SHIVAJI UNIVERSITY, KOLHAPUR - 416004, MAHARASHTRA
PHONE:EPABX-2609000, www.unishivaji.ac.in, bos@unishivaji.ac.in
शिवाजी विद्यापीठ, कोल्हापूर -४१६००४,महाराष्ट्र
दूरध्वनी-ईपीएबीएक्स -२६०९०००, अभ्यासमंडळे विभाग दुरध्वनी ०२३१-२६०९०९४

Estd. 1962
"A++" Accredited by NAAC (2021)
With CGPA 3.52

Ref./SU/BOS/Com & Mgt./156 **Date : 25/05/2026**

The Principal
All Concerned Affiliated Colleges/ Institutions,
Shivaji University, Kolhapur

Subject :Regarding syllabi of B.Com. (Computer Application) Part-III (Sem. V & VI) degree programme under the Faculty of Commerce & Management as per National Education Policy, 2020 (NEP 2.0)
Reference : शिवाजी वि.जा.क. संलग्नता/टी-2/1567 दिनांक 31 मे, 2024

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the University authorities have accepted and granted approval to the syllabi of **B.Com. (Computer Application) Part-III (Sem. V & VI)** under the Faculty of Commerce & Management as per National Education Policy, 2020 **(NEP 2.0)**

This syllabi shall be implemented from the academic **year 2026-2027** onwards subject to the approval from the state government. A soft copy containing the syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in (Online Syllabus).

The question paper on the pre-revised syllabi of above mentioned programme will be set for the examinations to be held in October/November 2026 & March/ April, 2027. These chances are available for repeater students, if any.

You are therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,

Dy. Registrar

Encl: As above
for Information and necessary action

Copy to:

1	The I/c Dean, Faculty of Commerce & Management	6	Appointment Section A & B
2	The Director, Board of Examinations and Evaluation	7	I.T.Cell /Computer Centre
3	The Chairman, Respective Board of Studies	8	Eligibility Section
4	B. Com. Section	9	Affiliation Section (T.1) (T.2)
5	Internal Quality Assurance Cell (IQAC Cell)	10	P.G. Seminar Section

SHIVAJI UNIVERSITY, KOLHAPUR

Estd. 1962,
NAAC "A++" Grade

Faculty of Commerce and Management

Syllabus for
Bachelor of Commerce (Computer Application)
B.Com (CA)
Part III (SEM-V & VI)

CBCS Course Structure to be implemented from Academic Year 2026-27
(Under NEP 2.0)

(Subject to the modifications that will be made from time to time)

SEMESTER V

S. No.	Course Code	Course Title	L	P	Credit	Theory			Practical	
						Int	Uni	Total	Int	Uni
1	DSC13	RDBMS	2		2	10	40	50		
2	DSC14	Java Programming	4		4	20	80	100		
3	DSM5	Fundamentals of Statistics –	4		4	20	80	100		
4	VSC4	Software Testing –	2		2	10	40	50		
5	DSE1.1	Emerging Trends in Information Technology	4		4	20	80	100		
	DSE1.2	Financial Technologies								
	DSE1.3	Enterprise Resource Planning								
6	DSC15	Lab on DSC13		4	2					50
7	DSC16	Lab on DSC14		4	2					50
8	FP2	Field Project		4	2					50
TOTAL					22			400		150

SEMESTER VI

S. No.	Course Code	Course Title	L	P	Credit	Theory			Practical	
						Int	Uni	Total	Int	Uni
1	DSC17	.Net Technology	4		4	20	80	100		
2	DSC18	Foundations of Linux	4		4	20	80	100		
3	DSM6	Bank Management	4		4	20	80	100		
5	DSE2.1	Information System Audit	4		4	20	80	100		
	DSE2.2	Web Application Security								
	DSE2.3	Network Security								
6	DSC19	Lab on DSC17		4	2					50
8	OJT1	On Job Training		8	4					100
TOTAL					22			400		150

SEMESTER-V

Course Code	Cours Title	L	T	P	Credit	Theory			Practical	
DSC13	RDBMS	2			2	**Int**	**Uni**	**Total**	**Int**	**Uni**
						10	40	50		
Course Outcomes (COs):	CO1: To understand core concepts of RDBMS CO2: To identify programing features of RDBMS.									
Prerequisite										Hrs.
UNIT I	**Introduction to RDBMS:** • DBMS vs. RDBMS • Keys: Primary, Foreign, Candidate, Super, Unique keys. • Database Constraints: NOT NULL, CHECK, Referential Integrity. • Functional Dependencies. • Normalization Forms: 1NF, 2NF, 3NF, BCNF. • Lossless and Dependency Preserving Decomposition. • DDL (Data Definition Language): Create, Alter, Drop, Truncate. • DML (Data Manipulation Language): Insert, Update, Delete, Select with WHERE, ORDER BY, GROUP BY, HAVING. • Joins: Inner, Left, Right, Full. • Built-in Functions: Numeric, Character, Date, Aggregate Functions (SUM, AVG, COUNT, MAX, MIN).									15
UNIT II	**PL/SQL Basics:** • Introduction to PL/SQL, PL/SQL architecture, Variables, constants • Data types (scalar, composite, %TYPE, %ROWTYPE attributes) • Conditional statements (IF-THEN-ELSE, CASE) • Loops (LOOP, WHILE, FOR, cursor FOR loops), • Cursors: Understanding and managing explicit cursors, their attributes, and parameterized cursors • Triggers: Creating DML, DDL, and database event triggers									15
Text Books/ Reference Books	1. Database Systems Using Oracle – Second edition – Nilesh Shah – PHI 2007 2. Database system concepts –Henry F.Korth. 3. Oracle 9i Complete reference – Loney Koch – Tata Mc Graw Hill 2005									

Course Code	Cours Title	L	T	P	Credit	Theory			Practical	
DSC14	Java Programming	4			4	**Int**	**Uni**	**Total**	**Int**	**Uni**
						20	80	100		
Course Outcomes (COs):	CO1: Understand the basics of Java Programing. CO2: Identify the Object Oriented Structure of Java Programing. CO3: Analyze the error handling and multithreading mechanism of Java programing CO4: Identify the GUI programing features of Java programing									
Prerequisite										Hrs.
UNIT I	**Introduction to Java Programming** JDK, JRE, JVM architecture, setting up the environment, and first program. Data types, variables, type casting, operators (arithmetic, logical), and control statements (if-else, switch, loops).									15
UNIT II	**Object-Oriented Programming (OOP)** Classes, objects, constructors, method overloading, inheritance, method overriding, this and super keywords, encapsulation, and abstraction (interfaces/ abstract classes).									15
UNIT III	**Advance Features:** Exception handling (try-catch-finally, throw), String handling (String, StringBuilder), and wrapper classes. Multithreading (Thread class, Runnable, synchronization), File I/O (InputStream, OutputStream, File handling).									15
UNIT IV	**GUI Programing** Differences between command-line applications and GUI applications, Overview of Java AWT framework, AWT Components: Frame, Panel, Basic Controls: Button, Label, TextField, TextArea, Checkbox, Choice, List, Layout Management: FlowLayout, BorderLayout, GridLayout, CardLayout, Event Handling: Event-driven programming concepts, Event classes and listener interfaces.									15
Text Books/ Reference Books	1. Programming with JAVA, A Primer by E Balagurusamy 2. Herbert Schildt, Java 2: The Complete Reference, Tata McGraw-Hill 3. The Java Tutorials: http://docs.oracle.com/javase/tutorial/) 4. The Java Tutorials of Sun Microsystems Inc 5. Java Complete Reference by Patric Norton 6. Core Java Vol. I (Addison- Wesley) Sun Press ISBN – 981-405-861-0 2. Core Java Vol. II (Addison- Wesley) Sun Press ISBN – 981-4058-50-5 7. Thinking in Java, Bruce Eckel,, Addison – Wesley, ISBN: 9814035750 8. Java 2 Programming Black Book by Steven Holzner, Dream Tech Publication									

Course Code	Cours Title	L	T	P	Credit	Theory			Practical	
DSM5	Fundamentals of Statistics	4			4	**Int**	**Uni**	**Total**	**Int**	**Uni**
						20	80	100		
Course Outcomes (COs):	CO1: Identify methods to collect data CO2: Represent the data in tabular and diagrammatic form. CO3: Prepare the frequency distribution for qualitative and quantitative data. CO4: Summarize the data using the measures of central tendency and measure of dispersion.									
Prerequisite										Hrs.
UNIT I	**Types and Presentation of Data:** Concept of statistical population and data. Qualitative & Quantitative data, Discrete & Continuous data, Frequency & Non-Frequency data, Geographical & Chronological data, Primary data & Secondary data with suitable examples.									15
UNIT II	**Tabular presentation of data-** Construction of tables, Types of tables. Frequency distribution —Discrete, grouped, continuous and cumulative. Graphical presentation of data- Histogram, frequency polygon, frequency curve, ogives, and Box-plot.									15
UNIT III	**Descriptive Statistics:** Measures of central tendency (mean, median, mode), dispersion (range, variance, standard deviation, coefficient of variation), skewness, and kurtosis.									15
UNIT IV	**Bivariate Analysis:** Scatter diagrams, correlation coefficient (Karl Pearson/Spearman's rank), and simple linear regression.									15
Text Books/ Reference Books	1. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2005): Fundamentals of Statistics, Vol. I, 8th Edn. World Press, Kolkata. 2. Gupta, S.C. and Kapoor, V.K. (2007): Fundamentals of Mathematical Statistics, 11th Edn., (Reprint), Sultan Chand and Sons. 3. Hogg, R.V., Craig, A.T. and Mckean, J.W. (2005): Introduction to Mathematical Statistics, 6th Edn. Pearson Education. 4. Miller, Irwin and Miller, Marylees (2006): John E. Freund's Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia. 5. Mood, A.M., Graybill, F.A. and Boes, D.C. (2007): Introduction to the Theory of Statistics, 3rd Edn., (Reprint), Tata McGraw-Hill Pub. Co. Ltd.									

<table>
<tr><th>Course Code</th><th>Cours Title</th><th>L</th><th>T</th><th>P</th><th>Credit</th><th colspan="3">Theory</th><th colspan="2">Practical</th></tr>
<tr><td rowspan="2">VSC4</td><td rowspan="2">Software Testing</td><td rowspan="2">2</td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2">2</td><td>Int</td><td>Uni</td><td>Total</td><td>Int</td><td>Uni</td></tr>
<tr><td>10</td><td>40</td><td>50</td><td></td><td></td></tr>
<tr><td>Course Outcomes (COs):</td><td colspan="10">After completion of this course students will be able to –
CO1. Understand the theoretical aspects of software testing.
CO2. Identify software testing tools to test web applications and mobile applications.</td></tr>
<tr><td>Prerequisite</td><td colspan="9"></td><td>Hrs.</td></tr>
<tr><td>UNIT I</td><td colspan="9">Software Testing Life Cycle (STLC):
Requirements analysis, test planning, test design, environment setup, execution, defect tracking, and test closure activities. Levels of Testing: Unit Testing: Testing individual components or sections of code, typically by developers, Integration Testing: Testing how different modules interact with each other, System Testing: Testing the complete and integrated software application, User Acceptance Testing (UAT): Final testing by end-users to ensure the software meets business requirements.</td><td>15</td></tr>
<tr><td>UNIT II</td><td colspan="9">Test Design Techniques:
Methods for creating effective test cases, such as Boundary Value Analysis (BVA), Equivalence Partitioning (EP), Decision Table testing, and error guessing. Types of Testing: Functional Testing: Ensuring the software performs its intended functions, including smoke, sanity, and regression testing, Non-Functional Testing: Evaluating aspects like performance (load, stress), security, usability, and compatibility. Automation Tools: Hands-on experience with popular tools like Selenium WebDriver for web applications, Appium for mobile apps, and others like UFT/QTP.</td><td>15</td></tr>
<tr><td>Text Books/ Reference Books</td><td colspan="10">Software Testing : A Practical Approach, Desai, Sandeep, Srivastava, Abhishek, Edition : Second, PHI Publications
Software Testing A Craftsman’s Approach Fourth Edition, Paul C. Jorgensen, CRC Press</td></tr>
</table>

Course Code	Cours Title	L	T	P	Credit	Theory			Practical	
DSE1.1	**Emerging Trends in IT**	4			4	**Int**	**Uni**	**Total**	**Int**	**Uni**
						20	80	100		
Course Outcomes (COs):	CO1: Understand the role of E-commerce in the Business environment CO2: Analyze the role of Cloud computing in the organization CO3: Understand the basic concepts of IoT and its role in industry CO4: Identify the different mobile communication techniques used in the business									
Prerequisite										Hrs.
UNIT I	**E-Commerce Fundamentals** E-commerce Systems: B2B, B2C models, digital payment systems, electronic data interchange (EDI), and online marketing, E-commerce vs Quick commerce, Dark stores.									15
UNIT II	**Cloud Computing** Introduction: Overview of Distributed Computing; Cloud introduction and overview; Cloud Computing in a Nutshell, Roots of Cloud Computing, Layers and Types of Clouds, Desired Features of a Cloud, Different types of cloud services; Deployment models; Advantages and Disadvantages; Companies in the Cloud. Cloud Models: IaaS, PaaS, SaaS, Public, Private, and Hybrid clouds, Infrastructure: Virtualization, containerization storage, and networking.									15
UNIT III	**Introduction to IoT & Architecture** Definitions, Characteristics, and Applications (Smart Cities, Health, Industry), IoT Enabling Technologies and Physical/Logical Design, IoT Network Architecture (Core Stack, Data Management), Introduction to Sensors, Actuators, and Smart Objects, Hardware Platforms: Arduino Uno, Raspberry Pi, ESP8266/ESP32, Case Studies: Smart Agriculture, Home Automation									15
UNIT IV	**Mobile Computing** Introduction to Mobile Computing: Definition, applications, and architecture, Cellular Systems (Telecommunication): GSM, GPRS, UMTS, 4G, 5G architecture, Mobile Network & Transport Layer: Mobile IP, Packet Delivery, Dynamic Host Configuration Protocol (DHCP), Indirect TCP, Snooping TCP, and Mobile TCP, Mobile Application Development & Middleware: Mobile Agents, Application Servers, and development platforms (Android/iOS).									15
Text Books/ Reference Books	1. Dr.C.S.Rayudu,‖E-Commerce &E-Business‖,Himalaya Publishing House, New Delhi, 2004. 2. John W. itinghouse james F.Ransome, —Cloud Computing Implementation, Management and Security‖ , CRC Press. 3. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547 4. Mischa Schwartz, Mobile Wireless Communications 1st Edition, Cambridge University Press, 2005									

Course Code	Cours Title	L	T	P	Credit	Theory			Practical	
DSE1.2	Financial Technologies	4			4	**Int**	**Uni**	**Total**	**Int**	**Uni**
						20	80	100		
Course Outcomes (COs):	CO1: To be able to understand elements and principles of Fintech CO2: To be able to understand the basics of Crypto currencies. CO3: To be able to understand dynamics of block chain. CO4: To able understand the effect of Fintech in various sectors.									
Prerequisite										Hrs.
UNIT I	Introduction to Fin-tech Evolution of Fin-tech across the world. Impact of digital disruption and innovations by Fin-tech on the Banking and Financial Sector									15
UNIT II	The Technology with Fin-tech Understanding the associated technology with respect to Cloud, Blockchain &Crypto currencies, RoboAdvisors, Biometrics and IoT.									15
UNIT III	Fin-tech Trends Understand the key Fin-tech trends which will disrupt the Financial Sector. Open Banking and Digital Only Banking Introduce the students to the transition to open banking and digital only banking, the technologies involved and the requirement for convenience and user experience.									15
UNIT IV	Fin-tech affecting different sectors Learn the effects of Fin-tech on Payment Innovations, Health, Real-Estate, and Insurance Sector									15
Text Books/ Reference Books	1. Bitcoin for Non-Mathematicians: Exploring the foundations of Crypto, SlavaGomzin/ Universal Publishers, USA, Latest 1 ST Edition 2020 2. The Robotics Process Automation, Handbook: A Guide to Implementing, Tom Taulli/ Apress, Latest 1 ST Edition 2020 Website Reference: 1. https://www.ibm.com/industries/banking-financial-markets/resources/omnichannelbankingpaper/ 2. https://thefinancialbrand.com/111080/evolution-future-digital-banking-baastransformation/									

Course Code	Cours Title	L	T	P	Credit	Theory			Practical	
DSE1.3	Enterprise Resource Planning	4			4	**Int**	**Uni**	**Total**	**Int**	**Uni**
						20	80	100		

Course Outcomes (COs):	After completion of this course students will be able to – CO1. Understand the concept of ERP and different ERP technologies CO2. Understand ERP implementation life cycle. CO3. Describe the ERP models. CO4. Learn process model and apply it in the re-design of a process & understand the important role it plays in the development of a BPR.	
Prerequisite		Hrs.
UNIT I	**Introduction to ERP:** Defining ERP, Origin and Need for an ERP System, Evolution of ERP, Benefits of an ERP System, Reasons for the Growth of ERP Market, ERP models, Subsystems of ERP models. ERP related technologies-Business Intelligence (BI), Data Warehousing, Data Mining, On-Line Analytical Processing (OLAP), Geographical Information System (GIS).	15
UNIT II	**ERP Implementation:** Prerequisites of ERP implementation, ERP implementation strategies, Phases in ERP implementation, ERP vendor selection criteria, Role of consultant in ERP implementation, Role of Users in ERP implementation, Role of Top management in ERP implementation.	15
UNIT III	**ERP Business Models-** Finance, Manufacturing (Production), Human Resources, Quality Management, Marketing, Sales, Distribution and service.	15
UNIT IV	**Introduction to BPR** Meaning, definition of BPR, History & development of BPR, Need of BPR, Concept of process, process management, process model Phases in BPR, Role of IT in BPR, BPR and ERP.	
Text Books/ Reference Books	1. Enterprise Resource Planning, Alexis Leaon, (Second Edition), Tata McGraw Hill Education Private Limited, 2011 2. ERP DEMYSTIFIED, Alexis Leon, (Second Edition), Tata McGraw Hill Education Private Limited, 2008 3. ERP Plak, CarolA., Eli Schragenheim (St. LuciePress NY) 4. Reengineering Corporation – Mammer, Micheal , JamisChambey 5. Business Process Reengineering – Jayaraman M.S.(TMG) 6. Best Practices in Reengineering – Carr D.K. JohnansonH.J.(MGH) 7. Business Process Reengineering: Myth & Reality – Coulson ThomasC.	

<table>
<tr><th>Course Code</th><th>Cours Title</th><th>L</th><th>T</th><th>P</th><th>Credit</th><th colspan="3">Theory</th><th colspan="2">Practical</th></tr>
<tr><td rowspan="2">DSC15</td><td rowspan="2">Lab on DSC13</td><td rowspan="2">2</td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2">2</td><td>Int</td><td>Uni</td><td>Total</td><td>Int</td><td>Uni</td></tr>
<tr><td>10</td><td>40</td><td>50</td><td></td><td></td></tr>
<tr><td>Course Outcomes (COs):</td><td colspan="10">After completion of this course students will be able to –
CO1: Apply DDL and DML oprations on data
CO2. Implement PL/SQL concepts for preparing and manipulating data.</td></tr>
<tr><td>Prerequisite</td><td colspan="9"></td><td>Hrs.</td></tr>
<tr><td>Programs</td><td colspan="9">Create the following relations-
Customer, Account, Loan,Branch , Depositor , Borrower, Supplier.
Perform following DDL operations on the relations
• Alter :Add-add columnsAdd-constraints
• Modify-modify the data type and size
• Drop-delete column
Perform following DML operations
• Insertion of records
• Arithmetic, Logical, Comparison operations
• String Operations
• Aggregate functions
• Aggregate functions with group by and having clause
• Nested sub-queries
• Update records
PL/SQL programs
Reverse the String
• Factorial of given number
• Pay Roll preparation and updation using cursor and trigger
• Student Mark Sheet Preparation and updation using cursor and trigger</td><td>15</td></tr>
</table>

Course Code	Cours Title	L	T	P	Credit	Theory			Practical	
DSC16	Lab on DSC14	2			2	**Int**	**Uni**	**Total**	**Int**	**Uni**
						10	40	50		
Course Outcomes (COs):	After completion of this course students will be able to – CO1: Apply object oriented concepts through java CO2. Implement GUI concepts for preparing interactive java applications.									
Prerequisite										Hrs.
Programs	1. Java programs based on branching and looping statements. 2 Java programs based Type Casting 3 Java programs based on command line arguments 4 Java programs based on constructors 5 Java programs based on inheritance 6 Java programs based on method overloading 7 Java programs based on method overriding 8 Java programs based on interfaces 9 Java programs based on packages 10 Java programs based on multithreading 11 Java programs based on exception handling 12 Java programs based on AWT									60

Course Code	Cours Title	L	T	P	Credit	Theory			Practical	
FP2	Field Project			4	2	**Int**	**Uni**	**Total**	**Int**	**Uni**
										50
Course Outcomes (COs):	After completion of this course student should be able to CO1. Understand domain knowledge of Relational Database Management System CO2. Identify the implementation of Relational Database Management System									
Prerequisite										Hrs.
Guidelinesfor Project 1. A group of maximum two to four students prepare a Field project under the guidance of internal teacher. 2. Students should adopt Field Visit approach 3. Students should visit any organization and collect the information about RDBMS used by the organization 4. Number of Copies: The student should submit one Spiral copy of the Field Project Report to College /University & also prepare one individually spiral copy. 5. The Field project report is duly signed by Principal or Head of Department, Project Guide and Student.										
Guidelines for submission of the Project Report. a. Paper: The Report shall be typed on white paper, A4 size, for the final submission. The report to be submitted must be original and subsequent copies may be photocopied on any paper. b. Typing: The typing shall be of standard letter size, 1.5 spaced and on both side of the paper. (Normal text should have Times New Roman, Font size 12. Headings can have bigger size) c. Margins: The typing must be done in the following margins: Left 1.5 inch, Right ----- 1 inch Top ----- 1 inch, Bottom 1 inch d. Front Cover: The front cover should contain the following details: TOP : The title in block capitals of 6mm to 15mm letters. CENTRE: Full name in block capitals of 6mm to 10mm letters. BOTTOM: Name of the University, Course, Year of submission -all in block capitals of 6mm to 10mm letters on separate lines with proper spacing with center alignment.										15
Documentation Format a) Cover Page b) Institute/College Recommendation c) Guide Certificate d) Declaration e) Acknowledgement f) Index g) Chapter Scheme 1) Organization Profile 2) Objectives of Tally 3) Scope of tally 4) Features of Tally 5) Advantages and Disadvantages of Tally 6) Reports (with valid data minimum 4 reports) 7) Conclusion										15

SEMESTER-VI

Course Code	Cours Title	L	T	P	Credit	Theory			Practical	
DSC17	.Net Technology	4			4	**Int**	**Uni**	**Total**	**Int**	**Uni**
						20	80	100		
Course Outcomes (COs):	CO1: To understand the features of windows and web-based application CO2: To understand the techniques for developing windows-based application using C# CO3: To understand the techniques for developing web-based application using ASP.NET CO4: To identify skills pertaining to data access technology through the systems using .NET platform.									
Prerequisite										Hrs.
UNIT I	**NET Framework & Fundamentals** .Net Framework, Exploring Visual Studio .NET, .NET Architecture: CLR (Common Language Runtime), CTS (Common Type System), CLS (Common Language Specification), Assembly & Deployment: Modules, Manifests, Garbage Collection, Assemblies, Visual Studio IDE: Project structure, debugging, and testing.									15
UNIT II	**Introduction to C#** Inside a C# Program, Data Types, Statements, Arrays, Using Strings, Objects, Classes and Structs, Properties, Inheritance, Indexers, Delegates, Events, Namespaces, Exception Handling, Assemblies, Windows Forms, Controls, Data binding to Controls, MDI Form, Advanced Database Programming using ADO.net.									15
UNIT III	**Introduction to ASP.net** Building a Web Application, Examples Using Standard Controls, Using HTML Controls, Validating Form Input Controls using Validation Controls, Understanding Applications and State, Applying Styles, Themes, and Skins, Creating a Layout Using Master Pages,									15
UNIT IV	**Database Management System** Working with relational databases: MS-Access, MSSQL Server, Creating Table, Editing and Updating table information, SQL Query, Binding to Databases using Controls, Data Management with ADO.net, Creating a Site Navigation Hierarchy, Navigation Controls, Membership and Role Management, Login Controls, Using Crystal Reports in Web Forms.									15
Text Books/ Reference Books	1. C# 4.0 The Complete Reference by Herbert Schildt 2. Essential C# 4.0‖ by Mark Michaelis and Eric Lippert 3. —C# in Depth‖ by Jon Skeet 4. —Head First C#: A Learner's Guide to Real-World Programming with C#, XAML, and .NET‖ by Jennifer Greene and Andrew Stellman 5. —Microsoft Visual C# Step by Step‖ by Sharp John 6. —Let Us C#‖ by Yashavant P Kanetkar									

Course Code	Cours Title	L	T	P	Credit	Theory			Practical	
DSC18	Foundations of Linux	4			4	**Int**	**Uni**	**Total**	**Int**	**Uni**
						20	80	100		
Course Outcomes (COs):	CO1: To understand fundamental concepts of Linux. CO2: To identify the techniques of Linux System administration. CO3: To implement basic commands in Linux CO4: To devlop shell scripts for commands and systems calls in Linux									
Prerequisite										Hrs.
UNIT I	**Introduction to the Linux** Environment History and evolution of the Linux operating systems, Comparison between free and proprietary software, Pros and cons of using Linux, Popular Linux distributions An overview of the Linux environment, Linux Architecture, Introduction to the Bourne Shell (bash) The vim editor									15
UNIT II	**Linux System Administration** Devices and file system management, User management, managing basic file system permissions Configuring the system - display, network, desktop, etc. System configuration files, System start-up and shutdown, Backup and system recovery Tools, An introduction to common applications and file formats on Linux, An introduction to tools for Linux development.									15
UNIT III	**Introduction to the CLI** Shell environment, commands, syntax, options, getting help Basic commands and utilities File system navigation and manipulation Process management Command line processing I/O redirection and filters.									15
UNIT IV	**Basic Shell Scripting** The built-in constructs of the shell, Basics of filters and regular expressions, Common Linux Commands using shell scripts, Programming using system calls under Linux, utility programs, Examples.									15
Text Books/ Reference Books	1. LINUX with Operating System Concepts by Richard Fox, CRC Press 2. Linux Commands- Instant Reference by Bryan PF affenberge 3. The Design of the Unix Operating System- Bach Page | 9 4. Unix Shell Programming- Yashwant Kanetkar 5. Unix Concepts and Application – Sumitabhadas 6. Linux : The Complete Reference- Richard Peterson									

Course Code	Cours Title	L	T	P	Credit	Theory			Practical	
DSE2.1	Information System Audit	4			4	**Int**	**Uni**	**Total**	**Int**	**Uni**
						20	80	100		
Course Outcomes (COs):	CO1: Understand system audit phases and functions CO2: Describes IS assets and audit controls CO3: Explain VAPT process and tools CO4: Understand IT ACT and various provisions in IT Act									
Prerequisite										Hrs.
UNIT I	**Systems Audit –** An Overview – Nature, Significance and Scope of Systems Audit – Steps Involved in Conducting Systems Audit – Systems Audit and Management Functions – Systems Audit of Computerized Secretarial Functions – Norms and Procedure for Computerization, Computers Control and Security – Testing of Computer Systems – Documentation Standards, Policies and Procedures, Audit Approach, preparation of audit report.									15
UNIT II	**IS Assets and Controls:** Information System Assets, Types of IS assets , Need of audit of computers effects of computers on auditing, types of audit, audit procedure, audit risks, Information System Control: framework of management control, introduction, top management control, evaluating the planning, organizing, leading and controlling function,									15
UNIT III	**Vulnerability Assessment & Penetration Testing (VAPT) :** Introduction and purpose of VAPT, VAPT goals and scope, Vulnerability Assessment Methodology, Types of Vulnerability, Tools for Vulnerability Scanning-Host based, network based and database based; Advantages and disadvantages of Vulnerability Assessment, Vulnerability testing methods and tools Penetration testing methods and tools									15
UNIT IV	**Information Technology Law** – Information Technology Act – Definitions, Important terms under Information Technology Legislation – Digital Signatures – Electronic Records – Certifying Authority – Digital Signature Certificate – Cyber Regulation Appellate Tribunal – Offences and Penalties									15
Text Books/ Reference Books	1 EDP Auditing - Ron Weber 2 PC and LAN security – Stephen Cobb 3 Enterprise Security - Protecting Information Assets - Michel E. Kabey 4 Enterprise Disaster Recovery Planning – Miora 5 Computer Security -Summies 6 Internet Security – Derek, Alkins 7 Information security policies procedures and standards by Thomas Pettier 8 Information System Security: security Management frameworks and best Practices by NinaGodbole 9.. D.P. Mittal : Law of Information Technology (Cyber Law) with Information Technology (Certifying Authorities) Rules, 2000, TaxmannPublications Pvt. Ltd.									

Course Code	Cours Title	L	T	P	Credit	Theory			Practical	
DSE2.2	Web Application Security	4			4	**Int**	**Uni**	**Total**	**Int**	**Uni**
						20	80	100		
Course Outcomes (COs):	CO1: Analyze recent web application attacks, understanding the methodologies used and the impact of such attacks. CO2: Develop skills in incident response and handling, learning to effectively manage and mitigate security breaches. CO3: Stay updated on emerging trends and technologies in web application security, preparing them for future challenges. CO4: Gain practical experience through hands-on labs and exercises, applying their knowledge to real-world scenarios and reinforcing their skills in web application security.									
Prerequisite										Hrs.
UNIT I	**Web Application Security Fundamentals:** Introduction to CIA, Authentication, Authorization and basic terminologies related to W.A.S. Overview of Web Application Security (Introduction, Web Functionality and security aspect) and Importance of Web Application Security in Modern Computing, Common Vulnerabilities and Exposures (CVEs) in Web Applications, Understanding the Threat Landscape, OWASP top 10 introduction, Important protocols for W.A.S. : HTTP, HTTPS, FTP, SMTP, DNS, SSH (Secure Shell), ICMP, TLS/SSL, Kerberos, OAuth, IPsec, API analysis and Third-party dependencies									15
UNIT II	**Web Application Penetration Testing (WAPT)** Overview of VAPT & WAPT, Cyber Kill chain, Information Gathering, Active & Passive Reconnaissance, Advanced Reconnaissance Techniques using OSINT, Client-Side Testing: XSS and its types, Cross-Origin Resource Sharing (CORS), ServerSide Testing: SQL injection and its types, Server-Side Request Forgery (SSRF), XML External Entity (XXE) Injection, Advanced Exploitation Techniques: Remote File Inclusion (RFI), Server-Side Template Injection (SSTI), User Attacks: Inducing User Actions, Capturing Cross-Domain Data, Client-Side Injection Attacks, Local Privacy Attacks, ActiveX Control attacks, Browser Attacks									15
UNIT III	**Advance Defensive Strategies** Advanced Input Validation Techniques, Securing Authentication and Authorization Mechanisms, API security and Secure configuration of cloud resources, Secure Session Management(IAM), File Security Principles, Web Application Firewalls (WAF) and Intrusion Detection Systems (IDS) Secure Coding Practices and Development Guidelines(Approaches to Code Review, Signatures of Common Vulnerabilities)									15
UNIT IV	**Incident Management** Incident response lifecycle and IR plan, Incident Response and Handling in Web Application Security, Legal and Ethical, Implications of Web Application Security Testing, Emerging Trends and Technologies in Web Application Security , Real-world Applications and Case Studies Case Studies of Recent Web Application Attacks, Understanding Real world red teaming Web Application attacks									15
Text Books/ Reference Books	1. Windows Server 2019 Cookbook: Over 100 recipes to effectively configure networks, manage security, and administer workloads, 2nd Edition Paperback – Import, 22 July 2020 by Mark Henderson (Author), Jordan Krause (Author) 2. Hacking Exposed Web Applications, 3rd edition, JOEL SCAMBRAY, VINCENT LIU, CALEB									

	SIMA 3. The Web Application Hacker's Handbook Discovering and Exploiting Security Flaws By DafyddStuttard, Marcus Pinto 4. Rich Bowen, Ken Coar, —Apache Cookbook‖, O'Reilly 5. Web Application Security, A Beginner's Guide, Bryan Sullivan, Vincent Liu, 2011,

Course Code	Cours Title	L	T	P	Credit	Theory			Practical	
DSE2.3	Network Security	4			4	**Int**	**Uni**	**Total**	**Int**	**Uni**
						20	80	100		
Course Outcomes (COs):	CO1: Analyze recent web application attacks, understanding the methodologies used and the impact of such attacks. CO2: Develop skills in incident response and handling, learning to effectively manage and mitigate security breaches. CO3: Stay updated on emerging trends and technologies in web application security, preparing them for future challenges. CO4: Gain practical experience through hands-on labs and exercises, applying their knowledge to real-world scenarios and reinforcing their skills in web application security.									
Prerequisite										Hrs.
UNIT I	Introduction to Network security, Model for Network security, Model for Network access security, Real-time Communication Security: Introduction to TCP/IP protocol stack, Implementation layers for security protocols and implications, IPsec: AH and ESP, IPsec: IKE.									15
UNIT II	Media- Based-Vulnerabilities, Network Device Vulnerabilities, Back Doors, Denial of Service (DoS), Spoofing, Man-in-the-Middle, and replay, Protocol -Based Attacks, DNS Attack, DNS Spoofing, DNS Poisoning, ARP Poisoning, TCP/IP Hijacking, Virtual LAN (VLAN), Demilitarization Zone (DMZ) , Network Access Control (NAC), Proxy Server , Honey Pot , Network Intrusion Detection Systems (NIDS) and Host Network Intrusion Prevention Systems Protocol Analyzers, Internet Content Filters, Integrated Network Security Hardware									15
UNIT III	Authentication: Kerberos, X.509 Authentication Service, Scanning: Port Scanning, Port Knocking- Advantages, Disadvantages. Peer to Peer security. Electronic Mail Security: Distribution lists, Establishing keys, Privacy, source authentication, message integrity, non-repudiation, proof of submission, proof of delivery, message flow confidentiality, anonymity, Pretty Good Privacy (PGP)									15
UNIT IV	Firewalls and Web Security: Packet filters, Application level gateways, Encrypted tunnels, Cookies. Assignments on latest network security techniques, Security applications in wireless sensor network and wireless Communication networks									15
Text Books/ Reference Books	• William Stallings, —Cryptography and Network Security – Principles and Practices‖, Prentice Hall of India, Third Edition, 2003. • Cisco: Fundamentals of Network Security Companion Guide (Cisco Networking Academy Program). • Saadat Malik, Saadat Malik. —Network Security Principles and Practices (CCIE Professional Development)‖. Pearson E ducation. 2002. (ISBN: 1587050250) . • Mark Ciampa —Security + Guide to Network Security Fundamentals/Edition 3‖ Cengage Learning publisher, ISBN-10: 1428340661, ISBN-13: 978-1428340664									

Course Code	Cours Title	L	T	P	Credit	Theory			Practical	
DSM6	Bank Management	4			4	**Int**	**Uni**	**Total**	**Int**	**Uni**
						20	80	100		
Course Outcomes (COs):	CO1: To aquire thorough knowledge of banking laws and operations. CO2: To identify the new concepts introduced in the banking system. CO3: To understand the functions and services of bank. CO4: To identify the initiatives of bank in financial inclusion and financial literacy.									
Prerequisite										Hrs.
UNIT I	**Indian Financial System & Types of Banks: -** Overview of the Indian Financial System, History - Structure - Role of Financial System in Economic Development. - Types of Banks: Central Bank, Commercial Banks, Co-operative Banks, Small Finance Banks, Payment Banks, Scheduled & Non-Scheduled Banks.									15
UNIT II	**Banking Regulation Act, 1949 & Banking Related Laws:** Introduction of Banking Regulation Act, 1949, History, Objectives, Features, Important provisions, Offences & Punishment and Amendments to the Banking Regulation Act, 1949. - Know Your Customer Norms, Consumer Protection Act, Anti Money Laundering Standards, Banking Ombudsman Scheme.									15
UNIT III	**Banker Relationship & Functions of Banks: -** Introduction & Definition of Customer, Banker-Customer Relationship: General & Special, Termination of relationship, Banker's Special Relationship. - Primary & Secondary Functions & Ancillary Services.									15
UNIT IV	**Financial Inclusion & Financial Literacy: -** Introduction, Objective, Need, Different Financial Inclusion Programmes and Schemes in India, Operations. - Meaning, Fundamental Components, Importance & Benefits.									15
Text Books/ Reference Books	1. Principles and Practice of Banking – Indian Institute of Banking and Finance. 2. Modern banking and Insurance – Jain J. N – JainR.K. 3. Banking Law and Practice in India- Tannan – DattaC.R. 4. Indian Banking – Nature and Problems – DesaiVasant. 5. Fundamentals of Banking Theory and practice – BasuA.K. 6. Principles & Practices of Banking - By Indian Institute of Banking & Finance Macmillan Publication.									

<table>
<tr><th>Course Code</th><th>Cours Title</th><th>L</th><th>T</th><th>P</th><th>Credit</th><th colspan="3">Theory</th><th colspan="2">Practical</th></tr>
<tr><td rowspan="2">DSC19</td><td rowspan="2">Lab on DSC17</td><td rowspan="2">2</td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2">2</td><td>Int</td><td>Uni</td><td>Total</td><td>Int</td><td>Uni</td></tr>
<tr><td>10</td><td>40</td><td>50</td><td></td><td></td></tr>
<tr><td>Course Outcomes (COs):</td><td colspan="10">After completion of this course students will be able to –
CO2: To develop windows-based application using C#
CO3: To develop web-based application using ASP.NET</td></tr>
<tr><td>Prerequisite</td><td colspan="9"></td><td>Hrs.</td></tr>
<tr><td>Programs</td><td colspan="9">1) Debug and deploy ASP.NET web applications
2) Discuss the insights of internet programming and implement complete applicationover the web
3) Use the features of Dot Net Framework along with the features of C#
4) Build and host web applications using ASP.NET
5) Develop and deploy Windows applications
6) Handle data by using ADO.NET architecture
7) Create database-driven ASP.NET web applications
8) Present data by using crystal report in .net framework
9) Validate Form Input Controls using Validation Controls
10) Understand Applications and State in .net programming</td><td>15</td></tr>
</table>