



Karmaveer Bhaurao Patil University, Satara

Syllabus for

B.Voc.-I (Software Development)

Under

Faculty of Science and Technology

(As per NEP 2020)

With effect from Academic Year 2026-2027

Syllabus for Bachelor of Vocational Software Development

PREAMBLE:

This syllabus is framed to give sound knowledge with an understanding of Software Development to undergraduate students in First year of B.Voc. Degree course. It has been designed to meet the specific needs of B.Voc. Software Development students in accordance with the NEP 2020 guidelines.

The academic structure for the B.Voc (Software Development) programme under the Faculty of Science and Technology at Karmaveer Bhaurao Patil University, Satara, aligned with the National Education Policy (NEP) 2020. It offers a progressive, credit-based pathway ranging from Level 4.5 to Level 6.0, allowing students to specialize in a Major and Minor while providing flexible exit and entry points. The structure integrates Major and Minor subjects with General/Open Electives (GE/OE), Skill Enhancement Courses (SEC), and Indian Knowledge Systems (IKS). Importance is placed on practical application through Vocational Skill Courses (VSC), Field Projects (FP), On Job Training (OJT), and Community Engagement Programmes (CEP).

The Bachelor of Vocational (B.Voc) in Software Development is a skill oriented undergraduate degree designed to bridge the gap between academic education and IT industry requirements.

General Objective of the Programme:

- 1) Provide multiple entry and exit options (UG Certificate, UG Diploma, UG Degree, and UG Honors/Honors with Research) integrated with National Skills Qualifications Framework (NSQF) courses or Internships or Continue with Major and Minor.
- 2) Equip students with practical skills in software development through a strong mix of theory and practical sessions, Vocational Skill Courses (VSC), and Skill Enhancement Courses (SEC).
- 3) Ensure engaging students in On Job Training (OJT), Field Projects (FP), Community Engagement Projects (CEP).
- 4) Develop professionals prepared with Value Education (VEC), Ability Enhancement (AEC), Indian Knowledge Systems (IKS), and Co-Curricular (CC) activities alongside core technical subjects.
- 5) Prepare students for advanced academic research and innovation through Research Methodology (RM), Field Project (FP) and Research Projects (RP) in the programme.

General Outcome of the Programme:

The students will be able to...

- 1) **GPO1:** Apply fundamental knowledge of software development, core subjects, and electives to analyze, design, and solve complex technical problems.
- 2) **GPO2:** Demonstrate practical skill developed through specialized practical credits, Skill Enhancement Courses (SEC), and Vocational Skill Courses (VSC).
- 3) **GPO3:** Adapt to workplace environments through hands-on experience gained from On-the-Job Training (OJT), Field Projects (FP), and NSQF-aligned internships.
- 4) **GPO4:** Conduct independent research, formulate methodologies, and execute field/research projects (FP-RP).
- 5) **GPO5:** Demonstrate awareness of ethics, Indian Knowledge Systems (IKS), environmental and human values (VEC), and active engagement in community development (CEP).

Programme Specific Objective:

- 1) Build a strong foundation in core programming concepts, algorithm development, and basic programming applications using languages like Python.
- 2) Impart practical skills in user interface and user experience (UI/UX) design and applied web development techniques to create modern, responsive web applications.
- 3) Develop Skill in structuring, querying, and managing relational databases using modern SQL and Advanced SQL frameworks.
- 4) Equip students with core knowledge of computer networks, data communications, and internet application protocols.
- 5) Provide real-world, laboratory-based learning across core domains along with specialized applied skills like Office Automation and Advanced Digital Marketing.
- 6) Develop thinking and problem-solving through computational statistics, linear algebra, aptitude, and logical reasoning.

Programme Specific Outcome:

The students will be able to...

- 1) Write, debug, and implement structured algorithms and Python programs to solve computational problems.
- 2) Create user friendly UI/UX interface layouts and build functional front-end web applications.

- 3) Design relational database schemas, construct optimized SQL/Advanced SQL queries, and manipulate database systems efficiently.
- 4) Understand basic networking architecture, implement data communication concepts, and configure internet applications.
- 5) Apply principles of linear algebra, computational statistics, logical reasoning, and aptitude to technical problem-solving.
- 6) Utilize workplace software tools, digital marketing practices, office automation technologies, and professional English communication for workplace effectiveness.

1. **TITLE:** B.Voc (Software Development) Part I

2. **YEAR OF IMPLEMENTATION:** From 2026-2027

3. **DURATION:** 01 year

4. **PATTERN:** Semester

5. **MEDIUM OF INSTRUCTION:** English

6. **STUDENT ELIGIBILITY:** 12th Science OR equivalent in Science Stream.

7. STRUCTURE OF COURSE: As per NEP 2020

Level/ Difficulty	Sem	Subject- 1	Subject- 2	Subject- 3	GE/OE	SEC	IKS	AEC	VEC	CC	Total
4.5 / 100	I	2 (T) + 2 (P)	2 (T) + 2 (P)	2 (T) + 2 (P)	2 (T)	2 (P)	2 (T) (Generic)	2 (T)	2 (P)		22
	II	2 (T) + 2 (P)	2 (T) + 2 (P)	2 (T) + 2 (P)	2 (P)	2 (P)		2 (T)	2 (P)	2	22

Exit Option: Award of UG certificate in Major with 44 credit & additional 4 credit core NSQF course/internship OR Continue with Major and Minor

Continue Option: Student will select one subject among the (Subject 1, Subject 2, Subject 3) as Major and another as Minor and Third subject will be dropped

Abbreviations: AEC: Ability Enhancement Course; VEC: Value Education Course; SEC: Skill Enhancement Course; CC: Co-curricular Course; IKS: Indian Knowledge System; GE: Generic Elective; T: Theory; P: Practical.

8. PAPER TITLES AND CREDIT DISTRIBUTION:

Semester I				
Sr. No.	Components	Course Code	Course Title	Credits
1.	Subject -1	BSDT 111	Applications of Programming	2
2.	Practical-I	BSDP 112	Lab Based on BSDT 111	2
3.	Subject-2	BSDT 113	UI/UX Designing	2
4.	Practical-II	BSDP 114	Lab Based on BSDT 113	2
5.	Subject-3	BSDT 115	Database Management System	2
6.	Practical-III	BSDP 116	Lab Based on BSDT 115	2
7.	GE	BSDTGE I	Computer Network & Internet Application	2
8.	IKS(Generic)	BSDTIKS I	Aptitude & Logical Reasoning	2
9.	AEC	BSDTAEC I	English for Communication-I	2
10.	SEC	BSDPSEC I	Office Automation	2
11.	VEC	BDSPVEC I	Core Programming Principles and Algorithms	2
Total				22
Semester II				
Sr. No.	Components	Course Code	Course Title	Credits
1.	Subject -1	BSDT 121	Python Programming-I	2
2.	Practical-IV	BSDP 122	Lab Based on BSDT 121	2
3.	Subject-2	BSDT 123	Applied Web Development	2
4.	Practical-V	BSDP 124	Lab Based on BSDT 123	2
5.	Subject-3	BSDT 125	Advanced SQL	2
6.	Practical-VI	BSDP 126	Lab Based on BSDT 125	2
7.	AEC	BSDTAEC II	English for Communication-II	2
8.	CC	BSDTCC I	Computational Statistics	2
9.	GE	BDSPGE II	Data Communications and Networking (Practical)	2
10.	SEC	BDSPSEC II	Advanced Digital Marketing (Practical)	2
11.	VEC	BDSPVEC II	Linear Algebra (Practical)	2
Total				22

9. EVALUATION STRUCTURE:

Semester I, Level 4.5

Course	Course Category	Course Code	Internal Evaluation	ESE	Total Marks	Credits
Subject 1	T	BSDT 111	20	30	50	2
	P	BSDP 112	20	30	50	2
Subject 2	T	BSDT 113	20	30	50	2
	P	BSDP 114	20	30	50	2
Subject 3	T	BSDT 115	20	30	50	2
	P	BSDP 116	20	30	50	2
GE	T	BSDTGE I	20	30	50	2
IKS	T	BSDTIKS I	20	30	50	2
AEC	T	BSDTAEC I	20	30	50	2
SEC	P	BSDPSEC I	20	30	50	2
VEC	P	BSDPVEC I	20	30	50	2
Total					550	22

Semester II, Level 4.5

Course	Course Category	Course Code	Internal Evaluation	ESE	Total Marks	Credits
Subject 1	T	BSDT 121	20	30	50	2
	P	BSDP 122	20	30	50	2
Subject 2	T	BSDT 123	20	30	50	2
	P	BSDP 124	20	30	50	2
Subject 3	T	BSDT 125	20	30	50	2
	P	BSDP 126	20	30	50	2
AEC	T	BSDTAEC II	20	30	50	2
CC	T	BSDTCC I	20	30	50	2
GE	P	BSDPGE II	20	30	50	2
SEC	P	BSDPSEC II	20	30	50	2
VEC	P	BSDPVEC II	20	30	50	2
Total					550	22

INTERNAL EVALUATION STRUCTURE

- Internal evaluation of theory papers shall carry a weightage of 40%.
- Activity: For the internal evaluation of theory papers following activities will be adopted for CCE I & CCE II: class test/ open book test/ online course/ Industrial review/ Industrial visit/ e learning video creation/ assignment/seminar/ case study/ fieldwork/ project.
- CCE III shall consist of multiple-choice questions.
- Each CCE will carry 10 marks for 2-credit theory papers and 20 marks for 4-credit theory papers, and the best two scores will be considered for final score.
- Internal evaluation of practical papers shall carry a weightage of 40%.
- For practical examinations, internal evaluation will be based on student performance, attendance, journal records, and viva voce.

Abbreviations: CCE: Continuous Comprehensive Examination;
ESE: End Semester Examination.

10. OTHER FEATURES:

a. LIBRARY:

Reference books, Textbooks and journals are available in Institute and Departmental Library. (Separate reference lists are attached along with the respective course syllabus)

b. EQUIPMENT:

- Computers: 120
- Smart Boards: 4
- Internet Connection



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Faculty of Science & Technology

Yashwantrao Chavan Institute of Science, Satara

Board of Studies in Computational Sciences

Programme: B.Voc. (Soft. Dev.)

Semester - I

Type: Subject-I T

Marks: 50

Credits: 2

From: A. Y. 2026-2027

Name of the Course and Code: Applications of Programming (BSDT 111)

Course Objectives: Student should be able to...

- 1) Understand the basic concepts and terminology of programming in general.
- 2) Study the ability to analyze a problem and design an algorithm to solve it.
- 3) Learn the basic concept of Object-Oriented Programming.
- 4) Understand the operators and control structure in C++.

Course Outcomes: Student will able to...

- 1) Explore algorithmic approaches to problem solving.
- 2) Formulate basic concept of programming.
- 3) Apply the concepts of object, classes and constructor.
- 4) Demonstrate programming concepts such as data types, operators, expressions, and input/output statements.

Module	Title and Contents	Hrs
Module -1:	'C' Fundamentals 1.1 History of 'C' language, Structure of a 'C' program, 'C' Program Development life cycle. 1.2 'C' tokens, Character set, Keywords, Identifiers, Variables, Constants, Data Types (Built-in and user defined data types). 1.3 Operators and Expressions, Character input and output: getchar(), putchar(). 1.4 String input and output: scanf(), printf(), gets() and puts(), Formatted Input and Output.	8
Module -2:	Control Structures and Arrays 2.1 Decision making structures: if, if-else, else-if ladder, nested if, and switch statements. 2.2 Loop control structures: for loop, while loop, and do-while loop. 2.3 Nested structures: Introduction, Declaration, Initialization, Accessing Members, Examples. 2.4 Jump Statements, Unconditional branching, Concept, types and application of Arrays.	8
Module -3:	Functions and Pointers 3.1 Concept of function: function declaration, definition, calling, arguments	6

	(parameters), return values, Standard library functions, User defined functions, Recursive functions. 3.2 Scope of variables and Storage classes. 3.3 Pointer declaration, initialization & dereferencing. 3.4 Pointer arithmetic: Introduction, Arithmetic Operations, Rules, Examples	
Module -4:	Introduction to OOP 4.1 Difference between POP and OOP, Structure of C++ Program, OOPs Concepts: encapsulation, inheritance, polymorphism, and abstraction. 4.2 Control and Looping Structure, Class Definition, Member Function. Definition. 4.3 Accessing Members from Object(S), Static Class Members. 4.4 Constructor and Destructor: Types of Constructors, Constructor overloading, difference between Constructor and Destructor	8

Reference Books: -

- 1) Gonzalez-Morris, German. Beginning C: From Beginner to Pro. 7th ed. New York: Apress, 2026.
- 2) Kanetkar, Yashavant. Let Us C. 19th ed. BPB Publications, 2023.
- 3) Gustedt, Jens. Modern C. 2nd ed. Shelter Island, NY: Manning Publications, 2019.
- 4) Prinz, Peter, and Tony Crawford. C in a Nutshell: The Definitive Reference. 2nd ed. Sebastopol, CA: O'Reilly Media, 2016.
- 5) Deitel, Paul, and Harvey Deitel. C: How to Program. 8th ed. Upper Saddle River, NJ: Pearson, 2015.

Evaluation Pattern:

Total Marks: 50

Comprehensive Continuous Evaluation (20 Marks): • CCE - I : 10 Marks • CCE - II : 10 Marks • CCE - III: 10 Marks: Objective • Note: The best of two scores will be considered for final mark entry.	End Semester Examination (30 Marks): • Question-1: Solve the following questions (Five questions of 2 Marks) • Question -2: Attempt any two questions (Three questions of 10 Marks) • Question -3: Attempt any four questions (Five questions of 5 Marks) Note: Conversion of 50 marks of ESE evaluation to 30 Marks
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(A State Public University Est. u/s 3(6) of MPUA 2016)
Faculty of Science & Technology

Yashvantrao Chavan Institute of Science, Satara

Board of Studies in Computational Sciences

Programme: B.Voc. (Soft. Dev.)

Semester - I

Type: Subject I-P

Marks: 50

Credits: 2

From: A. Y. 2026-2027

Name of the Course and Code: Practical I (BSDP 112)

Practical Batch:20 Student/Batch

Course Objectives: Student should be able to...

- 1) Introduce the basic concepts of problem-solving using fundamentals of C programming.
- 2) Learn logical thinking and problem-solving skills using programming.
- 3) Understand the operators and control structure in C++
- 4) Study the constructors and destructors.

Course Outcomes: Student will able to...

- 1) Apply the basic syntax, data types, and operators of the C language to write and execute simple programs.
- 2) Implement programs involving arrays, functions, and basic input/output operation
- 3) Develop C++ programs using classes, objects, arrays of objects, and member functions.
- 4) Design modular programs using functions, classes, constructors, and destructors.

Sr.No.	Practicals Title (Any 15 of the Following)	Hrs
1)	Write a C programs using printf() function.	
2)	Write a C programs using Build-in DataTypes.	
3)	Write a C programs using scanf() function.	
4)	Write a C programs using getchar(),putchar().	
5)	Write a C programs using gets() and puts().	
6)	Write a C programs using operators.	
7)	Write a C program using if, if-else.	
8)	Write a C program using for loop.	
9)	Write a C program using while loop	
10)	Program based on do while statement.	
11)	Write a C program to demonstrate the use of break, continue, and goto statements.	
12)	Write a C program to find the sum and average of elements of a one-dimensional array.	
13)	Write a C program using a user-defined function (with function declaration, definition, and call).	
14)	Write a C program to demonstrate pointer declaration, initialization, and dereferencing.	
15)	Write a C++ Program to display Names, Roll No., and grades of 3 students who	

	have appeared in the examination. Declare the class of name, Roll No. and grade.	
17)	Create an array of class objects. Read and display the contents of the array.	
18)	Create a class Student with data members and member functions to display student details.	
19)	Write a C++ program to use scope resolution operator. Display the various values of the same.	
20)	Write C++ program using constructor.	

Reference Books: -

- 1) Gonzalez-Morris, German. Beginning C: From Beginner to Pro. 7th ed. New York: Apress, 2026.
- 2) Kanetkar, Yashavant. Let Us C. 19th ed. BPB Publications, 2023.
- 3) Gustedt, Jens. Modern C. 2nd ed. Shelter Island, NY: Manning Publications, 2019.
- 4) Prinz, Peter, and Tony Crawford. C in a Nutshell: The Definitive Reference. 2nd ed. Sebastopol, CA: O'Reilly Media, 2016.
- 5) Deitel, Paul, and Harvey Deitel. C: How to Program. 8th ed. Upper Saddle River, NJ: Pearson, 2015.

Evaluation Pattern:

Total Marks: 50

Internal Evaluation (20 Marks):	Practical Exam Paper (30 Marks):
• Journal: 05 Marks • Students' Performance: 05 Marks • Viva: 05 Marks • Mini Project/Case Study: 05 Marks	• Selection I: Attempt any TWO questions (10 marks each) • Selection II: Attempt any TWO questions (05 marks each)



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Board of Studies in Computational Sciences

Programme: B.Voc. (Soft. Dev.)

Semester - I

Type: Subject II-T

Marks: 50

Credits: 2

From: A. Y. 2026-27

Name of the Course and Code: UI/UX Designing (BSDT 113)

Course Objectives: Student should be able to...

- 1) Understand the fundamentals of web designing and the working of web browsers and servers.
- 2) Learn how to create and structure web pages using HTML.
- 3) Study styling and layout techniques with CSS, including responsive design.
- 4) Explore interactive web page features using JavaScript and DOM manipulation.

Course Outcomes: Student will able to...

- 1) Demonstrate the structure of web pages using HTML.
- 2) Design visually appealing web pages using CSS, including responsive layouts.
- 3) Create interactive web page features using JavaScript and DOM manipulation.
- 4) Implement modern web page layouts and components using Bootstrap.

Module	Title and Contents	Hrs.
Module -1:	Introduction to Web Designing and HTML 1.1 Web Browser and Server, Static vs Dynamic Websites, HTML Editors, HTML vs XML, Structure of HTML Document, Tags, HTML Forms. 1.2 HTML Input Types and Attributes. 1.3 HTML Buttons and Basic Form Validation. 1.4 Meta Tags and SEO Basics in HTML.	8
Module -2:	Cascading Style Sheets 2.1 Introduction to CSS, CSS Selectors, Colors, Fonts, Text Styles, Border, Margin, Padding, Display, Position, Float. 2.2 Layout techniques in CSS: Introduction to Flexbox, Media Queries, CSS Grid Layout. 2.3 CSS Variables and Shadow Effects. 2.4 CSS Animations and Transition.	8
Module -3:	Bootstrap Framework 3.1 Bootstrap: Introduction to Bootstrap, Grid System, Typography and Colors, Buttons and Utilities, Forms, Components.	8

	3.2 Bootstrap Slider and Popup Modal. 3.3 Bootstrap Cards: Introduction to Cards, Card Components, Card layouts 3.4 Bootstrap Navigation Bars: Introduction to Navigation Bars, Navbar Components, Types of Navigation Bars.	
Module -4:	JavaScript 4.1 Introduction to JS, Variables & Data Types, Operators, Control Statements, Functions. 4.2 Arrays, Objects, DOM Basics. 4.3 Basic Form Validation. 4.4 Error Handling.	6

Reference Books: -

- 1) Flanagan, David. JavaScript: The Definitive Guide. 7th ed. Sebastopol, CA: O'Reilly Media, 2020.
- 2) Simpson, Kyle. You Don't Know JS Yet: Get Started. 2nd ed. Sebastopol, CA: O'Reilly Media, 2020.
- 3) Spurlock, Jake. Bootstrap: Responsive Web Development. Sebastopol, CA: O'Reilly Media, 2013.
- 4) Osmani, Addy. Learning JavaScript Design Patterns. Sebastopol, CA: O'Reilly Media, 2012.
- 5) Duckett, Jon. HTML and CSS: Design and Build Websites. Indianapolis: John Wiley & Sons, 2011.

Evaluation Pattern:

Total Marks: 50

Comprehensive Continuous Evaluation (20 Marks): • CCE - I : 10 Marks • CCE - II : 10 Marks • CCE - III: 10 Marks: Objective • Note: The best of two scores will be considered for final mark entry.	End Semester Examination (30 Marks): • Question-1: Solve the following questions (Five questions of 2 Marks) • Question -2: Attempt any two questions (Three questions of 10 Marks) • Question -3: Attempt any four questions (Five questions of 5 Marks) Note: Conversion of 50 marks of ESE evaluation to 30 Marks
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Faculty of Science and Technology

Yashwantrao Chavan Institute of Science, Satara

Board of Studies in Computational Sciences

Programme: B.Voc. (Soft. Dev.)

Semester - I

Type: Subject II-P

Marks: 50

Credits: 2

From: A. Y. 2026-27

Name of the Course and Code: Practical II (BSDP 114)

Practical Batch:20 Student/Batch

Course Objectives: Student should be able to...

- 1) Understand the fundamentals of web designing.
- 2) Learn the structure of HTML documents and the proper use of tags, forms, and input types.
- 3) Study creating responsive and interactive webpages using HTML, CSS, and JavaScript.
- 4) Learn modern layout techniques using Flexbox and CSS Grid for responsive design.

Course Outcomes: Student will able to...

- 1) Build HTML web pages with headings, paragraphs, lists, links, images, audio, and video.
- 2) Create multi-page websites with proper navigation and links.
- 3) Design and implement forms with input types, buttons, and validation.
- 4) Develop responsive layouts using Flexbox and CSS Grid.

Sr.No.	Practical Titles (Any 15 of the following)	Hrs.
1)	Write a simple HTML page with a title, heading, paragraph, and a list of your favorite websites.	60
2)	Create a HTML page containing links to external websites and internal pages.	
3)	Write a basic HTML form that asks for name, email, password, and gender.	
4)	Implement a form with submit and reset buttons and apply basic HTML5 validation.	
5)	Design a webpage using meta tags for description, keywords, and author for SEO purposes.	
6)	Construct a table with at least 3 rows and 4 columns containing sample data.	
7)	Demonstrate embedding image, video, and audio on a webpage with proper attributes.	
8)	Write a CSS program to style a webpage with different fonts, colors, and text styles for headings and paragraphs.	
9)	Design a CSS box with border, margin, padding, and apply different Border styles.	
10)	Apply CSS using element, class, and ID selectors to style different elements.	
11)	Create a responsive layout using Flexbox with at least 3 sections side by side.	

12)	Use CSS Grid layout to design a webpage with a header, sidebar, main content, and footer.	
13)	Demonstrate a hover effect on buttons and transition animations for smooth effects.	
14)	Implement media queries to make a webpage mobile-friendly.	
15)	Write an HTML and JavaScript program to accept two numbers and perform addition, subtraction, multiplication, and division using a switch statement.	
16)	Write an HTML and JavaScript program to create a student object containing student name and an array of marks, and define a function to calculate and display the average marks.	
17)	Write a program to take text from an HTML input and append it as a new item to a list every time a button is clicked.	
18)	Write a program to validate a login form, ensuring the username is longer than 5 characters and the password is not empty.	
19)	Write an HTML and JavaScript program to accept three numbers and display the largest number.	
20)	Create a dynamic calculator using HTML, CSS, and JavaScript.	

Reference Books: -

- 1) Flanagan, David. JavaScript: The Definitive Guide. 7th ed. Sebastopol, CA: O'Reilly Media, 2020.
- 2) Simpson, Kyle. You Don't Know JS Yet: Get Started. 2nd ed. Sebastopol, CA: O'Reilly Media, 2020.
- 3) Spurlock, Jake. Bootstrap: Responsive Web Development. Sebastopol, CA: O'Reilly Media, 2013.
- 4) Osmani, Addy. Learning JavaScript Design Patterns. Sebastopol, CA: O'Reilly Media, 2012.
- 5) Duckett, Jon. HTML and CSS: Design and Build Websites. Indianapolis: John Wiley & Sons, 2011.

Evaluation Pattern:

Total Marks: 50

Internal Evaluation (20 Marks):

- Journal: 05 Marks
- Students' Performance: 05 Marks
- Viva: 05 Marks
- Mini Project/Case Study: 05 Marks

Practical Exam Paper (30 Marks):

- Selection I: Attempt any TWO questions (10 marks each)
- Selection II: Attempt any TWO questions (05 marks each)



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Board of Studies in Computational Sciences

Programme: B.Voc. (Soft. Dev.)

Semester - I

Type: Subject III-T

Marks: 50

Credits: 2

From: A. Y. 2026-2027

Name of the Course and Code: Database Management System (BSDT 115)

Course Objectives: Student should be able to...

- 1) Understand the fundamentals of databases and database architecture.
- 2) Study relational algebra and calculus concepts.
- 3) Learn normalization rules to reduce redundancy and maintain data integrity.
- 4) Utilize UML diagrams for modeling database systems.

Course Outcomes: Student will able to...

- 1) Analyze real-world scenarios and design database schemas using ER models.
- 2) Execute complex SQL queries.
- 3) Implement a structured relational database system.
- 4) Formulate Mathematical Queries.

Module	Title and Contents	Hrs
Module -1:	Database System Concepts 1.1 Introduction to Database system- Data, Database, DBMS, Components, Characteristics, Types, Data Storage, Data Retrieval, Data Redundancy, Data Consistency, Data Security. 1.2 Database system vs. File system, Data Abstraction-Degree of Data Abstraction. 1.3 Database Architecture-Three-Level Architecture, Data Independence, Types of Database Architecture, Transaction Management-ACID Properties. 1.4 Introduction To RDBMS- DBMS Vs. RDBMS, Features of RDBMS.	7
Module -2:	Data Models & Design 2.1 Introduction to data models-Types, Building blocks. 2.2 ER-Model-Entities, Attributes, Relationships, Constraints, Cardinality in ER Model and ER-Diagram design. 2.3 Relational Database Model- Schema, Relational Schema in DBMS, Relational Model, Codd's Rules in DMBS. 2.4 Introduction to UML: History, Advantages, Limitations, Types of UML Diagram-Behavior Diagrams and Structure Diagrams, Normalization:(1NF, 2NF, 3NF, BCNF).	8
Module -3:	Relational Algebra and Calculus 3.1 Introduction to Relational algebra - Selection, projection, set operations, Renaming, Joins, Division -Syntax and Semantics. 3.2 Operators- Unary Operators, Binary Operators, Join grouping and ungrouping. 3.3 Relational Calculus(RC)-Introduction to RC, Components of RC, Examples 3.4 Relational Calculus (RC) vs Relational Algebra (RA)	7

Module -4: Introduction to SQL	4.1 Overview to SQL- Features of SQL, SQL Data types, Operators, SQL Commands 4.2 SQL Functions- Aggregate Functions (MIN, MAX, SUM, AVG, COUNT) 4.3 SQL Clauses-From clause, Where Clause, Having Clause, Group By clause, Order By clause, SQL Constraints-Primary Key, Foreign Key, Unique, NOT NULL, Default Constraint 4.4 SQL Joins- Inner Join, Left Outer Join, Right Outer Join, Full Join, Subqueries- Purpose of Subqueries, Types of subqueries	8
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Reference Books: -

- 1) Coronel, Carlos, and Steven Morris. Database Systems: Design, Implementation, and Management. 14th ed. Boston: Cengage Learning, 2021.
- 2) Silberschatz, Abraham, Henry F. Korth, and S. Sudarshan. Database System Concepts. 7th ed. New York: McGraw-Hill Education, 2019.
- 3) Elmasri, Ramez, and Shamkant B. Navathe. Fundamentals of Database Systems. 7th ed. Boston: Pearson, 2017.
- 4) Connolly, Thomas, and Carolyn Begg. Database Systems: A Practical Approach to Design, Implementation, and Management. 6th ed. Harlow, UK: Pearson Education Limited, 2015.
- 5) Pandya, Bhavesh, Safa Hamdare, and A. K. Sen. Database Management System (DBMS). 1st ed. New Delhi: Vikas Publishing House, 2015.

Evaluation Pattern:

Total Marks: 50

Comprehensive Continuous Evaluation (20 Marks): • CCE - I : 10 Marks • CCE - II : 10 Marks • CCE - III: 10 Marks: Objective • Note: The best of two scores will be considered for final mark entry.	End Semester Examination (30 Marks): • Question-1: Solve the following questions (Five questions of 2 Marks) • Question -2: Attempt any two questions (Three questions of 10 Marks) • Question -3: Attempt any four questions (Five questions of 5 Marks) Note: Conversion of 50 marks of ESE evaluation to 30 Marks
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Board of Studies in Computational Sciences

Programme: B.Voc. (Soft. Dev.)

Semester -I

Type: Subject III-P

Marks: 50

Credits: 2

From: A. Y. 2026-27

Name of the Course and Code: Practical III (BSDP 116)

Practical Batch:20 Student/Batch

Course Objectives: Student should be able to...

- 1) Study integrity constraints to ensure data consistency.
- 2) Utilize aggregate functions for data analysis.
- 3) Learn transaction mechanisms to manage database consistency.
- 4) Understand joins, combine and filter data from multiple tables.

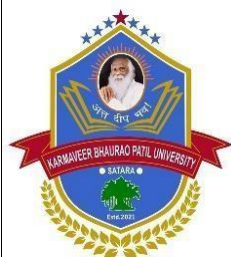
Course Outcomes: Student will able to...

- 1) Develop relational database schemas and tables for real-world applications
- 2) Implement SQL commands to manipulate database objects effectively.
- 3) Analyze normalization techniques for effective database design.
- 4) Retrieve data from multiple related tables using joins for data analysis.

Sr.No.	Practical Titles (Any 15 of the following)	Module
1)	Design a Database and create required tables. For e.g. Student, College Database.	60
2)	Write the queries to implement DDL and DQL commands.	
3)	Write the queries to implement DML commands	
4)	Apply constraints like Primary Key, Foreign key, NOT NULL, Default constraint to the tables.	
5)	Write a SQL statement to implement Where clause and Having Clause.	
6)	Write a SQL statement to implement From Clause, Order By Clause, Group By Clause.	
7)	Write SQL Queries to implement LIKE, AND, OR Operator.	
8)	Write the query for implementing the following functions: MAX(), MIN() , AVG(), COUNT().	
9)	Write the SQL program to display average salary of Employee using functions.	
10)	Write the queries to implement the Inner Join and Full Join.	
11)	Write the queries to implement the Left Outer Join and Right Outer Join.	

12)	Write the query to implement the concept of Integrity constraints.	
13)	Create a table employee with the attribute emp_id, emp_name, salary, Department and perform the following queries.	
14)	Retrieve all employee from the sales department a. Get the list of employees who earns more than 50,000 b. Display all employee ordered by salary in descending order c. Display all employee order by emp_name in ascending order d. Display employee order by department name and by the salary.	
15)	Create a table student with the columns std_id, name, age, and a table name department with column std_id, dept_name and perform following tasks: a. Write an SQL command to create both tables with following constraints primary_key on std_id, foreign key on std_id in department table, unique constraint on dept_name, not null constraint on all columns. b. Write a SQL command to update the dept_name of a specific student c. Write an SQL command to delete a student with a specific std_id d. Write an SQL query using inner join to display std_name along with their dept_name.	
16)	Create a table employee and perform the following tasks: a. Find the total salary paid to employee. b. Find the avg salary of employee. c. Find highest salary among the employee. d. Find the lowest salary among the employee. e. Find the total no. of employee.	
17)	Write an SQL query using a subquery to perform following tasks. a. Retrieve employees who earn more than the average salary in the company. b. Find employees whose salary is equal to the highest salary in the company. c. Find employees who earn more than the average salary of their department.	
18)	Create Teacher table with the following fields (Name, Dept_No, Date of joining, Dept_name, Location, Salary) and perform following tasks: a. Using commit and rollback. b. Give Increment of 25% salary for Mathematics Department c. Perform Rollback command	
19)	Write the query to create the views	

20)	Write a query to create view using single and Multiple tables.	
Reference Books: - 1) Coronel, Carlos, and Steven Morris. Database Systems: Design, Implementation, and Management. 14th ed. Boston: Cengage Learning, 2021. 2) Silberschatz, Abraham, Henry F. Korth, and S. Sudarshan. Database System Concepts. 7th ed. New York: McGraw-Hill Education, 2019. 3) Elmasri, Ramez, and Shamkant B. Navathe. Fundamentals of Database Systems. 7th ed. Boston: Pearson, 2017. 4) Connolly, Thomas, and Carolyn Begg. Database Systems: A Practical Approach to Design, Implementation, and Management. 6th ed. Harlow, UK: Pearson Education Limited, 2015. 5) Pandya, Bhavesh, Safa Hamdare, and A. K. Sen. Database Management System (DBMS). 1st ed. New Delhi: Vikas Publishing House, 2015. 6) Desai, Bipin C. Database Management Systems. 1st ed. New Delhi: Galgotia Publications, 2010.		
Evaluation Pattern:		
Total Marks: 50		
Internal Evaluation (20 Marks): • Journal: 05 Marks • Students' Performance: 05 Marks • Viva: 05 Marks • Mini Project/Case Study: 05 Marks		Practical Exam Paper (30 Marks): • Selection I: Attempt any TWO questions (10 marks each) • Selection II: Attempt any TWO questions (05 marks each)



Karmaveer Bhaurao Patil University, Satara
(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science & Technology

Yashvantrao Chavan Institute of Science, Satara

Board of Studies in Computational Sciences

Programme: B.Voc (Soft.Dev.)

Semester – I

Type: GE

Marks: 50

Credits: 2

From: A. Y. 2026-2027

Name of the Course and Code: Computer Network and Internet Applications (BSDTGE I)

Course Objectives: Student should be...

- 1) Understand the fundamental concepts of computer networks, including the hardware and software components.
- 2) Study the OSI and TCP/IP reference models and the specific functions of each layer.
- 3) Learn the mechanics of transmission media, switching techniques, and physical data flow.
- 4) Gain a deep understanding of Internet Protocols, addressing schemes, and subnetting logic.

Course Outcomes: Student will able to...

- 1) Analyze Network Architectures.
- 2) Evaluate Transmission & Switching Technologies.
- 3) Implement IP Addressing and Subnetting.
- 4) Describe the mechanisms of the Transport Layer.

Module	Title and Contents	Hrs
Module -1:	Introduction to Computer Network 1.1 Definition of Computer network, Basic Building Blocks of Computer network, Characteristics of Computer network, Network Hardware's & Software's in Computer network. 1.2 Network Architecture and Reference Models: Types of Architecture in CN, OSI Reference Model, TCP/IP Reference Model. 1.3 Types of Computer Networks (PAN, LAN, CAN, MAN, WAN). 1.4 Types of Topologies in Computer network, Advantages and Disadvantages of Computer network.	7
Module -2:	Transmission Media and Switching 2.1 Definition of Transmission Media, Types of Transmission Media. 2.2 Types of Guided Media: Twisted Pair Cable, Coaxial Cable, Optical Fiber Cable. 2.3 Types Unguided Media: Radio Waves, Microwaves, Infrared Waves, Satellite Communication. 2.4 Switching Techniques in Computer Networks: Introduction to Switching, Packet, Types of Switching	7
Module -3:	History of Internet & IP addresses 3.1 History of Internet, Uses of Internet, World Wide Web (WWW). 3.2 IP addresses, IPv4, IPv6, Difference between IPv4 & IPv6. 3.3 Public and Private IP Addresses: Definition Public and Private IP Addresses,	8

	Difference between Public and Private IP Addresses. 3.4 Subnetting and Routing: Definition, Types, Advantages and Example of Subnetting and Routing	
Module -4:	Transport & Application Layer 4.1 3way Handshake, Transport Layer Protocol, User datagram protocol. 4.2 Definition and working of Secure Socket Layer (SSL). 4.3 Point-to-Point Tunneling Protocol – PPTP, Multipurpose Internet Mail Extension (MIME) Protocol, Application Layer Protocols Client Server Model 4.4 Definition and working of Electronic Mail, Working & Need of Content distribution Network	8

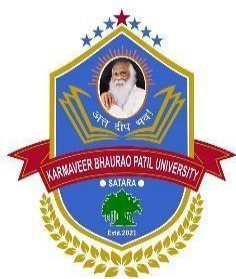
Reference Books: -

- 1) Kurose, James, and Keith Ross. Computer Networking: A Top-Down Approach. 8th ed. London: Pearson, 2021.
- 2) Tanenbaum, Andrew S., David J. Wetherall, and Nick Feamster. Computer Networks. 6th ed. Boston: Pearson, 2021.
- 3) Forouzan, Behrouz A. Data Communications and Networking. 5th ed. New York: McGraw-Hill Education, 2017
- 4) Tallings, William. 2016. Data and Computer Communications. 10th ed. Boston: Pearson.
- 5) Olifer, Natalia, and Victor Olifer. Computer Networks: Principles, Technologies and Protocols for Network Design. 2nd ed. Hoboken, NJ: Wiley, 2012.

Evaluation Pattern:

Total Marks: 50

Comprehensive Continuous Evaluation (20 Marks): • CCE - I : 10 Marks • CCE - II : 10 Marks • CCE - III: 10 Marks: Objective • Note: The best of two scores will be considered for final mark entry.	End Semester Examination (30 Marks): • Question-1: Solve the following questions (Five questions of 2 Marks) • Question -2: Attempt any two questions (Three questions of 10 Marks) • Question -3: Attempt any four questions (Five questions of 5 Marks) Note: Conversion of 50 marks of ESE evaluation to 30 Marks
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Faculty of Commerce and Management

Yashvantrao Chavan Institute of Science, Satara

Board of Studies in Computational Sciences

Programme: B.Voc. (Soft. Dev.)

Semester - I

Type: IKS

Marks: 50

Credits: 2

From: A. Y. 2026-27

Name of the Course and Code: Aptitude and Logical Reasoning (BSDTIKS I)

Course Objectives: Student should be able to...

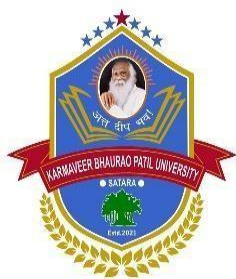
- 1) Understand students' quantitative aptitude skills required for competitive examinations and professional assessments.
- 2) Enhance logical reasoning and analytical thinking abilities for effective problem-solving.
- 3) Improve verbal reasoning and non-verbal reasoning skills through structured exercises and puzzles.
- 4) Gain critical thinking, decision-making, and pattern recognition skills.

Course Outcomes: Student will able to...

- 1) Apply quantitative aptitude concepts to solve arithmetic, algebraic, and numerical problems accurately.
- 2) Demonstrate critical thinking and analytical skills in solving verbal and non-verbal reasoning problems.
- 3) Solve aptitude questions within time constraints using effective problem-solving strategies.
- 4) Interpret and evaluate data presented in tables, graphs, and charts using data interpretation techniques.

Module	Title and Contents	Hrs.
Module -1:	Basic mathematical relations and formulae: 1.1 Basic mathematical relations and formula - Number relations. 1.2 Ratio & proportion, Percentage relation, Average relation. 1.3 Computation - Basic arithmetic computation, Simplification, Approximation, Speed calculation techniques. 1.4 Data interpretation-Examples on Tables, Graphs.	9
Module -2:	Data sufficiency: 2.1 Definition of Data sufficiency and Examples. 2.2 Measurement- 2D&3D Shapes, Unit Conversions, Geometry & Standard formula. 2.3 Time and distance- Examples, Arithmetic - Simple & compound interest. 2.4 Relationship between numbers - Factors & multiples, Prime numbers, LCM & HCF, Divisibility rules, Number patterns.	6
Module -3:	Differences: 3.1 Differences & Discrimination- Letter-Based Difference, Meaning-Based Difference, Shape-Based (Figure) Difference, and Odd Pair, Mixed Category. 3.2 Decision-making and Judgment - Situation-Based Decision, Time	8

	Management, Logical Judgment, Problem-solving- Basic Mathematical Problem, Work & Time Problem, Age Problem, Equation-Based Problem, Real-Life Situation Problem. 3.3 Analogies- Word, Number and Letter analogy, Functional relationship. 3.4 Analysis - Data interpretation, Pattern analysis, Cause-effect reasoning.	
Module -4: Arithmetic reasoning:	4.1 Arithmetic reasoning- Basic operations, Word problems, Ages problems, Profit and loss, Relationship concept- Blood relations, Family tree problems, Coded relationships. 4.2 Arithmetic number series- Increasing/decreasing series, Arithmetic progression, Missing number, Odd one out. 4.3 Similarities- Word, Concept and Functional Similarities. 4.4 Verbal and figure classification, Space visualization- Mirror and Water images, Paper folding/cutting, 3D shapes (cube, dice), Rotation of objects.	7
Reference Books: - 1) Sharma, Arun. How to Prepare for Logical Reasoning for CAT. 5th ed. New Delhi: McGraw Hill Education, 2019. 2) Khattar, Dinesh. General Intelligence and Reasoning. Rev. ed. New Delhi: S. Chand Publishing, 2018. 3) Aggarwal, R. S. A Modern Approach to Logical Reasoning. 2nd ed. New Delhi: S. Chand Publishing, 2014. 4) Sijwali, B. S., and Indu Sijwali. A New Approach to Reasoning: Verbal and Non-Verbal. 2nd edition. New Delhi: Arihant Publications, 2014. 5) Praveen, R. V. Quantitative Aptitude and Reasoning. 2nd ed. New Delhi: PHI Learning, 2013.		
Evaluation Pattern:		
Total Marks: 50		
Comprehensive Continuous Evaluation (20 Marks): • CCE - I : 10 Marks • CCE - II : 10 Marks • CCE - III: 10 Marks: Objective • Note: The best of two scores will be considered for final mark entry.	End Semester Examination (30 Marks): • Question-1: Solve the following questions (Five questions of 2 Marks) • Question -2: Attempt any two questions (Three questions of 10 Marks) • Question -3: Attempt any four questions (Five questions of 5 Marks) Note: Conversion of 50 marks of ESE evaluation to 30 Marks	



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Board of Studies in Computational Sciences

Programme: B.Voc. (Soft. Dev.)

Semester - I

Type: SEC

Marks: 50

Credits: 2

From: A. Y. 2026-27

**Name of the Course and Code: Office Automation (BSDPSEC I) Practical
Batch:20 Student/Batch**

Course Objectives: Student should be able to...

- 1) Understand the basic and advanced features of Microsoft Word, Excel, PowerPoint, and Access.
- 2) Learn practical skills in document creation, data management, presentation design, and database handling.
- 3) Study the effective use of MS Office tools for academic, professional, and organizational purposes.
- 4) Gain the ability to create professional and visually appealing documents, spreadsheets, charts, presentations, and databases.

Course Outcomes: Student will able to...

- 1) Develop professional documents using Microsoft Word with appropriate formatting, styles, tables, and page layouts.
- 2) Implement formulas, functions, data management techniques, and chart creation using Microsoft Excel.
- 3) Analyse data and information using Excel tools and present the results effectively through suitable charts and visualizations.
- 4) Create and Design effective presentations using Microsoft PowerPoint with appropriate layouts, animations, transitions, and multimedia elements.

Sr.No	Practical Titles (Any 15 of the following)	Hrs.
1)	Create a new Word document and type a short paragraph about your favorite hobby.	60
2)	Format the paragraph: change font to Arial, size 14, text color blue, and make the first sentence bold and italic.	
3)	Align the paragraph to center, set line spacing to 1.5, and indent the first line by 1 cm.	
4)	Insert a table with 3 rows and 4 columns, merge the first-row cells as a title, and adjust column width.	
5)	Add a header with your name, a footer with today's date, and page numbers at the bottom center.	
6)	In Excel, enter data for 5 students (Name, Math, Science, English marks). Bold the headers and center-align the data.	
7)	Calculate total marks for each student using addition, and find the difference between the highest and lowest Math score using subtraction.	
8)	Use functions in Excel: SUM for total marks, AVERAGE for subject average, MAX and MIN for highest and lowest Science marks.	

9)	Create charts: Column chart for total marks, Pie chart for Math marks distribution, Line chart for science marks trend.	
10)	Apply conditional formatting: highlight marks below 35 in red and above 75 in green.	
11)	Create a new presentation and add a title slide with a title and subtitle.	
12)	Change the slide layout of a second slide and apply a design theme to all slides.	
13)	Insert an image, a shape, and a SmartArt graphic on one slide.	
14)	Apply animation to text or objects and add a transition effect between slides.	
15)	Run the slide show and set automatic timings for each slide.	
16)	Create a new database in your database software.	
17)	Create a table with fields (e.g.StudentID, Name, Age, Grade) and set appropriate data types.	
18)	Insert at least 5 records into the table.	
19)	Create a simple select query to display all records of students with Grade “A”.	
20)	Generate a report from the table or query showing student details.	

Reference Books: -

- 1) Kalpesh Patel, Microsoft Office 2010, 2014.
- 2) Marjorie S. Hunt & Barbara Clemens, Illustrated Microsoft Office 365 & Office 2016, 2016/2017.
- 3) Linda Foulkes, Learn Microsoft Office 2019, 2020.
- 4) Abigail Rusu, et al., Intro to Microsoft Office, 2021.
- 5) Linda Foulkes, Learn Microsoft Office 2021, Second Edition, 2022.

Evaluation Pattern:

Total Marks: 50

Internal Evaluation (20 Marks):	Practical Exam Paper (30 Marks):
• Journal: 05 Marks • Students' Performance: 05 Marks • Viva: 05 Marks • Mini Project/Case Study: 05 Marks	• Selection I: Attempt any TWO questions (10 marks each) Selection II: Attempt any TWO questions (05 marks each)



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Board of Studies in Computational Sciences

Programme: B.Voc. (Soft. Dev.)

Semester – I

Type: VEC

Marks: 50

Credits: 2

From: A. Y. 2026-27

**Name of the Course and Code: Core Programming Principles and Algorithms
(BSDPVEC I) Practical Batch:20 Student/Batch**

Course Objectives: Student should be able to ...

- 1) Understand problem-solving using algorithms.
- 2) Learn pseudocode and flowchart design.
- 3) Enhance logical thinking and structured programming skills.
- 4) Analyse time and space complexity.

Course Outcomes: Student will be able to...

- 1) Design algorithms for basic computational problems.
- 2) Represent solutions using flowcharts and pseudocode.
- 3) Apply control structures (loops, conditions).
- 4) Evaluate algorithm efficiency (time & space complexity).

Sr.No	Practical Titles (Any 15 of the following)	Hrs.
1)	Develop an Algorithm and Flowchart for using the <code>printf()</code> function.	60
2)	Draw a flowchart to display an algorithm to allow a user to enter ten numbers. The algorithm should then display the sum of the numbers.	
3)	Create an algorithm to calculate the cost of sending a parcel using the following rules: If the weight of the parcel is 2 kg or under then the standard charge is \$3. There is then a charge of \$2 for each extra kilogram up to 10 kg. After 10 kg the charge per extra kilogram is \$3. Display the algorithm.	
4)	Create an algorithm that will output the times tables from 2 to 12. It should state the table being output and then that number multiplied from 2 to 12. Display your algorithm using pseudocode.	
5)	Design an algorithm that will allow a user to enter two numbers. They should then be asked to enter either 'D' or 'M'. If the user enters 'D', then a procedure should divide the first number by the second and output the result. If the user enters 'M', then a procedure should multiply the two numbers together. Create an algorithm and display it as pseudocode and as a flowchart	
6)	Develop an Algorithm and Flowchart to demonstrate the use of break, continue, and goto statements.	
7)	Create an Algorithm and flowchart to compute the volume of a sphere. Use the formula: $V = (4/3) * \pi * r^3$ where pi is equal to 3.1416 approximately. The r is the radius of sphere. Display the result.	
8)	Write an algorithm the converts the input Celsius degree into its equivalent Fahrenheit degree. Use the formula: $F = (9/5) * C + 32$.	

9)	Write an algorithm and flowchart that exchanges the value of two variables: x and y. The output must be: the value of variable y will become the value of variable x, and vice versa. Apply conditional formatting: highlight marks below 35 in red and above 75 in green.	
10)	Write an algorithm and flowchart that takes as input the purchase price of an item (P), its expected number of years of service (Y) and its expected salvage value (S). Then outputs the yearly depreciation for the item (D). Use the formula: $D = \frac{(P - S)}{Y}$. Also find the Time complexity of it.	
11)	Write an algorithm and flowchart accept the age of a person. Display the message Eligible for Role if the age is equal to or greater than 18, otherwise display the message Not Eligible. Also Find the Space Complexity of it.	
12)	Develop an Algorithm and Flowchart to find the sum and average of elements of a one-dimensional array.	
13)	Write an algorithm to check whether given number is +ve, -ve or zero. Find the space Complexity and time complexity.	
14)	Write an algorithm to find the sum of all even number up to given number. Find the space Complexity and time complexity.	
15)	Draw a flowchart to find the sum of all multiples of 5 up to given number. Find the space Complexity and time complexity.	
16)	Develop an algorithm to evaluate S using the relation: $S = 1 + 4 + 9 + 16 + \dots + n^2$. Find the space Complexity and time complexity.	
17)	Write an algorithm to compute the arithmetic mean of n numbers. Find the space Complexity and time complexity.	
18)	Write an algorithm to determine a student's final grade and indicate whether it is passing or failing. The final grade is calculated as the average of four marks	
19)	Write an algorithm and draw a flowchart that will calculate the roots of a quadratic equation.	
20)	Write an algorithm and draw a flowchart to calculate 2^4 using a loop approach? Verify your result by a trace table.	

Reference Books: -

- 1) Kulkarni, Udayakumar G. Algorithm & Flowchart: A Student Manual. 2022
- 2) Chaudhuri, A. B. Flowchart and Algorithm Basics. Boston: Mercury Learning and Information, 2020.
- 3) Cormen, Thomas H., Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein. Introduction to Algorithms. Cambridge, MA: MIT Press, 2009.
- 4) Skiena, Steven S. The Algorithm Design Manual. 2nd ed. London: Springer, 2008.
- 5) Silver, Gerald A., and Joan B. Silver. Computer Algorithms and Flowcharting. New York: McGraw-Hill, 1975.

Evaluation Pattern:

Total Marks: 50

Internal Evaluation (20 Marks):

- Journal 1: 05 Marks
- Students' Performance: 05 Marks
- Viva: 05 Marks
- Mini Project/Case Study: 05 Marks

Practical Exam Paper (30 Marks):

- Selection I: Attempt any TWO questions (10 marks each)
- Selection II: Attempt any TWO questions (05 marks each)



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Board of Studies in Computational Sciences

Programme: B.Voc. (Soft. Dev.)

Semester – II

Type: Subject I-T

Marks: 50

Credits: 2

From: A. Y. 2026-27

Name of the Course and Code: Python Programming-I (BSDT 121)

Course Objectives: Student should be...

- 1) Understand the basic building blocks of Python, including syntax, variables, and operators.
- 2) Use decision-making (if-else) and loops to solve logical problems.
- 3) Learn how to store, organize, and manipulate data using Python's built-in data structures.
- 4) Understand writing of reusable code using functions and modules.

Course Outcomes: Student will able to...

- 1) Create well-structured Python programs using proper indentation and comments.
- 2) Develop modular programs using control & looping structures 'Python'.
- 3) Effectively use Lists, Tuples, Sets, and Dictionaries to manage complex information.
- 4) Solve the complex problems into smaller, manageable, and reusable functions.

Module	Title and Contents	Hrs.
Module -1:	Introduction to Python Programming 1.1 History of Python, Introduction to Python, Structure of a 'python' program. 1.2 Input/output in python, Comments in Python, Variables, and Keywords. 1.3 Data Types and Operators in Python. 1.4 Indentation in Python: Introduction to Indentation, Introduction to Indentation, Example of Indentation.	8
Module -2:	Control Structures in Python 2.1 Decision making structures: Introduction to Decision Making, Types of Decision Making. 2.2 Loop control structures: Introduction to Looping, Types of Loops in Python. 2.3 Introduction to Jump Control Statements, Types of Jump Control Statements. 2.4 Nested Control Structures: Introduction to Nested Control Structures, Nested Decision Making, Nested Loops.	6
Module -3:	Data Structures in Python 3.1 List- Defining & Creating list, Accessing, Updating, deleting values of a list, Methods used in List, built in function with list, Tuple-Defining & Creating Tuple, Accessing, Updating, deleting values of a Tuple, Methods used in Tuple, Built in function with list.	8

	3.2 Set - Defining & Creating Set, Accessing, Updating, deleting values of a Set, Methods used in Set, Built in function with Set. 3.3 Dictionary - Defining and Creating Dictionary, Accessing, Updating, deleting values of a Dictionary, Methods used in Dictionary. 3.4 Built in function with Dictionary.	
Module -4:	Functions with Basic OOP concepts 4.1 Python Functions, Use of python built in functions (String, Math's), User Defined Function, Function Declaration, Function Call, Parameter Passing. 4.2 Types of Function Arguments, Lambda Function & its use cases. 4.3 Basic OOP concepts- Introduction to object-oriented, Creating classes and objects, Data Abstraction, Encapsulation. 4.4 Constructor & Destructor in python.	8

Reference Books: -

- 1) Matthes, Eric. Python Crash Course: A Hands-On, Project-Based Introduction to Programming. 3rd ed. San Francisco: No Starch Press, 2023.
- 2) Ramalho, Luciano. Fluent Python: Clear, Concise, and Effective Programming. 2nd ed. Sebastopol, CA: O'Reilly Media, 2022
- 3) Sweigart, Al. Automate the Boring Stuff with Python: Practical Programming for Total Beginners. 2nd ed. San Francisco: No Starch Press, 2019.
- 4) Zelle, John. Python Programming: An Introduction to Computer Science. 3rd ed. Franklin, Beedle & Associates, 2016
- 5) Lutz, Mark. Python Pocket Reference. 5th ed. Sebastopol, CA: O'Reilly Media, 2014.

Evaluation Pattern:

Total Marks: 50

Comprehensive Continuous Evaluation (20 Marks): • CCE - I : 10 Marks • CCE - II : 10 Marks • CCE - III: 10 Marks: Objective • Note: The best of two scores will be considered for final mark entry.	End Semester Examination (30 Marks): • Question-1: Solve the following questions (Five questions of 2 Marks) • Question -2: Attempt any two questions (Three questions of 10 Marks) • Question -3: Attempt any four questions (Five questions of 5 Marks) Note: Conversion of 50 marks of ESE evaluation to 30 Marks
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Faculty of Science and Technology

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Board of Studies in Computational Sciences

Programme: B.Voc. (Soft. Dev.)

Semester - II

Type: Subject I-P

Marks: 50

Credits: 2

From: A. Y. 2026-27

Name of the Course and Code: Practical IV (BSDP 122)

Practical Batch:20 Student/Batch

Course Objectives: Student should be able to ...

- 1) Introduce the basic concepts of Python's unique syntax, such as variables, indentation etc.
- 2) Study the application of control flow.
- 3) Learn the practical use of Python's core collections—Lists, Tuples, and Dictionaries.
- 4) Introduce Object-Oriented Programming (OOP) to model real-world entities.

Course Outcomes: Student will be able to...

- 1) Create well-structured Python programs using proper indentation and comments.
- 2) Develop modular programs using control & looping structures 'Python'.
- 3) Effectively use Lists, Tuples, Sets, and Dictionaries to manage complex information.
- 4) Design classes and objects to model real-world scenarios.

Sr.No	Practical Titles (Any 15 of the following)	Hrs.
1)	Write a python program to Create three variables to store your name, age, and favorite city. (e.g., user_name, age) and print them using a single print() statement.	60
2)	Write a python program to Assign the value 50 to three different variables (a, b, and c) in a single line of code. Then, print their sum to verify the assignment.	
3)	Swap the values of two variables, x = 10 and y = 20, without using a third "temporary" variable. Use Python's multiple assignment feature.	
4)	Use the exponent operator (**) to calculate the cube root of a number entered by the user.	
5)	Write a C program for Program indentation.	
6)	Write a Python program to check whether a number is even or odd.	
7)	Write a python program to calculate the area of a circle, rectangle & square using Match case.	
8)	Write a loop that prints numbers 1 to 50. If a number is divisible by 3, print "Fizz"; by 5, print "Buzz"; by both, print "Fizz Buzz".	
9)	Create a list of 5 fruits. Perform operations: append a new fruit, remove one, sort them alphabetically, and use a loop to print only fruits with more than 5 letters.	
10)	Write a program that Create a tuple named my tuple with the values (10, 20, 30, 40, 50). Print the third element and the total length.	
11)	Write a Program that takes a tuple of single-digit integers (e.g., (1, 2, 3)) and	

	converts it into a single integer (e.g., 123).	
12)	Write a program that Create a dictionary where the keys are student names and values are their total marks. Add a new student, update an existing student's marks, and remove a student from the dictionary.	
13)	Write a program that Create a dictionary where the keys are numbers between 1 and 15 and the values are the squares of those keys.	
14)	Write a function greet_user(name) that takes a string argument and prints a personalized greeting.	
15)	Write a function print_table(n) that prints the multiplication table for a given number n up to 10.	
16)	Write a function find_max(a, b, c) that returns the largest of three numbers without using the built-in max() function.	
17)	Create a function count_case(text) that accepts a string and returns a dictionary containing the count of uppercase and lowercase letters.	
18)	Write a program for demonstration of lambda function.	
19)	Create a class Book with attributes like title and author. Add a constructor (__init__) to initialize these values. Create a method display_info() to print the book details.	
20)	Create a class Bank_Account with a private variable __balance. Create methods to deposit() and withdraw() that safely modify the balance without allowing direct access.	

Reference Books: -

- 1) Matthes, Eric. Python Crash Course: A Hands-On, Project-Based Introduction to Programming. 3rd ed. San Francisco: No Starch Press, 2023.
- 2) Ramalho, Luciano. Fluent Python: Clear, Concise, and Effective Programming. 2nd ed. Sebastopol, CA: O'Reilly Media, 2022
- 3) Sweigart, Al. Automate the Boring Stuff with Python: Practical Programming for Total Beginners. 2nd ed. San Francisco: No Starch Press, 2019.
- 4) Zelle, John. Python Programming: An Introduction to Computer Science. 3rd ed. Franklin, Beedle & Associates, 2016
- 5) Lutz, Mark. Python Pocket Reference. 5th ed. Sebastopol, CA: O'Reilly Media, 2014.

Evaluation Pattern:

Total Marks: 50

Internal Evaluation (20 Marks):

- Journal: 05 Marks
- Students' Performance: 05 Marks
- Viva: 05 Marks
- Mini Project/Case Study: 05 Marks

Practical Exam Paper (30 Marks):

- Selection I: Attempt any TWO questions (10 marks each)
- Selection II: Attempt any TWO questions (05 marks each)



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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computational Sciences

Programme: B.Voc. (Soft. Dev.)

Semester - II

Type: Subject II-T

Marks: 50

Credits: 2

From: A. Y. 2026-27

Name of the Course and Code: Applied Web Development (BSDT 123)

Course Objectives: Student should be...

- 1) Understand fundamentals of JavaScript and PHP.
- 2) Study the concepts of modern JavaScript including ES6 features and modules.
- 3) Learn advanced JavaScript techniques such as asynchronous programming and API handling.
- 4) Explore control structures and looping statements in PHP.

Course Outcomes: Student will able to...

- 1) Apply modern JavaScript features to build interactive web applications.
- 2) Develop dynamic web pages using PHP.
- 3) Implement OOP concepts in PHP applications.
- 4) Perform database operations using PHP and MySQL.

Module	Title and Contents	Hrs.
Module -1:	Advanced JavaScript 1.1 ES6 Features in JavaScript: ES6 Scoping, Arrow Functions, Template Literals, Array & Object, Spread & Reset Operators. 1.2 Advanced JavaScript Concepts: JS Modules (import/export), Promises and Async/Await, Fetch API & JSON. 1.3 Array Methods in JavaScript: Introduction to Array Methods, Adding Removing, Searching, Checking elements, Array Conversion Methods. 1.4 Local & Session Storage: Introduction to Local Storage and Session Storage, Difference Between Local Storage and Session Storage.	8
Module -2:	PHP Basics 2.1 Introduction to PHP, Installing and Configuring XAMPP, PHP Syntax and Structure. 2.2 Variables, Data Types and Operators in PHP. 2.3 Control Structures: Introduction to Control Structures, Decision Making Statements, Conditional Operator. 2.4 Loops in PHP: Introduction to Loops, Types of Loops, Loop Control Statements.	7
Module -3:	Advanced PHP & Web Logic 3.1 Functions in PHP, Arrays in PHP, File Handling, Object-Oriented	7

	PHP. 3.2 Date and Time Functions in PHP, Session Management- Introduction to Sessions, starting a Session, Creating Session Variables, Destroying Sessions. 3.3 Cookie Management- Introduction to Cookies, Cookie Operations in PHP. 3.4 Exception Handling: Introduction to Exception Handling, Exception Handling Mechanism, Advantages of Exception Handling.	
Module -4:	PHP Advanced Concepts & Database Integration 4.1 MySQL Basics & Tables, PHP with MySQL Connectivity. 4.2 CRUD Operations in PHP, Prepared Statements. 4.3 SQL Joins basics, Login/Registration System. 4.4 Data Pagination: Introduction to Data Pagination, Pagination in PHP and MySQL, Advantages of Data Pagination.	8

Reference Books: -

- 1) Robin Nixon, Learning PHP, MySQL & JavaScript, O'Reilly Media, Seventh Edition, 2025.
- 2) Mika Schwartz, PHP Objects, Patterns, and Practice, Apress, Fourth Edition, 2020.
- 3) Jon Duckett, PHP & MySQL: Server-Side Web Development, Wiley, First Edition, 2022.
- 4) Kyle Simpson, You Don't Know JS: Types & Grammar, Shroff / O'Reilly, First Edition, 2015.
- 5) Eric Freeman & Elisabeth Robson, Head First JavaScript Programming, O'Reilly Media, First Edition, 2014.

Evaluation Pattern:

Total Marks: 50

Comprehensive Continuous Evaluation (20 Marks): • CCE - I : 10 Marks • CCE - II : 10 Marks • CCE - III: 10 Marks: Objective • Note: The best of two scores will be considered for final mark entry.	End Semester Examination (30 Marks): • Question-1: Solve the following questions (Five questions of 2 Marks) • Question -2: Attempt any two questions (Three questions of 10 Marks) • Question -3: Attempt any four questions (Five questions of 5 Marks) Note: Conversion of 50 marks of ESE evaluation to 30 Marks
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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computational Sciences

Programme: B.Voc. (Soft. Dev.)

Semester - II

Type: Subject II-P

Marks: 50

Credits: 2

From: A. Y. 2026-27

Name of the Course and Code: Practical V (BSDP 124)

Practical Batch:20 Student/Batch

Course Objectives: Student should be able to...

- 1) Understand ES6 features such as let, const, arrow functions, and template literals.
- 2) Study arrays and objects using modern JavaScript techniques.
- 3) Learn PHP syntax, data types, variables, operators, loops, and control structures.
- 4) Study PHP with MySQL and perform CRUD operations using secure queries.

Course Outcomes: Student will be able to...

- 1) Apply ES6 features in JavaScript programs.
- 2) Implement asynchronous JS using Promises, async/await, and Fetch.
- 3) Develop PHP scripts using variables, loops, and conditions.
- 4) Perform database operations and secure queries with PHP-MySQL.

Sr.No	Practical Titles (Any 15 of the following)	Hrs.
1)	Create variables using let and const inside a block and check their scope.	60
2)	Write a function as a normal function and convert it into an arrow function.	
3)	Create a greeting message using template literals combining first and last name.	
4)	Merge two arrays using the spread operator and perform map, filter, and reduce on them.	
5)	Fetch data from a public API (JSON Placeholder) using fetch and display it in the console.	
6)	Write a PHP script to display "Hello, World!" and create variables of different types.	
7)	Perform arithmetic operations on two numbers and display the result.	
8)	Use if-else and switch to check conditions and display messages.	
9)	Create an array of 5 elements and loop through them to display values.	
10)	Use loops (for or while) to print sequences of numbers.	
11)	Write a function to calculate factorial of a number.	
12)	Create an associative array of students with marks and display the highest mark.	
13)	Create a file, write text into it, and read the content back.	
14)	Start a session to store username and create a cookie for the same username.	

15)	Create a class with properties and methods, instantiate it, and call its method.	
16)	Create a MySQL table user and connect PHP to the database.	
17)	Insert, update, and delete records in the user's table.	
18)	Fetch all records and display them using a loop.	
19)	Use prepared statements to insert data securely into the database.	
20)	Create a login form with PHP and MySQL, validating user credentials.	

Reference Books: -

- 1) Jon Duckett, PHP & MySQL: Server-Side Web Development, 2022
- 2) Joel Murach & Ray Harris, Murach's PHP and MySQL, 2017.
- 3) Robin Nixon, Learning PHP, MySQL & JavaScript with jQuery, CSS & HTML5, 2014.
- 4) Jon Duckett, Web Design with HTML, CSS, JavaScript and jQuery, 2014.
- 5) Sharanam Shah & Vaishali Shah, PHP Project for Beginners, 2011.

Evaluation Pattern:

Total Marks: 50

Internal Evaluation (20 Marks):

- Journal: 05 Marks
- Students' Performance: 05 Marks
- Viva: 05 Marks
- Mini Project/Case Study: 05 Marks

Practical Exam Paper (30 Marks):

- Selection I: Attempt any TWO questions (10 marks each)
- Selection II: Attempt any TWO questions (05 marks each)



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Faculty of Science and Technology

Yashvantrao Chavan Institute of Science, Satara
Board of Studies in Computational Sciences

Programme: B.Voc. (Soft. Dev.)	Semester – II
Type: Subject III-T	Marks: 50
Credits: 2	From: A. Y. 2026-27
Name of the Course and Code: Advanced SQL (BSDT 125)	

Course Objectives: Student should be able to...

- 1) Learn the fundamentals of SQL and relational database concepts.
- 2) Understand advanced SQL concepts including user access control and privileges.
- 3) Study iterative statements for efficient database programming.
- 4) Enhance triggers for enforcing business rules and maintaining data integrity.

Course Outcomes: Student will be able to...

- 1) Apply SQL commands to retrieve, filter and summarize data effectively.
- 2) Analyze advanced SQL techniques.
- 3) Solve real-world database problems using advanced Oracle SQL techniques and PL/SQL programming.
- 4) Implement dynamic SQL for runtime query construction and execution.

Module	Title and Contents	Hrs
Module -1:	Introduction to SQL and Database Objects 1.1 Introduction to SQL- Overview of SQL, Writing Basic SQL Select Statement, Restricting and sorting data, Single row functions-String function, Numeric function, Data function. 1.2 Aggregating data using group function: Introduction to Group Functions, Types of Group Functions, Grouping Data 1.3 View- Introduction to Views, Creating and Managing Views, Applications of Views. 1.4 Creating other database object-Sequences, Index sand Synonyms.	7
Module -2:	Advanced SQL 2.1 Controlling User Access in SQL- Create user, GRANT Command, REVOKE command, Role in SQL, Privileges in SQL. 2.2 Advanced Subqueries- Introduction to Subqueries, Types of subqueries, Multiple Columns subqueries, and subqueries in from clause. 2.3 Set Operators in SQL. 2.4 Clusters- Cluster key, Cluster indexes, Types of clusters.	7

Module -3: Procedural language (PL/SQL):	3.1 Introduction to PL/SQL, Features and Execution Environment: Introduction to PL/SQL, Features of PL/SQL, Generic PL/SQL Block, PL/SQL Execution Environment in Oracle Engine. 3.2 PL/SQL Elements: Character Set, Data Types, Variables and Operators. 3.3 Procedures in PL/SQL- Overview of PL/SQL procedures, Advantages and Disadvantages of Procedures, Creating Procedures in PL/SQL, Parameters in procedures. 3.4 Control Structures- IF -THEN Statements, IF-THEN-ELSE Statement, IF-THEN-ELSIF Statement, CASE Statements, PL/SQL Iterative Statements- For Loop, While Loop, Loop Exit.	8
Module -4: Dynamic SQL	4.1 Dynamic SQL-Overview of Dynamic SQL, Static SQL vs. Dynamic SQL, Steps to use Dynamic SQL, Advantages and Disadvantages of Dynamic SQL. 4.2 Cursor- Introduction to cursor, Use of cursor, Declaring and Defining Cursor, Types of cursors. 4.3 Triggers: Definition of Trigger, Trigger Event Types, Trigger body, Business Application Scenarios for Implementing Triggers. 4.4 Create DML Triggers using the CREATE TRIGGER Statement.	8
Reference Books: - 1) Coronel, Carlos, and Steven Morris, Database Systems: Design, Implementation, and Management, 14th edition, Boston: Cengage Learning, 2021. 2) Molinaro, Anthony, SQL Cookbook: Query Solutions and Techniques for Database Developer, 2nd edition, Sebastopol, CA: O'Reilly Media, 2020. 3) Beaulieu, Alan, Learning SQL: Generate, Manipulate, and Retrieve Data, 3rd edition, Sebastopol, CA: O'Reilly Media, 2020. 4) Kyte, Thomas, and Darl Kuhn, Expert Oracle Database Architecture: Oracle Database 9i, 10g, and 11g Programming Techniques and Solutions, 3rd edition. Berkeley, CA: Apress, 2014. 5) Winand, Markus, SQL Performance Explained: Everything You Need to Know About Slow Queries., 1st edition, Self-published, 2012.		
Evaluation Pattern:		
Total Marks: 50		
Comprehensive Continuous Evaluation (20 Marks): • CCE - I : 10 Marks • CCE - II : 10 Marks • CCE - III: 10 Marks: Objective • Note: The best of two scores will be considered for final mark entry.	End Semester Examination (30 Marks): • Question-1: Solve the following questions (Five questions of 2 Marks) • Question -2: Attempt any two questions (Three questions of 10 Marks) • Question -3: Attempt any four questions (Five questions of 5 Marks) Note: Conversion of 50 marks of ESE evaluation to 30 Marks	



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Faculty of Science and Technology

Yashvantrao Chavan Institute of Science, Satara

Board of Studies in Computational Sciences

Programme: B.Voc. (Soft. Dev.)

Semester – II

Type: Subject III-P

Marks: 50

Credits: 2

From: A. Y. 2026-27

Name of the Course and Code: Practical VI (BSDP 126)
Practical Batch:20 Student/Batch

Course Objectives: Student should be able to...

- 1) Understand advanced query writing skills using complex SQL statements.
- 2) Optimize SQL queries for better performance.
- 3) Study advanced features such as cursors, exception handling, and dynamic SQL.
- 4) Explore security features including roles and privileges management.

Course Outcomes: Student will be able to...

- 1) Construct complex SQL queries to retrieve and manipulate data efficiently.
- 2) Apply transaction control statements to maintain data consistency and integrity.
- 3) Integrate advanced SQL features to develop efficient database-driven applications.
- 4) Implement relational database schemas with appropriate integrity constraints.

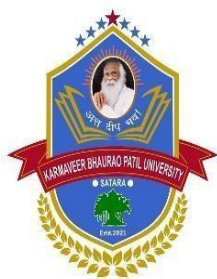
Sr.No	Practical Titles (Any 15 of the following)	Hrs
1)	Write an SQL queries using DDL and DML commands.	60
2)	Create procedure for raising employee salary for employee table.	
3)	Write a PL/SQL program that declare a variable x and assign its value to 1 print the value of x.	
4)	Write a PL/SQL program to print addition of two number.	
5)	Write a PL/SQL program to swap the value of two variables.	
6)	Write a PL/SQL program to print table of given number using for loop.	
7)	Write a PL/SQL program to classify employees into grades based on salary: Salary > 50,000 → Grade A, Salary between 30,000–50,000 → Grade B, Salary < 30,000 → Grade C output.	
8)	Write an SQL queries using Group By clause to perform tasks on Employee table.	
9)	Design a University Enrollment database with proper constraints to enforce data integrity.	
10)	Create a Bank_ Accounts table with: 1. Account number as PRIMARY KEY. 2. Balance should never be negative.	

11)	Write an SQL statement to create the view and perform the following tasks: a) Create view on student table. b) Display all records on view. c) Update the view. d) Delete the view.	
12)	Create a trigger for customer table.	
13)	Write a PL/SQL program to print the name of the month based on a given number (1–12) using a CASE statement.	
14)	Write a PL/SQL program to calculate the grade of a student based on their marks.	
15)	Write a PL/SQL program to find sum of numbers from 1 to n.	
16)	Write a program using a procedure to check whether the number is even or odd.	
17)	Write a procedure to calculate the average of three numbers.	
18)	Write a procedure to display reverse string that takes a string as input and prints its reverse.	
19)	Write an SQL query to create sequence and perform following tasks: - Create the Sequence. - Alter the sequence to increment by 5. - Drop the sequence.	
20)	Create Cursor for the customer table to perform following tasks. - Create cursor c and display id, name from c customer table. - Create Cursor for raising employee salary for customer table.	

Reference Books:

- 1) Coronel, Carlos, and Steven Morris. Database Systems: Design, Implementation, and Management. 14th ed. Boston: Cengage Learning, 2021.
- 2) Beaulieu, Alan. Learning SQL: Generate, Manipulate, and Retrieve Data. 3rd ed. Sebastopol, CA: O'Reilly Media, 2020.
- 3) Molinaro, Anthony. SQL Cookbook: Query Solutions and Techniques for Database Developers. 2nd ed. Sebastopol, CA: O'Reilly Media, 2020.
- 4) Viescas, John L. SQL Queries for Mere Mortals: A Hands-On Guide to Data Manipulation in SQL. 4th ed. Boston: Addison-Wesley Professional, 2018.
- 5) Celko, Joe. Joe Celko's SQL for Smarties: Advanced SQL Programming. 5th ed. Burlington, MA: Morgan Kaufmann (Elsevier), 2015.

Evaluation Pattern:	
Total Marks: 50	
Internal Evaluation (20 Marks): • Journal1: 05 Marks • Students' Performance: 05 Marks • Viva: 05 Marks • Mini Project/Case Study: 05 Marks	Practical Exam Paper (30 Marks): • Selection I: Attempt any TWO questions (10 marks each) • Selection II: Attempt any TWO questions (05 marks each)



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Faculty of Commerce and Management

Yashwantrao Chavan Institute of Science, Satara

Board of Studies in Computational Sciences

Programme: B.Voc. (Soft. Dev.)

Semester - II

Type: CC

Marks: 50

Credits: 2

From: A. Y. 2026-27

Name of the Course and Code: Computational Statistics (BSDTCC I)

Course Objectives: Student should be...

- 1) Understand techniques of data collection and its presentation.
- 2) Compute various measures of central tendency and measures of dispersion.
- 3) Summarize data through central tendencies and measures of dispersion
- 4) Understand the concept of probability and its applications.

Course Outcomes: Student will able to...

- 1) Apply quantitative aptitude concepts to solve arithmetic, algebraic, and numerical problems accurately.
- 2) Demonstrate critical thinking and analytical skills in solving verbal and non-verbal reasoning problems.
- 3) Define probabilities and conditional probabilities.
- 4) Identify the types of the events.

Module	Title and Contents	Hrs.
Module -1:	Data Condensation, Presentation, and Measures of Central Tendency 1.1 Definition and scope of Statistics, concept of statistical population sample, qualitative & quantitative data, variables. 1.2 Scales of measurements: Nominal, Ordinal, Interval & Ratio. Collection and Summarization of univariate data and frequency distribution. 1.3 Data Presentation: Diagrammatic & graphical presentation with real applications- Pie diagram, line diagram. Simple, multiple & partial bar diagram, histogram, ogive curves. 1.4 Measures of central Tendency: Mathematical and positional averages: A.M, G.M, H.M, Median, Mode, relation between them and their properties (Without proof), Partition values.	7
Module -2:	Measures of Dispersion and Moments, Skewness and Kurtosis 2.1 Measures of Dispersion: Range, Quartile deviation, Mean deviation, Variance, standard deviation, coefficient of variation. Various properties of these measures and their utility (Without proof). 2.2 Raw and central moments, central moments in terms of raw moment's up to 4 th order. 2.3 Measures of skewness: Definition, Bowley's coefficient, Karl Pearson's coefficient, measure of skewness based on moment. 2.4 Kurtosis: Definition, measures of kurtosis, Sheppard's correction.	8

Module -3: Probability	3.1 Concepts of experiments and random experiments. Definitions: Sample space, Discrete sample space (finite and countably infinite). 3.2 Event, Elementary event, Compound event, favorable event, Definitions of Mutually exclusive events, Exhaustive events, Impossible events, certain event. Power set $P(\Omega)$ (sample space consisting at most 3 sample points). Illustrative examples. Equally likely outcomes (events). 3.3 Apriori (classical) definition of probability of an event. Axiomatic definition of probability with reference to a finite and countably infinite sample space. 3.4 Proof of the results: (i) $P(\Phi) = 0$, $P(A^c) = 1 - P(A)$, (ii) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ (with proof) and its generalization (Statement only). (iii) If $A \subset B$, $P(A) \leq P(B)$, (iv) $0 \leq P(A \cap B) \leq P(A) \leq P(A \cup B) \leq [P(A) + P(B)]$. Definition of probability in terms of odd ratio. Illustrative examples based on results.	8
Module -4:	Conditional Probability and Independence of events: 4.1 Definition of conditional probability of an event. Multiplication theorem for two events. Partition of sample space. Idea of Posteriori probability. 4.2 Statement and proof of Baye's theorem, examples on Baye's theorem. Elementary examples on probability and conditional probability. 4.3 Concept of Independence of two events. Proof of the result that if A and B are independent then, (i) A and B^c (ii) A^c and B, (iii) A^c and B^c are independent. 4.4 Pairwise and Mutual Independence for three events. Elementary examples.	7
Reference Books: - 1) Agarwal B. L, Statistics, New Age International P Ltd. Delhi, 2015 2) Goon A. M, Gupta M. K. and Dasgupta B, Fundamentals of Statistics Vol. I and II, Calcutta World Press, 2016 3) Gupta S. P, Statistical Methods, Sultan Chand and Sons, Delhi, 2002 4) Elhance D. N, Elhance V, Aggarwal B. M, Fundamentals of Statistics, Kitab Mahal Daryaganaj New Delhi, 2018 5) Mukhopadhyay P. An Introduction to the Theory of Probability, World Scientific Publishing Company, 2011		
Evaluation Pattern:		
Total Marks: 50		

**Comprehensive Continuous Evaluation
(20 Marks):**

- CCE - I : 10 Marks
- CCE - II : 10 Marks
- CCE - III: 10 Marks: Objective
- Note: The best of two scores will be considered for final mark entry.

End Semester Examination (30 Marks):

- Question-1: Solve the following questions
(Five questions of 2 Marks)
- Question -2: Attempt any two questions
(Three questions of 10 Marks)
- Question -3: Attempt any four questions
(Five questions of 5 Marks)

Note: Conversion of 50 marks of ESE evaluation to 30 Marks



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Yashwantrao Chavan Institute of Science, Satara

Board of Studies in Computational Sciences

Programme: B.Voc. (Soft. Dev.)

Semester -II

Type: GE

Marks: 50

Credits: 2

From: A. Y. 2026-27

**Name of the Course and Code: Data Communication and Networking
(BSDPGE II)
Practical Batch:20 Student/Batch**

Course Objectives: Student should be able to...

- 1) Familiarize with the physical components, tools, and media required to build a functional network.
- 2) Provide hands-on experience in configuring logical addresses (IPv4) and networking protocols on various operating systems.
- 3) Analyze network topologies and switching methods using industry-standard software.
- 4) Enhance the ability to perform subnetting and resource allocation for efficient network management.

Course Outcomes: Student will be able to...

- 1) Describe the specifications of network hardware (NIC, Switch, Router) and transmission media.
- 2) Manually configure and manage TCP/IP settings (IP, Subnet Mask, Gateway) on Windows and Linux systems.
- 3) Utilize Command Line Interface (CLI) utilities to configure network paths, resolve hostnames, and diagnose connection faults.
- 4) Design and simulate complex network topologies (Star, Mesh) and analyze the efficiency of switching techniques.

	Practical Titles	Hrs.
1)	To understand and compare the Internal Configurations of Laptop and Desktop.	60
2)	To Study the Transmission media and tools: Co-axial cable, UTP cable, Crimping tool, Connectors etc	
3)	Identify the various networking components (NIC, Switch, Router, Bridge).	
4)	Demonstrate the process of crimping an RJ-45 connector using Cat6 cable for both Straight-through and Crossover standards.	
5)	Preparing the UTP cable for cross and direct connection using crimping tool.	
6)	Configure a static IP address, Subnet Mask, and Default Gateway on a Windows/Linux machine.	
7)	Change the Default IP address of Computer manually.	
8)	Execute ping, ifconfig, ipconfig, systeminfo, tracert, nslookup and netstat to map the path to a remote server using Command Prompt	

9)	Connect the computers in Local Area Network.	
10)	Installation and Introduction of simulation tools packet tracer/ GNS3 Software.	
11)	Using a simulator (Cisco Packet Tracer/GNS3), design and implement a Star Topology and a Mesh Topology.	
12)	Use a simulation tool to demonstrate the difference in resource utilization between Circuit Switching (dedicated path) and Packet Switching (store-and-forward).	
13)	Given a Class C network (e.g., 192.168.10.0/24), divide it into four subnets of equal size. Calculate the Network ID, Broadcast Address, and Usable Host Range for each subnet.	
14)	Configuration of TCP/IP protocols in Window/LINUX.	
15)	Demonstrate the Folder Sharing in window /Linux.	
16)	Demonstrate the Process of printer sharing between windows.	
17)	Executes Setting up a desktop client (like Outlook or Thunderbird) using Manual Setup to define incoming and outgoing serve.	
18)	Demonstration of Remote Sharing.	

Reference Books: -

- 1) Kurose, James F., and Keith W. Ross. Computer Networking: A Top-Down Approach. 8th ed. Harlow, UK: Pearson Education, 2021.
- 2) Tanenbaum, Andrew S., David J. Wetherall, and Nick Feamster. Computer Networks. 6th ed. Boston: Pearson, 2021.
- 3) Lammle, Todd. Cisco Certified Network Associate (CCNA) Study Guide: Exam 200-301. Vol. 2. Indianapolis, IN: John Wiley & Sons, 2020.
- 4) Stallings, William. Data and Computer Communications. 10th ed. Upper Saddle River, NJ: Pearson, 2014.
- 5) Fall, Kevin R., and W. Richard Stevens. TCP/IP Illustrated, Volume 1: The Protocols. 2nd ed. Upper Saddle River, NJ: Addison-Wesley, 2011.

Evaluation Pattern:

Total Marks: 50

Internal Evaluation (20 Marks):

- Journal: 05 Marks
- Students' Performance: 05 Marks
- Viva: 05 Marks
- Mini Project/Case Study: 05 Marks

Practical Exam Paper (30 Marks):

- Selection I: Attempt any TWO questions (10 marks each)
- Selection II: Attempt any TWO questions (05 marks each)



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Yashvantrao Chavan Institute of Science, Satara

Board of Studies in Computational Sciences

Programme: B.Voc. (Soft. Dev.)

Semester -II

Type: SEC

Marks: 50

Credits: 2

From: A. Y. 2026-27

Name of the Course and Code: Advanced Digital Marketing (BSDPSEC II)
Practical Batch:20 Student/Batch

Course Objectives: Student should be able to...

- 1) Understand the fundamentals of digital marketing.
- 2) Gain practical knowledge of web analytics tools.
- 3) Study skills in social media marketing and content creation.
- 4) Learn and implement effective digital marketing strategies.

Course Outcomes: Student will be able to...

- 1) Apply SEO and SEM strategies to improve website ranking and online visibility.
- 2) Develop and use digital marketing tools and techniques in business.
- 3) Design and evaluate digital marketing campaigns based on business goals.
- 4) Execute social media strategies to enhance brand recognition and engage target audiences.

Sr.No.	Practical Titles (Any 15 of the following)	Hrs.
1)	Perform basic SEO (Search Engine Optimization) for the website (add keywords, meta title, meta description, image alt text).	
2)	Select primary and secondary keywords for website optimization. Identify high search volume and low competition keywords.	
3)	Create a search ad campaign using Google Ads. (Search Engine Marketing (SEM))	
4)	Integrate Google Analytics with the website. Analyse traffic sources (organic, direct, social).	
5)	Create an Instagram Business Account and post promotional content on Instagram: a. Posting reels and stories. b. Using hashtags. c. Measuring reach and impressions.	
6)	Create and optimize a Facebook Business Page and run a small promotional campaign using Facebook Ads.	

7)	Start a YouTube marketing channel on YouTube and upload a product promotion video. d. Upload product/service video. e. Add keywords in title and description. f. Analyse views and subscribers.	
8)	Run a small influencer marketing analysis for any.	
9)	Compare performance of Facebook, Instagram, and YouTube.	
10)	Design and send an email marketing campaign using Mailchimp.	
11)	Create a landing page for lead generation and connect it with a contact form.	
12)	Create a promotional banner using any tool: a. Add logo, tagline, offer details. b. Use brand colours. c. Export for social media use.	
13)	Create a Google My Business Profile: g. Add business name, address, phone number. h. Upload photos. i. Check customer reviews. j. Improve local search visibility.	
14)	Competitor Website Analysis: a. Select two competitor websites. b. Compare their keywords, content, and social media activity. c. Identify their strengths and weaknesses. d. Suggest improvement ideas.	
15)	Create a WhatsApp Marketing Campaign: a. Use WhatsApp Business: b. Create business profile c. Send promotional message to customers d. Share product catalogue e. Analyse customer responses	
16)	Online Customer Feedback Collection: a. Create feedback form using Google Forms. b. Share form link with customers. c. Collect and analyse responses. d. Prepare improvement suggestions.	
17)	Social Media Content Calendar Preparation: a. Prepare one-month content plan. b. Decide posting dates and themes. c. Plan reels, stories, and promotional posts.	

18)	Create business profile on Twitter: a. Post promotional tweets. b. Use hashtags. c. Track likes, retweets, engagement	
19)	Study IT policy and ethical issues in detail: a. Intellectual Property Rights (IPR). b. Copyright, trademarks, and patents. c. Avoiding plagiarism and content theft. d. Proper use of licensed software and media.	
20)	Digital Marketing Campaign Report including: a. SEO performance. b. SEM campaign results. c. Social media performance. d. Website analytics. e. Provide suggestions for future campaign improvement.	

Reference Books: -

- 1) Choudhury, Sourav, and Bikramjit Rishi. Principles of Digital Marketing. 2nd ed. Noida: Pearson Education, 2025.
- 2) Sood, Gaurav. Digital Marketing and Advertising: Practical Approach and Industry Practices. Birmingham: Packt Publishing, 2024.
- 3) Babu, K. G. Raja Sabarish, B. Anbazhagan, and S. Meenakumari. Digital Marketing. 1st ed. [Publisher Location Unknown], 2023.
- 4) Maloo, Pramod. The Start-up Founder's Guide To Digital Marketing. [Publisher Location Unknown], 2018.
- 5) Rai, Abhishek. Digital Marketing. [Publisher Location Unknown], 2015.

Evaluation Pattern:

Total Marks: 50

Internal Evaluation (20 Marks): • Journal: 05 Marks • Students' Performance: 05 Marks • Viva: 05 Marks • Mini Project/Case Study: 05 Marks	Practical Exam Paper (30 Marks): • Selection I: Attempt any TWO questions (10 marks each) • Selection II: Attempt any TWO questions (05 marks each)
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Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Commerce and Management

Yashvantrao Chavan Institute of Science, Satara

Board of Studies in Computational Sciences

Programme: B.Voc. (Soft. Dev.)

Semester - II

Type : VEC

Marks: 50

Credits : 2

From: A. Y. 2026-27

Name of the Course and Code: Linear Algebra (BSDPVEC I)

Practical Batch: 20 Student/Batch

Course Objectives: Student should be able to...

- 1) Understand the fundamental concepts of vectors, vector spaces, and linear transformations.
- 2) Understand null space and its significance in linear algebra.
- 3) Gain knowledge of eigenvalues, eigenvectors and their computation using programming.
- 4) Learn the ability to verify matrix properties such as symmetry and orthogonality.

Course Outcomes: Student will be able to...

- 1) Apply the concepts of vectors, vector spaces, and linear transformations to solve mathematical problems.
- 2) Perform matrix operations including addition, multiplication, transpose, inverse, and determinant calculation accurately.
- 3) Determine the rank, nullity, and linear dependence/independence of vectors in a vector space.
- 4) Compute eigenvalues and eigenvectors, and diagonalizable matrices where applicable.

Sr.No.	Practical's Title (Any 15 of the following)	Hrs
1)	Write a program to create Row, Column, Zero and Identity Matrices.	60
2)	Write a program to Perform addition and subtraction of matrices.	
3)	Write a program to perform Matrix Multiplication.	
4)	Write a program to Perform transpose and inverse of matrices.	
5)	Write a program to Compute determinant of a matrix.	
6)	Write a program to Compute Trace of a matrix.	
7)	Write a program to Check singularity of matrix ($\det(A) = 0$).	
8)	Write a program to Find Adjoint of a matrix.	
9)	Write a program to Solving system of linear equation ($Ax = b$ form).	
10)	Write a program to Solve system using Inverse method.	
11)	Write a program to Solve system using Cramer's Rule.	
12)	Write a program to Solve Gauss Elimination Method.	
13)	Write a program to Find rank using Row Echelon Form.	
14)	Write a program to Check linear independence.	

15)	Write a program to Find the null space of matrix.	
16)	Write a program to Compute eigenvalues and eigenvectors.	
17)	Write a program to Check symmetric matrix.	
18)	Write a program to Check orthogonality of matrix.	
19)	Write a program to Cayley-Hamilton Theorem verification.	
20)	Write a program to Decompose square matrix into Lower (L) and Upper (U) matrices (LU Decomposition).	

Reference Books: -

- 1) Daniel T. Valentine & Brian D. Hahn, Essential MATLAB for Engineers and Scientists, 8th Edition, Academic Press, 2022.
- 2) James W. Demmel , Applied Numerical Linear Algebra, 1st Edition , Society for Industrial & Applied Mathematics (SIAM) , 1997.
- 3) Gilbert Strang , Introduction to Linear Algebra, 5th Edition , Wellesley-Cambridge Press , 2016.
- 4) Gene H. Golub & Charles F. Van Loan, Matrix Computations, 4th Edition, Johns Hopkins University Press, 2013.
- 5) William Ford & David Stapleton, 2nd Edition, Elsevier, 2025.

Evaluation Pattern:

Total Marks: 50

Internal Evaluation (20 Marks):

- Journal: 05 Marks
- Students' Performance: 05 Marks
- Viva: 05 Marks
- Mini Project/Case Study: 05 Marks

Practical Exam Paper (30 Marks):

- Selection I: Attempt any TWO questions (10 marks each)
- Selection II: Attempt any TWO questions (05 marks each)