Advanced Courses								
Course Title	Full Stack Application Development								
Credit	Theory:	2	Practical:	2	Total:	4			
Effective From	Academic Year : 2026-2027								
Course Outcomes	<p>CO1: The skills acquired in this course are highly transferable and applicable in a wide range of professional settings.</p> <p>CO2: Whether students aim to become web developers, designers, or entrepreneurs, proficiency in web development technologies is invaluable.</p> <p>CO3: Through hands-on projects and exercises, students will gain practical experience in building real-world solutions.</p> <p>CO4: Students will be able to develop modern, complex, responsive, and scalable websites.</p> <p>CO5: Understand necessary functionalities and elements of client-side and server-side development of a website.</p>								
Mapping between Cos and PSOs		PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
Course Content	<p>Unit-1: Fundamentals of Angular (v17) for Single Page Applications</p> <p>1.1 Angular Recap & Project Setup</p> <p> 1.1.1 Brief Recap of Angular 17 Core Concepts: Components, Services, Routing</p> <p> 1.1.2 Setting up a scalable Angular project using Angular CLI with Standalone Components</p> <p> 1.1.3 Folder Structure and Module Organization for Large Projects</p> <p>1.2 Advanced Routing & State Handling</p> <p> 1.2.1 Implementing Lazy Loading with Feature Modules</p> <p> 1.2.2 Route Guards: CanActivate, CanDeactivate for securing routes</p> <p> 1.2.3 Route Resolvers for preloading data</p> <p> 1.2.4 Introduction to advanced state handling using RxJS Subjects and Behavior Subjects</p> <p>1.3 Reactive Forms in Real Applications</p> <p> 1.3.1 Dynamic form generation using Form Array</p> <p> 1.3.2 Custom Validators and Asynchronous Validation</p> <p> 1.3.3 Centralized error handling and displaying validation messages</p> <p> 1.3.4 Submitting forms to APIs and form state management</p> <p>1.4 Building Reusable UI Components & Design Patterns</p> <p> 1.4.1 Creating reusable card, modal, and alert components</p> <p> 1.4.2 Component interaction with RxJS and Shared Services</p> <p> 1.4.3 Use of ng-template, ng-container, ng-content for structural flexibility</p>								

	<p>1.4.4 Smart vs Dumb Components: Best practices</p> <p>1.5 Application Deployment & Performance Optimization</p> <p>1.5.1 Angular build process, environments, and optimization flags</p> <p>1.5.2 Deploying Angular applications using Firebase Hosting</p> <p>1.5.3 Performance tuning: trackBy, OnPush change detection, lazy loading routes/components</p> <p>Unit – 2: Introduction to Express.js and Server-Side Basics with Node.js</p> <p>2.1 Introduction to Node.js and Express.js</p> <p>2.1.1 Installing Node.js (v20+) and setting up Express server</p> <p>2.1.2 Creating a RESTful backend using Express.js</p> <p>2.1.3 Introduction to nodemon and project structuring</p> <p>2.2 Handling Routes and HTTP Methods</p> <p>2.2.1 Defining routes using GET, POST, PUT, DELETE</p> <p>2.2.2 Sending responses and working with route/query parameters</p> <p>2.2.3 Connecting routes to controller logic</p> <p>2.3 Middleware and API Basics</p> <p>2.3.1 Understanding middleware in Express</p> <p>2.3.2 Using built-in and custom middleware (e.g., body-parser, static files)</p> <p>2.3.3 Introduction to CORS and environment variables</p> <p>Unit – 3: Building Web App Components and Backend Integration</p> <p>3.1 Working with Forms and APIs</p> <p>3.1.1 Handling form submissions in Express</p> <p>3.1.2 Sending JSON responses and extracting request data</p> <p>3.1.3 Connecting Angular forms to Express APIs</p> <p>3.2 Organizing Code with Models and Controllers</p> <p>3.2.1 Structuring backend with models, services, and controllers</p> <p>3.2.2 Creating data models for users/products using MongoDB (Mongoose)</p> <p>3.2.3 Basic CRUD operations using Express and MongoDB</p> <p>3.3 Authentication and Security Basics</p> <p>3.3.1 Introduction to Firebase Authentication (Email & Password)</p> <p>3.3.2 Adding user registration and login to Angular frontend</p> <p>3.3.3 Securing backend routes with Firebase Admin SDK and JWT</p> <p>Unit-4:Firebase and React Integration</p> <p>4.1 Firebase Firestore and Realtime Database</p> <p>4.1.1 Setting up Firebase project and Firestore database</p> <p>4.1.2 Performing basic CRUD operations on Firestore (add, read, update, delete)</p> <p>4.1.3 Structuring collections and subcollections</p> <p>4.2 Connecting Firebase with Angular and Express</p> <p>4.2.1 Integrating Firebase SDK in Angular to fetch/store data</p> <p>4.2.2 Connecting Firebase Admin SDK in Express for backend access</p> <p>4.2.3 Basic deployment using Firebase Hosting (for frontend)</p> <p>4.3 Overview of React Frontend for Full Stack Developers</p> <p>4.3.1 Setting up a basic React app using Vite or Create React App</p> <p>4.3.2 Understanding JSX, functional components, and hooks (useState, useEffect)</p> <p>4.3.3 Integrating Firebase in a React app for data access and authentication</p> <p>[Versions recommended: Node.js:v20 LT Sorhigher, Angular:v17+, Express:v4.x, Firebase:v10 SD Kor latest (modular SDK)]</p> <p>[Students will submit E-Document for Project report. One internal guide will be allocated for every ten groups</p> <p>All groups are required to contact their internal guides once a week to endorse their Project progress work</p>
Reference Books	<ol style="list-style-type: none"> Angular: Up and Running: Learning Angular, Step by Step, Shyam Seshadri, O'Reilly Media, Inc. Mastering Web Application Development with AngularJS, Pawel Kozlowski, Peter Bacon Darwin, Packt Publishing Beginning Node.js, Express & MongoDB Development, by Greg Lim, ISBN-13:

	<p>978-9811480287</p> <ol style="list-style-type: none"> 4. Building Scalable Web Apps with Node.js and Express: Design and Develop a Robust, Scalable, High-Performance Web Application Using Node.js, Express.js, TypeScript, and Redis, Yamini Panchal, Ravi Kumar Gupta, Orange Education Pvt. Ltd, ISBN-13: 978-8197223815 5. MongoDB, Express, Angular, and Node.js Fundamentals, Paul Oluyeye, Packt Publishing, ISBN-13: 978-1789808735 6. Pro Express.js: Master Express.js: The Node.js Framework for Your Web Development, by AzatMardan, APress, 1st ed. Edition, ISBN-13: 978-1484200384 7. Mastering Express.js: A Comprehensive Guide to Node.js Web Development, Rupesh Kumar Tipu, Vandna B, Suman Punia, LAP Lambert Academic Publishing, ISBN-13: 978-6207808090 8. Express.js: Node.js Framework for Web Application Development, Daniel Green, ASIN: B014FVDVUA 9. Mastering Firebase: The Complete Guide to Building and Scaling Apps, by Kameron Hussain, Frahaan Hussain, Sonar Publishing, ISBN-13: 979-8223728290 10. The Road to Firebase: Your Journey to Master Firebase in JavaScript, Robin Wieruch, 2018 Edition Firebase Cookbook, Houssemyahiaoui, Packt Publishing, ISBN-13: 978-1788296335
Teaching Methodology	ClassWork,Discussion,Labwork,Self-Study,Seminarsand/orAssignments
Evaluation Method	<p>50%Internal assessment.:</p> <ul style="list-style-type: none"> - Attendance, Class and home Assignment, Unit test. <p>Project Assessment, Presentation and viva-voce 50%</p> <p>External assessment. :</p> <ul style="list-style-type: none"> - Theory written examination <p>Project Assessment, Presentation and viva-voce</p>

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Sc. Computer Application (B.Sc.CA)								
Semester	6								
NCrF Credit Level	5.5								
Course Type	Major								
Course Subtype	Nil								
Subject Type	Discipline Specific								
Course Code	603								
Course Level	400-499 Advanced Courses								
Course Title	Project								
Credit	Theory & Practical:	4				Total:	4		
Effective From	Academic Year : 2026-2027								
Course Outcomes	<p>CO1:Analyze: Students will be able to analyze project requirements, identify suitable tools, and prepare an implementation strategy.</p> <p>CO2:Create: Students will develop full-fledged applications using relevant web, mobile, or hybrid technologies.</p> <p>CO3:Apply: Students will gain experience in applying the Software Development Life Cycle (SDLC) to real-world problems.</p> <p>CO4:Create: Students will prepare and submit a comprehensive project report that meets academic and professional standards.</p> <p>CO5:Evaluate: Students will present their project solutions confidently and clearly to technical and non-technical audiences.</p>								
Mapping between Cos and PSOs		PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
Course Content	<p>STEP – 1: Project Planning and Definition</p> <p>1.1 Understanding Problem Statement</p> <p>1.2 Feasibility Study and Requirement Analysis</p> <p>1.3 Technology Stack Selection (Web, Mobile, Cloud, Database)</p> <p>1.4 Project Scheduling and Team Role Allocation</p> <p>STEP – 2: Project Design and Architecture</p> <p>2.1 System Design – High Level and Low Level</p> <p>2.2 Database Design and ER Diagram</p> <p>2.3 UI/UX Planning and Wireframing</p> <p>2.4 Data Flow Diagram and Architecture Diagram</p> <p>STEP – 3: Project Development</p> <p>3.1 Frontend Development</p> <p>3.2 Backend Development</p> <p>3.3 Integration with Database and External APIs</p> <p>3.4 Testing: Unit Testing, Integration Testing, User Acceptance Testing</p> <p>STEP – 4: Documentation and Deployment</p> <p>4.1 Preparing Project Documentation: SRS, Design Document, User Manual</p> <p>4.2 Deployment on Hosting Platforms (like Firebase, Heroku, GitHub Pages, etc.)</p> <p>4.3 Project Report Writing in Standard Format</p>								

	<p style="text-align: center;">4.4 Preparing and Delivering Project Presentation</p> <p>[Students will submit E-Document for Project report. One internal guide will be allocated for every ten groups All groups are required to contact their internal guides once a week to endorse their project progress work.]</p>	
Project Evaluation Scheme	Component	Marks
	Problem Definition and Planning	10%
	Design and Architecture	15%
	Implementation and Functionality	30%
	Testing and Deployment	15%
	Documentation	10%
	Final Presentation & Viva	20%
	Total	100%
Evaluation Method	<p>50% Internal assessment.</p> <ul style="list-style-type: none"> - Attendance and reporting to internal guides <p>Internal project presentation and demonstration, project documentation.</p> <p>50% External assessment.</p> <p>Project presentation and demonstration, viva-voce and e-project report.</p>	

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	B.Sc. Computer Application (B.Sc.CA)								
Semester	6								
NCrF Credit Level	5.5								
Course Type	MINOR								
Course Subtype	NIL								
Subject Type	Discipline Specific								
Course Code	60								
Course Level	200-299 (Intermediate Level)								
Course Title	Digital Commerce and Cyber Security								
Credit	Theory:	4	Practical:	-	Total:	4			
Effective From	Academic Year : 2026-2027								
Course Outcomes	<p>CO1: Explain digital commerce models and digital value chain. CO2: Describe digital payment systems and blockchain fundamentals. CO3: Identify major cyber threats and security principles. CO4: Explain web security mechanisms and network protections. CO5: Interpret cyber laws, ethical practices, and data privacy principles.</p>								
Mapping between Cos and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
Course Content	<p>Unit-1:Introduction to Digital Commerce 1.1 Concepts of Digital Commerce 1.2 Aims of Digital Commerce 1.3 Digital Commerce Framework 1.4 Digital Commerce Consumer Applications 1.5 Digital Commerce Organizational Applications 1.6 Introduction to m-Commerce</p> <p>Unit-2:Network Infrastructure of Digital Commerce, Payment and Security: 2.1. Concepts of Information Way 2.2. Components of I-Way 2.2.1. Network Access Equipment 2.2.2. Local on-ramps 2.2.3. Global Information Distribution Network 2.3. Transaction Models 2.4 Digital Commerce Payments and Security Issues 2.4.1. Digital Commerce Payment Systems</p>								

	<p>2.4.2. Debit Card Based, Credit Card Based, Risks & EPS 2.4.3. e-Cash, e-Cheque, e-wallet 2.4.4. security issues</p> <p>Unit-3:Introduction to Cyber Crimes: 3.1Category of Cyber Crimes 3.2 Technical Aspects of Cyber Crimes 3.2.1 Unauthorized access & Hacking 3.2.2 Trojan,Virus and Worm Attacks 3.2.3 E-Mail related Crimes: Spoofing, Spamming, Bombing 3.2.4 Denial of Service Attacks 3.2.5 Distributed Denial of Service Attack 3.3 Various crimes: 3.3.1 IPR Violations (Software Piracy, Copyright Infringement, Trademark Violations, Theft of Computer Source Code, Patent Violations) 3.3.2 Cyber Squatting, Cyber Smearing, Cyber Stalking 3.3.3 Financial Crimes (Banking, Credit Card, Debit Card related)</p> <p>Unit – 4: Cyber Security Fundamentals 4.1 Concepts of Cyber Security 4.1.1 Types of Threats 4.1.2 Advantages of Cyber Security 4.2 Basic Terminologies 4.2.1 IP Address, MAC Address 4.2.2 Domain Name Server (DNS) 4.2.3 DHCP, Router, Bots 4.3 Common Types of Attacks 4.3.1 Distributed Denial of Service 4.3.2 Man in the Middle, Email Attack 4.3.3 Password Attack, Malware 4.4 Hackers 4.4.1 Various Vulnerabilities 4.4.1.1 Injection Attacks, Changes in Security Settings 4.4.1.2 Exposure of Sensitive Data 4.4.1.3 Breach in Authentication Protocol 4.4.2 Types of Hackers: White Hat and Black Hat</p>
Reference Books	<ol style="list-style-type: none"> 1. Frontiers of Electronic Commerce, Ravi Kalakota and Andrew Whinston, Addison Wesley. 2. Electronic Commerce: A Managerial Perspective, Efraim Turban, Jae Lee, David King, H. Michael Chung, Addison Wesley. 3. E-Commerce: An Indian Perspective, Joseph, PHI. 4. E-Mail Hacking, Ankit Fadia, Vikas Publishing House Pvt. Ltd. 5. E-Commerce: Concepts, Models, Strategies, G. V. S. Murthy, Himalaya Publisher. 6. Cyber Crime in India, Dr. M. Dasgupta, Centax Publications Pvt. Ltd. 7. Cyber Laws and Crimes, Barkha U., Rama Mohan, Universal Law Publishing Co. Pvt. Ltd. 8. Cyber Crime, Bansal S. K., A.P.H. Publishing Corporation. 9. Cyber Security: Understanding Cyber Crime, Computer Forensics and Legal Perspectives, Nina Godbole and Sunit Belapur, Wiley India Publication.
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	<p>50%Internal assessment.</p> <ul style="list-style-type: none"> - Attendance, Class and home Assignment. - Unit Tests <p>50%External assessment. Written Theory exam</p>

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Sc. Computer Application (B.Sc.CA)								
Semester	6								
NCrF Credit Level	5.5								
Course Type	AEC								
Course Subtype	Nil								
Subject Type	AEC								
Course Code	605								
Course Level	100-199 Foundation Course								
Course Title	Ability Enhancement Course(AEC): Project and Interview Presentation Soft Skills								
Credit	Theory:	2	Practical:	-	Total:	2			
Effective From	Academic Year : 2026-2027								
Course Outcomes	<p>1)CO1: (Understand): Explain the essential components of professional project documentation and communication in the software and IT industry.</p> <p>2)CO2: (Apply): Demonstrate the ability to present project concepts clearly using structured presentation techniques and visual aids relevant to IT solutions.</p> <p>3)CO3: (Analyze): Evaluate the technical and soft skill requirements of various IT job roles and align personal project work and presentation accordingly.</p> <p>4)CO4: (Create): Develop a mini-project or prototype by integrating appropriate software tools and technologies and document it as per standard industry practices.</p> <p>5)CO5: (Evaluate): Justify design choices, tool selection, and development approach during interviews or viva presentations using logical reasoning and industry-specific language.</p>								
Mapping between Cos and PSOs		PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
Course Content	<p>Unit – 1: Communication and Presentation Skills in the IT Industry</p> <p>1.1 Fundamentals of Communication</p> <p> 1.1.1 Verbal and Non-verbal Communication</p> <p> 1.1.2 Barriers in Communication in Technical Teams</p> <p> 1.1.3 Listening and Clarity in Technical Discussions</p> <p>1.2 Presentation Skills for IT Professionals</p> <p> 1.2.1 Creating Technical Presentations</p> <p> 1.2.2 Using Tools like PowerPoint, Canva, Prezi</p> <p> 1.2.3 Speaking with Confidence in Team and Client Meetings</p> <p>1.3 Email and Technical Writing Etiquette</p> <p> 1.3.1 Writing Clear Technical Emails</p> <p> 1.3.2 Preparing Professional Reports and Documentation</p> <p>Unit – 2: Software Documentation and Report Writing</p> <p>2.1 Understanding Software Development Life Cycle (SDLC)</p> <p> 2.1.1 Role of Documentation at Each Phase</p> <p> 2.1.2 Agile Documentation vs Traditional Models</p> <p>2.2 Technical Project Documentation</p> <p> 2.2.1 Problem Statement and Requirements</p>								

	<p>2.2.2 Design Diagrams: UML, ER Diagrams 2.2.3 Testing and Deployment Documentation 2.3 Final Report Writing and Formatting 2.3.1 Structuring a Complete Project Report 2.3.2 IEEE / ACM Style Guidelines and Referencing 2.3.3 Common Errors to Avoid in Technical Reports</p> <p>Unit – 3: Career Preparation and Interview Skills 3.1 Resume and LinkedIn Profile Building 3.1.1 Components of a Tech Resume 3.1.2 Tailoring Resumes for Software Roles 3.2 Interviewing Skills for IT Roles 3.2.1 Understanding the Interview Process in Software Companies 3.2.2 Technical Round vs HR Round Expectations 3.2.3 STAR Method for Behavioral Interview Questions 3.3 Mock Interview Sessions 3.3.1 Self-Introduction Practice 3.3.2 Group Feedback and Interview Etiquette</p> <p>Unit – 4: Final Project Presentation and Seminar 4.1 Project Showcase Guidelines 4.1.1 Preparing for Project Presentation 4.1.2 Demonstrating Code, UI, and Deployment 4.2 Seminar and Peer Review 4.2.1 Presentation to Class and Faculty Panel 4.2.2 Peer Evaluation Criteria 4.3 Soft Skill Reflection and Final Assessment 4.3.1 Student Reflections on Soft Skills Gained 4.3.2 Final Grading and Suggestions for Improvement [One topic will be allocated to every students. The student will prepare a seminar and presentation along with a documentation.]</p>
Reference Books	<ol style="list-style-type: none"> 1) Technical Communication: Principles and Practice, Meenakshi Raman & Sangeeta Sharma, Oxford University Press India, ISBN: 9780195695747 2) Soft Skills: Know Yourself and Know the World, Dr. Alex K., S. Chand Publishing, ISBN: 9789352534357 3) Communication Skills for Engineers, Sunita Mishra & C. Muralikrishna, Pearson Education India, ISBN: 9788131733844 4) Business Communication, P. D. Chaturvedi & Mukesh Chaturvedi, Pearson Education India, ISBN: 9788131733585 5) Developing Soft Skills, Gajendra Singh Chauhan, Wiley India, ISBN: 9788126577500 6) The Quick and Easy Way to Effective Speaking, Dale Carnegie, Simon & Schuster, ISBN: 9780743528322 7) Cracking the Coding Interview, Gayle Laakmann McDowell, CareerCup, ISBN: 9780984782857 8) Presentation Skills for Technical Professionals, Naomi Karten, Dorset House Publishing, ISBN: 9780932633585 9) Interviewing: Principles and Practices, Charles Stewart & William Cash Jr., McGraw-Hill Education, ISBN: 9780078036804 10) The Art of Public Speaking, Stephen E. Lucas, McGraw-Hill Education, ISBN: 9780073523910.
Teaching Methodology	Class Work, Discussion, Presentation, Self-Study, Seminars and/or Assignments
Evaluation Method	<p>50% Internal assessment.</p> <ul style="list-style-type: none"> - Attendance, Class and home Assignment, Unit Tests (Seminar). - Internal presentations, documentation, viva-voce and Seminar <p>50% External assessment. Presentation, documentation, presentation and Viva-voce.</p>

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS**

Program Name	B.Sc. Computer Application (B.Sc.CA)									
Semester	6									
NCrF Credit Level	5.5									
Course Type	Internship									
Course Subtype	Nil									
Subject Type	Internship									
Course Code	606									
Course Level	400-499 Advanced Course									
Course Title	Internship									
Credit	Theory:	4	Practical:	-	Total:	4				
Effective From	Academic Year : 2026-2027									
Course Outcomes	<p>1) CO1 (Apply): Apply programming, development, or analytical skills gained in the classroom to solve real-world computing problems during the internship.</p> <p>2) CO2 (Analyze): Analyze the architecture, workflow, and practices of the host organization to understand the integration of computer systems in business or technical environments.</p> <p>3) CO3 (Evaluate): Evaluate project requirements, software tools, and technologies used during the internship to recommend improvements or alternative approaches.</p> <p>4) CO4 (Create): Create a structured technical report and project documentation summarizing the tasks, challenges, and outcomes of the internship.</p> <p>5) CO5 (Present): Present the project findings and experience effectively using professional communication and presentation skills tailored to the IT/software industry.</p>									
Mapping between Cos and PSOs		PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO8	
	CO1									
	CO2									
	CO3									
	CO4									
	CO5									
Internship Structure and Deliverable by Students:	<p>Duration: 120 Hours Mode: Offline / Online / Hybrid Location: Industry, business firms, IT companies, local government offices, health organizations, media, artisans, etc. Deliverables by Student:</p> <ol style="list-style-type: none"> 1. Internship Joining Report 2. Weekly Progress Logbook 3. Project or Assignment Work (if applicable) 4. Final Internship Report (<i>with photographs, certificates, etc.</i>) <p>Presentation and Viva Voce</p>									
Project Evaluation Scheme		Component					Marks			
		Problem Definition and Planning					10%			
		Design and Architecture					15%			
		Implementation and Functionality					30%			
		Testing and Deployment					15%			
		Documentation					10%			

	Final Presentation & Viva	20%
	Total	100%
Reference Books	INTERNSHIP REPORT TEMPLATE (to be submitted after internship completion) Front Page Title: Internship Report Student Name: Roll Number: Program and Semester: College Name and Department: Name of Organization/Company: Internship Duration (From–To): Internship Guide Name(Industry and Faculty): Submission Date: 1. Acknowledgment A short paragraph acknowledging the guidance and support of the organization and faculty mentor. 2. Certificate Internship Completion Certificate (copy from organization). 3. Declaration Declaration by the student that the report is original and submitted for academic purposes. 4. Internship Details Name and Address of Organization Nature of Business / Services Department / Team worked in Name and Designation of Industry Supervisor 5. Objectives of Internship What you aimed to learn and accomplish. 6. Description of Work Done Overview of the tasks and responsibilities handled Description of technologies/tools used Screenshots, flowcharts, or diagrams (if applicable) 7. Learning Outcomes Skills developed, software or tools learned, industry exposure gained. 8. Challenges and Solutions Mention any problems faced and how you solved them. 9. Weekly Summary Brief of what was done in each week (can be derived from the logbook). 10. Conclusion Summary of overall experience, learning, and impact on career development. 11. References Any websites, books, or resources referred to during the internship. INTERNSHIP LOGBOOK FORMAT (to be maintained weekly)	
Teaching Methodology	Class Work, Discussion, Presentation, Self-Study, Seminars and /or Assignments	
Evaluation Method	50% Internal assessment. - Attendance, Class and home Assignment, Unit Tests(Seminar). - Internal presentations, documentation, viva-voce and Seminar 50% External assessment. Presentation, documentation, presentation and Viva-voce.	