Karmaveer Bhaurao Patil University, Satara

Syllabus for

B. Sc. I Data Science

Under

Faculty of Science and Technology

(As per NEP 2020)

With effect from Academic Year 2025-2026

Syllabus for Bachelor of (B.Sc.) Part – I Data Science

PREAMBLE:

In the era of digital transformation, data has emerged as a vital asset, driving innovation, shaping decisions, and unlocking solutions to complex global challenges. The Bachelor of Science in Data Science program is designed to cultivate a new generation of analytical thinkers and problem solvers equipped with the interdisciplinary knowledge of mathematics, statistics, computer science, and domain-specific expertise. This program aims to instil in students the skills necessary to extract meaningful insights from data, develop intelligent systems, and make data-driven decisions ethically and responsibly. It fosters curiosity, critical thinking, and a commitment to lifelong learning, preparing graduates to lead and innovate in academia, industry, government, and society. With a foundation rooted in rigor and relevance, the B.Sc. in Data Science aspires to empower students to become contributors to a data-informed world—capable of addressing emerging challenges with clarity, precision, and purpose.

GENERAL OBJECTIVES OF THE COURSE: -

1. To create graduates with sound knowledge of Data Science, who can contributetowards recent advances in technology?
2. To provide advanced and in-depth knowledge of data science and specialization in oneor two subjects of the new era of technology.
3. To prepare Graduates who will achieve peer-recognition, as an individual or ina team, through demonstration of good analytical, design, programming, and implementation skills.
4. To enable students, pursue a professional career in Data Science in related industry,business and research.
5. To impact industry knowledge and practical skills of current trends in IT field to thestudents.
6. To develop the ability among students to formulate, analyze and solve real life problemsfaced in Computer Science industry. To produce computer science professionals whocan be directly employed or start his/her own work as
7. To Develop designing, analyzing and critical thinking skill among students.

PROGRAM OUTCOMES:

1. Possess a strong foundation of knowledge in their chosen field of study.
2. Develop a scientific mindset, becoming open-minded, critical, and curious, which will support their entry into research and innovation.
3. Be skilled in practical work, experiments, and the use of laboratory materials.
4. Be eligible to pursue higher studies in their field, both in India and abroad.
5. Qualify to appear for examinations for jobs in government organizations.
6. Meet the minimum eligibility requirements for various science-related job opportunities.
7. Enhance critical thinking, develop a scientific attitude, solve problems, improve practical skills, boost communication abilities, and strengthen social interactions.

PROGRAM SPECIFIC OUTCOME:

After completing the B.Sc. (Data Science) program, students will:

1. Demonstrate strong grounding in mathematics, statistics, and computer science principles essential for data analysis and modeling.
2. Acquire, clean, process, and manage structured and unstructured data from diverse sources using appropriate tools and techniques
3. Apply statistical and machine learning models to derive insights, make predictions, and support data-driven decision-making.
4. Develop and implement algorithms using modern programming languages (such as Python, R, or SQL) to solve real-world data problems.
5. Effectively communicate data insights through visualization, storytelling, and presentation tailored to both technical and non-technical audiences.
6. Integrate data science methods with domain-specific knowledge to solve interdisciplinary problems in fields such as business, healthcare, finance, or the environment.
7. Understand and apply ethical principles, data privacy standards, and legal considerations in data handling and analysis.

1. TITLE: **Data Science**

2. YEAR OF IMPLEMENTATION: **2025-2026**

3. DURATION: **01 year**

4. PATTERN: **Semester examination**

5. MEDIUM OF INSTRUCTION: **English**

COURSE STRUCTURE

As per NEP-2020 (2.0)

Sem Level	Courses			OE	VSC/ SEC	AEC/ VEC/ IKS	OJT/ FP/ CEP/ CC/RP	Total Credits	Degree/ Cum. Cr. MEME
	Course I	**Course II**	**Course III**						
Sem I (4.5)	DSC-I(2) DSC-II(2) DSC P-I(2)	DSC-I(2) DSC-II(2) DSC P-I(2)	DSC-I(2) DSC-II(2) DSC P-I(2)	OE I (2)	---	IKS- I (2) (Generic)	---	22	UG Certificate 44
Sem II (4.5)	DSC-III(2) DSC-IV(2) DSC P-II(2)	DSC-III(2) DSC-IV(2) DSC P-II(2)	DSC-III(2) DSC-IV(2) DSC P-II(2)	OE II (2)	---	VEC-I(2) (Democracy, election and Indian constitution)	---	22	Exit option: 4 Credits NSQF/ Internship / Skill Courses
Credits	12	12	12	04	---	08	---	44	

COURSE TITLE

B. Sc. (Data Science) Part-I SEM I				
Sr. No.	**Components**	**Course Code**	**Course Title**	**Credits**
1	Course-I	BDST 111	Fundamental Data Science	02
		BDST 112	Database Management System	02
		BDSP 113	Data Science Practical Course – I based on Fundamental Data Science(BDST 111) and Database Management System(BDST 112)	02
2	Course-II	BDST 114	Fundamental of Computer	02
		BDST 115	Computer programming with C	02
		BDSP 116	Data Science Practical Course – II based on Fundamental of Computer (BDST 114) and Computer Programming with C (BDST 115)	02
3	Course-III	BDST 117	Computational Mathematics - I	02
		BDST 118	Computational Mathematics – II	02
		BDSP 119	Data Science Practical Course – III based on Computational Mathematics - I (BDST 117) and Statistics for Data Science – I (BDST 118)	02
7	OE	BDSTOE 1	Music Studies P-I	02
8	IKS	BDSTIKS 1	Introduction to Indian Knowledge System	02
			Total	**22**
B. Sc. (Data Science) Part-I SEM II				
Sr. No.	**Components**	**Paper Code**	**Course**	**Credits**
1	Course-I	BDST 121	Data Storage Technology	02
		BDST 122	Relational Database Management System	02
		BDSP 123	Data Science Practical Course – I based on Data Storage Technology (BDST 121) and Relational Database Management System (BDST 122)	02
3	Course-II	BDST 124	Web Development	02
		BDST 125	Operating System Concept	02
		BDSP 126	Data Science Practical Course – II based Web development (BDST 124) and Operating System Concept (BDST 125)	02
4	Course-III	BDST 127	Computational Mathematics - III	02
		BDST 128	Computational Mathematics – IV	02
		BDSP 129	Data Science Practical Course – III based on Web development (BDST 124) and Operating System Concepts (BDST 125)	02
7	OE	BDSTOE 2	Music Studies P-II	02
8	VEC	BDSTVEC 1	Democracy, Election and Indian Constitution	02
			Total	**22**

EVALUATION STRUCTURE

- **Semester I, Level 4.5**

Course	Course Category	Course Code	Internal Evaluation			ESE	Total Marks	Credits
			CCE-I	Mid - Semester	CCE-II			
Subject 1	T	BDST 111	05	10	05	30	50	02
	T	BDST 112	05	10	05	30	50	02
	P	BDSP 113	--	--	--	50	50	02
Subject 2	T	BDST 111	05	10	05	30	50	02
	T	BDST 112	05	10	05	30	50	02
	P	BDSP 113	--	--	--	50	50	02
Subject 3	T	BDST 111	05	10	05	30	50	02
	T	BDST 112	05	10	05	30	50	02
	P	BDSP 113	--	--	--	50	50	02
OE	T	BDSTOE 1 (For IDS Courses)	05	--	05	15	25	01
	P	BDSPOE 1	--	--	--	25	25	01
OE	T	BDSTOE 1 (For Humanities)	05	10	05	30	50	02
IKS	T	BDSTIKS 1	05	10	05	30	50	02
Total							**550**	**22**

OE : Open Elective Course ,IKS : Indian

Evaluation Structure : B.Sc. I, NEP 2.0

➢ **Semester II, Level 4.5**

Course	Course Category	Course Code	Internal Evaluation			ESE	Total Marks	Credits
			CCE-I	Mid - Semester	CCE-II			
Subject 1	T	BDST 121	05	10	05	30	50	02
	T	BDST 122	05	10	05	30	50	02
	P	BDSP 123	--	--	--	50	50	02
Subject 2	T	BDST 121	05	10	05	30	50	02
	T	BDST 122	05	10	05	30	50	02
	P	BDSP 123	--	--	--	50	50	02
Subject 3	T	BDST 121	05	10	05	30	50	02
	T	BDST 122	05	10	05	30	50	02
	P	BDSP 123	--	--	--	50	50	02
OE	T	BDSTOE 2 (For IDS Courses)	05	--	05	15	25	01
	P	BDSPOE 2	--	--	--	25	25	01
OE	T	BDSTOE 2 (For Humanities)	05	10	05	30	50	02
VEC	T	BDSTVEC1	05	10	05	30	50	02
Total							**550**	**22**

OE : Open Elective Course , VEC : Value Education Course

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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc	**Semester** - I
Type : Course 1	**Marks:** 50
Credits : 2	**From:** A. Y. 2025-26

Name of the Course: BDST 111 Fundamentals of Data Science

Course Objectives: Student should be able to learn…

1) Fundamental concepts of Data Science.
2) Study basic principles of Data Science.
3) Develop skills for Data Management.
4) Think through the ethics surrounding privacy, data sharing.

Course Outcomes:

1) Explore the fundamental concepts of data science.
2) Understand data analysis techniques for applications handling large data.
3) Understand various machine learning algorithms used in data science process.
4) Visualize and present the inference using various tools.

Module	Title and Contents	Hrs
Module -1:	**Module -1: Data Science Concepts** **1.1** Defining data science and big data **1.2** Recognizing the different types of data **1.3** Gaining insight into the data science process **1.4** Data Science Process: Overview, Different steps **1.5** Machine Learning Definition and Relation with Data Science.	6
Module -2:	**Module -2: Data management And Analysis** **2.1** Data collection and management: Introduction**,** Sources of data, Data collection and APIs **2.2** Exploring and fixing data**,** Data storage and management**,** Data analysis: Introduction, Terminology and concepts **2.3** Introduction to statistics, Central tendencies and distributions, Variance **2.4** Distribution properties and arithmetic, Samples/CLT **2.5** Basic machine learning algorithms, Linear regression, SVM, Naive Bayes	8
Module -3:	**Module -3: Data visualization** **3.1** Data visualization: Introduction, **3.2** Types of data visualization, **3.3** Data for visualization: Data types, **3.4** Data encodings, Retinal variables, **3.5** Mapping variables to encodings, Visual encodings.	7
Module -4:	**Module -4: Applications of Data Science** **4.1** Technologies for visualization, **4.2** Python, **4.3** Recent trends in various data collection and analysis techniques, **4.4** Various visualization techniques, **4.5** Application development methods of used in data science.	9

Reference Books:-

1) Mittal Gautam, Data Science Simplified: A Hands-on Guide for Beginners, Notion Press, 2021
2) Raghunathan, Foundations of Data Science, CRC Press,2020
3) Patil Prashant, Big Data Analytics: A Comprehensive Guide, McGraw-Hill Education, 2019
4) Ian H. Witten, Frank, Eibe, Data Mining: Practical Machine Learning Tools and Techniques, Morgan Kaufmann,2016
5) Grus Joel, O'Reilly, Data Science from Scratch: First Principles with Python, 1st edition, 2015.
6) Jeffrey David, Leskovec, Anand Rajaraman, Ullman, Cambridge, Mining of Massive Datasets, J20 University Press, 2nd edition, 2014.
7) Jure Leskovek, Anand Rajaraman, Jeffrey Ullman, Mining of Massive Datasets. v2.1, Cambridge University Press,

<table>
<tr><td colspan="2">2014.
8) O'Neil Cathy, Schutt Rachel, O’ Reilly, Doing Data Science, Straight Talk from the Frontline,1st edition, New York, O’Reilly Media,2013.</td></tr>
<tr><td colspan="2">Evaluation Pattern:</td></tr>
<tr><td colspan="2">Total Marks: 50</td></tr>
<tr><td>Internal Continuous Evaluation (20Marks):

• CCE – I: 10 Marks: Objective
• CCE – II: 10 Marks: Objective
• Mid Semester Exam: 20 Marks: Subjective
on to 20 Marks</td><td>End Semester Examination (30 Marks):
• Question -1: Solve the following questions
(Five question of 2 Marks)
• Question -2: Attempt any two questions
(Three question of 10 Marks)
Question -3: Attempt any two questions
(Five question of 5 Marks)
• Note: Conversion of 50 marks of ESE evaluation to 30 Marks</td></tr>
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Board of Studies in Computer Science

Programme: B.Sc	**Semester** - I
Type : Course I	**Marks:** 50
Credits : 2	**From:** A. Y. 2025-26

Name of the Course: BDST 112 Database Management System

Course Objectives: Student should be able to learn…

1) Understand the fundamental concepts of data.
2) Understand principles of databases.
3) Identify the database management operation.
4) Discuss the concept of procedure oriented, object-oriented programming languages, Database Management.

Course Outcomes:

1) Apply the basics of data, information, system and Database.
2) Evaluate basics of different database models for software development.
3) Design the basics of Relational algebra operations and Relational Calculus.
4) Demonstrate SQL basics and write queries to perform different operations on real world data.

Module	Title and Contents	Hrs
Module -1:	**Module -1: Database Management System** **1.1** DBMS (Database Management System), Key Features of DBMS, **1.2** File System, Difference between File System and DBMS, **1.3** Types of Database Systems Centralized, Distributed, **1.4** Cloud, DBMS Architecture: Single-tier, **1.5** Two-tier, Three-tier.	8
Module -2:	**Module -2: Basic of Structured Query Language** **2.1** Introduction to SQL, Basic Data Type in SQL: Binary Data types, **2.2** Numeric Datatype Character String Datatype, **2.3** Date and time Data types, **2.4** SQL Operator: Arithmetic Operators, Comparison Operators Logical Operators, **2.5** SQL DDL Commands, SQL DML Commands,Type of Constraints.	7
Module -3:	**Module -3: Data Models and Storage Fundamentals** **3.1** Overview of Data Models: Hierarchical, Network, Object-oriented, **3.2** Entities, Attributes, Relationships, **3.3** Object-Based Data Models: Concepts, Features, Advantages, ER Modeling Basics, **3.4** Primary and Secondary Storage, Primary key, foreign key, candidate key, super key, unique key **3.5** Normalization: Concept of normalization, advantages, First NF, Second NF, Third NF, Examples of normalizations.	8
Module -4:	**Module -4: Advance Database Concepts** **4.1** Importance of Database Security, **4.2** Introduction to NoSQL, **4.3** Concepts of Big Data, **4.4** Introduction to Warehouse, **4.5** Case Study: Design Database System for- Library management system.	7

Reference Books:-

1) R. Elmasri, S.B. Navathe, (2010), Fundamentals of Database Systems 6th Edition,Pearson Education
2) R. Ramakrishanan, J. Gehrke, (2002), Database Management Systems 3rd Edition,McGraw-Hill,
3) Silberschatz, H.F. Korth, S. Sudarshan, (2010), Database System Concepts 6th Edition,McGraw Hill
4) Silberschatz Abraham, Database System Concepts, Mc Graw Hill, 2021

5) Chan Ben, SQL Programming: Learn the Ultimate Coding, Basic Rules of the Structure Query Language, Notion Press, 2020
6) Teorey Toby, Database Modeling and Design: Logical Design, Morgan Kaufmann, 2010
7) SQL, PL/SQL The Programming Language of ORACLE – Ivan Bayross. BPB publication,2021

Evaluation Pattern:	
Total Marks: 50	
Internal Continuous Evaluation (20Marks): • CCE – I: 10 Marks: Objective • CCE – II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective on to 20 Marks	**End Semester Examination (30 Marks):** • Question -1: Solve the following questions (Five question of 2 Marks) • Question -2: Attempt any two questions (Three question of 10 Marks) Question -3: Attempt any two questions (Five question of 5 Marks) • Note: Conversion of 50 marks of ESE evaluation to 30 Marks

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Programme: B.Sc	**Semester** - I
Type : Course I	**Marks:** 50
Credits : 2	**From:** A. Y. 2025-26

Name of the Course: BDSP 113 Practical - I

Course Objectives: Student should be able to learn…

1) Learn Fundamental concepts of Data Science.
2) Understand Basic principles of Data Science.
3) Identify programming skills using the fundamentals and basics of C Language.
4) Understand Algorithms and flowchart of programs in C and to solve the problems.

Course Outcomes:

1) Explore the fundamental concepts of data science.
2) Perform data analysis techniques for applications handling large data.
3) Perform various machine learning algorithms used in data science process.
4) Apply software's are available for C Programming and how to use the Editor for writing Programand how to execute it.

Module	Title and Contents	Hrs
Module -1:	**Module -1: Fundamental of Data Science** **1.1** Identify relevant data sources and collect the required data. **1.2** Clean and pre-process the data to ensure its quality and integrity. **1.3** Convert the data into a suitable format for analysis, such as CSV, Excel, or a database format. **1.4** Create a bar chart to compare categorical variables or display counts or frequencies. **1.5** Customize the chart with labels, colors, and legends to enhance readability. **1.6** Construct a histogram to display the distribution of a single variable. **1.7** Adjust the bin sizes to reveal different levels of granularity in the data. **1.8** Case study on Applications of Data Science **1.9** Case Study on Data Center. **1.10** Case Study on Healthcare.	30
Module -2:	**Module -2: Database Management System** **2.1** Installation of MySQL Database **2.2** Create Database Company. **2.3** Create a table named Employees with columns for EmployeeID, FirstName, LastName, Position, and Salary. **2.4** Insert five records into the Employees table. **2.5** Select the FirstName and LastName of all employees. **2.6** Select all information for employees who are Data Scientist. **2.7** Select all employees whose first name starts with 'J'. **2.8** Select all employees whose salaries are between 60,000 and 70,000. **2.9** Select all employees who are either Developers or Testers. **2.10** Select all unique positions from the Employees table.	30

Reference Books:-

1) Mittal Gautam, Data Science Simplified: A Hands-on Guide for Beginners, Notion Press, 2021
2) Raghunathan, Foundations of Data Science, CRC Press,2020
3) Patil Prashant, Big Data Analytics: A Comprehensive Guide, McGraw-Hill Education, 2019

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8) O'Neil Cathy, Schutt Rachel, O' Reilly, Doing Data Science, Straight Talk from the Frontline,1st edition, New York, O'Reilly Media,2013.

Evaluation Pattern:

Total Marks: 50

Journal and Students Performance Viva (10 M)	**Practical Exam Paper (40 M):**
• Journal: 5 marks • Student's Performance: 5 marks	• Question -1 Attempt any two question (20 M) (write Two questions of 10 marks out of three questions based on BDST111) • Question -2 Attempt any one question (20 M) (write Two questions of 10 marks out of three questions based on BDST112)

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Programme: B.Sc	**Semester** - I
Type : Course II	**Marks:** 50
Credits : 2	**From:** A. Y. 2025-26

Name of the Course: BDST 114 Fundamentals of Computer

Course Objectives: Student should be able to learn…

1) Define basic concepts and terminology of computers.
2) Understand how to operate desktop computers to carry out computational tasks.
3) Learn working of Hardware and Software and the importance of operating systems.
4) Identify programming languages, number systems, peripheral devices,networking, multimedia, and internet concept

Course Outcomes: Students will be able to…

1) Describe basic concepts and terminology of information technology.
2) Evaluate the fundamentals of personal computers and their operations.
3) Maintain their small account using the computers and enjoy in the world of InformationTechnology
4) Use the computer for basic purposes of preparing his personnel/business letters, viewing information on internet (the web), sending mails, preparing his business presentations, playinggames etc.

Module	Title and Contents	Hrs
Module -1:	**Module -1: Computers Concepts** **1.1** Introduction, Definition, Characteristics of computer, **1.2** Evolution of Computer, Block Diagram Of a computer, **1.3** Generations of Computer,Classification of Computers, **1.4** Applications of Computer, **1.5** Capabilities and limitations of computer.	6
Module -2:	**Module -2: Basic Computer Organization** **2.1** Role of I/O devices in a computer system, **2.2** Input Units: Keyboard, Terminals and its types, Pointing Devices, Scanners and its types, **2.3** Voice Recognition Systems, Vision Input System, **2.4** Touch Screen, and Output Units: Monitors and its types, Printers: Impact Printers and itstypes, **2.5** Non-Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers.	8
Module -3:	**Module -3: Software's and Operating System** **3.1** Software and its needs, types of S/W, System Software: Operating System, **3.2** Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages, **3.3** Application S/W and its types: Word Processing, Spread Sheets Presentation, Functions, **3.4** Measuring System Performance, Assemblers, Compilers and Interpreters. Batch Processing, **3.5** Multiprogramming, Multi-tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux.	7
Module -4:	**Module -4: Computer Arithmetic and Data Communication** **4.1** Binary, Binary Arithmetic, Number System: Positional & Non-Positional, Binary, Octal, Decimal, Hexadecimal, **4.2** Converting from one number system to another, Converting from one number system to another, Converting from one number system to another, **4.3** Communication Process, Data Transmission speed, Communication Types (modes),	9

	Data Transmission Medias, Modem and its working, characteristics, **4.4** Types of Networks, LAN Topologies,Computer Protocols, **4.5** Concepts relating to networking	

Reference Books:-

1) Guy Hart-Davis (2023) "The ABCs of Microsoft Office 97 Professional edition", BPBPublications.
2) Karl Schwartz (1998), "Microsoft Windows 98 Training Guide" BPB Publications.
3) C.S. French (1998) "Data Processing and Information Technology", BPB Publications
4) P.K Sinha (1992) `Computer Fundamentals`, BPB Publications
5) Sinha P, Computer Fundamentals, BPB ,2004.

Evaluation Pattern:	
Total Marks:50	
Internal Continuous Evaluation (20Marks): • CCE – I: 10 Marks: Objective • CCE – II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective on to 20 Marks	**End Semester Examination (30 Marks):** • Question -1: Solve the following questions (Five question of 2 Marks) • Question -2: Attempt any two questions (Three question of 10 Marks) Question -3: Attempt any two questions (Five question of 5 Marks) • Note: Conversion of 50 marks of ESE evaluation to 30 Marks

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Programme: B.Sc	**Semester** - I
Type : Course II	**Marks:** 50
Credits : 2	**From:** A. Y. 2025-26

Name of the Course: BDST 115 Computer Programming with C

Course Objectives: Student should be able to learn…

1) Adequate knowledge on the need of programming languages.
2) Study the need of problem-solving techniques.
3) Understand programming skills using the fundamentals and basics of C Language.
4) Algorithms and flowchart of programs in C and to solve the problems.

Course Outcomes:

1) Develop algorithm writing and flowchart drawing.
2) Evaluate the compilation process and execution of any C Program.
3) Analyze the use of Functions and Arrays to solve in real life applications.
4) Apply the use of Arrays to solve in real life applications.

Module	Title and Contents	Hrs
Module -1:	**Module -1: Fundamentals of C language** **1.1** Problem Solving definition, Step involving in problem solving, **1.2** Algorithm, Characteristics, Flowcharts, Definition, Symbol, features, **1.3** History of 'C' language, Structure of 'C' programs, 'C' Tokens, **1.4** Character set and keywords, Constant and its type, **1.5** Variable and its type Data types, Operators and its types, Precedence rules, Input/output using standard functions.	6
Module -2:	**Module -2: Branching, Looping and Functions** **2.1** Conditional branching, if, if else, else if ladder, switch, **2.2** Nested statements. Looping for, while do-while statements, **2.3** Unconditional control statements- go to, break and continue, **2.4** Definition, types & parts of functions, Local and global variable, **2.5** Library functions and User defined functions.	8
Module -3:	**Module -3: Array** **3.1** Understanding the Array and its types, **3.2** Array of structures, Arrays within Structures, **3.3** Structure and function, Nested structure, **3.4** Pointer to structure, Array definition and declaration, **3.5** Initialization of arrays, types of arrays, String handling functions, Arrays and functions.	7
Module -4:	**Module -4: Pointer and Union** **4.1** Understanding the pointers, Definition and declaration, **4.2** Operations onpointer, Pointer initialization, **4.3** Pointer and function, Definition and declaration, **4.4** Structure initialization, **4.5** Difference betweenstructure and union.	9

Reference Books:-

1. Yashwant Kanetkar (2018) Let Us C, BPB Publications, Edition 18
2. Peter Prinz and Tony Crawford (2016) C in a Nutshell (2nd Ed.)
3. Jeri R. Hanly and Elliot B. Koffman (2009)Problem Solving and Program Design in C (6thEdition)
4. E. Balagurusamy (2008) Programming in ANSI C, McGraw Hill Education Edition 6
5. Peter van der Linden (1994)Expert C Programming: Deep C Secrets
6. Brian Kernighan and Dennis Ritchie (1988) The C Programming Language –, Pearson EducationIndia,

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7. P. Kamal, Learn Arrays in c with example, Kindle edition ,2013</td></tr>
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Programme: B.Sc	**Semester** - I
Type : Course II	**Marks:** 50
Credits : 2	**From:** A. Y. 2025-26

Name of the Course: BDSP 116 Practical II

Course Objectives: Student should be able to learn…

1) Learn Fundamental concepts of Data Science.
2) Understand Basic principles of Data Science.
3) Identify programming skills using the fundamentals and basics of C Language.
4) Understand Algorithms and flowchart of programs in C and to solve the problems.

Course Outcomes:

1) Explore the fundamental concepts of data science.
2) Perform data analysis techniques for applications handling large data.
3) Perform various machine learning algorithms used in data science process.
4) Apply software's are available for C Programming and how to use the Editor for writing Programand how to execute it.

Module	Title and Contents	Hrs
Module -1:	**Fundamentals of Computer** **1.1** Identification of the peripherals of a computer, components ina CPU and their functions. **1.2** Assembling and disassembling the system hardwarecomponents of personal computer. **1.3** Basic Computer Hardware Trouble shooting. **1.4** Study of LAN and Wi-Fi Basics. **1.5** Basic Computer Proficiency- 1. Familiarization of Computer Hardware Parts 2. Basic Computer Operations and Maintenance. 3. Dos and Don'ts, Safety Guidelines in Computer Lab **1.6** Familiarization of Basic Software – Operating System, Word Processors, Internet Browsers, Integrated Development Environment (IDE) with Examples. **1.7** Verify the components of a typical computersystem. **1.8** Explore, maintain files, and customize the Windowoperating system. **1.9** Integrate Word, Excel, and PowerPoint to preparebusiness documents. **1.10**Study of basics of computer networks	30

Module -2:	**Computer Programming with C** **2.1** Write a program to accept 5 subject marks and calculate total marks, percentage, and grade of student. **2.2** Write a program to perform arithmetic operations. **2.3** Write a program to input n numbers and find the Odd and Even numbers. **2.4** Write a program to find the age of a person (Input birth date and today date). **2.5** Write a program to find the sum of first in natural numbers. **2.6** Write a program to accept the range and generate Fibonacci Series. **2.7** Write a program to calculate sum of numbers using simple function. **2.8** Write a program to calculate factorial of number using Recursion. **2.9** Write a program to enter array elements and perform arithmetic operations. **2.10** Write a program to sort the numbers in ascending and descending order using array.	30

Reference Books:-

1) Raghunathan, Foundations of Data Science, CRC Press,2020
2) Patil Prashant, Big Data Analytics: A Comprehensive Guide, McGraw-Hill Education, 2019
3) Ian H. Witten, Frank, Eibe, Data Mining: Practical Machine Learning Tools and Techniques, Morgan Kaufmann,2016
4) Grus Joel, O'Reilly, Data Science from Scratch: First Principles with Python, 1st edition, 2015.
5) Jeffrey David, Leskovec, Anand Rajaraman, Ullman, Cambridge, Mining of Massive Datasets, J20 University Press, 2nd edition, 2014.
6) Jure Leskovek, Anand Rajaraman, Jeffrey Ullman, Mining of Massive Datasets. v2.1, Cambridge University Press, 2014.
7) O'Neil Cathy, Schutt Rachel, O' Reilly, Doing Data Science, Straight Talk from the Frontline,1st edition, New York, O'Reilly Media,2013.

Evaluation Pattern:

Total Marks: 50

Journal and Students Performance Viva (10 M)	**Practical Exam Paper (40 M):**
• Journal: 5 marks • Student's Performance: 5marks	• Question -1 Attempt any two question (20 M) (write Two questions of 10 marks out of three questions based on BDST114) • Question -2 Attempt any one question (20 M) (write Two questions of 10 marks out of three questions based on BDST115)

Karmaveer Bhaurao Patil University, Satara

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

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc	**Semester** - I
Type : Course III	**Marks:** 50
Credits : 2	**From:** A. Y. 2025-26

Name of the Course: BDST 117 Computational Mathematics - I

Course Objectives: Student should be able to learn…

1) Understand Fundamental properties of matrices and their applications.
2) Learn classical notations of logic.
3) Know different number systems and their conversion.
4) Study the concept of graph and trees to tackle real situations.

Course Outcomes:

1) Understand the fundamental concepts in Discrete mathematics, including sets, logic, proof techniques etc.
2) Apply mathematical reasoning and formal logic to construct valid arguments, analyze prepositions and solve problems.
3) Analyze the efficiency of algorithms using concept from Discrete mathematics.
4) Evaluate complex problems by applying appropriate mathematical techniques and arrive at logical solutions.

Module	Title and Contents	Hrs
Module -1:	**Module -1: Matrices** **1.1** Defining data science and big data **1.2** Definition and properties of determinants, Definition and types of matrices, **1.3** Basic Operations of matrices, Inverse and Transpose of a matrix, Characteristic Polynomial, **1.4** Definition and examples of Eigenvalues and Eigenvectors, **1.5** Caley's-Hamilton theorem, Singular Value Decomposition.	6
Module -2:	**Module -2: Number Systems** **2.1** Decimal, Binary, and hexadecimal Number systems and their inter conversion, **2.2** Binary addition, subtraction, **2.3** multiplication and division, **2.4** signed and unsigned binary numbers, **2.5** 1's and 2's complement representation.	8
Module -3:	**Module -3: Graphs** **3.1** Definition, Basic properties, Examples, **3.2** Special Graphs, Directed and undirected graphs, **3.3** Concept of degree, **3.4** Matrix representation of graphs, **3.5** Walk, Trail, Path and Circuits.	7
Module -4:	**Module -4: Trees** **4.1** Definition and examples of trees, **4.2** Rooted trees, **4.3** Binary trees and their properties, **4.4** Spanning trees, Minimal spanning trees, **4.5** Kruskal's Algorithm.	9

Reference Books:-

1. S. Lipschutz and M. Lipson, Computational Mathematics I, Schaum's Outlines Series, Tata McGraw Hill, 2017.
2. C. L. Liu and D. P. Mohapatra, Elements of Discrete Mathematics, 4 th edition, McGraw Hill Education, 2017.
3. N. L. Biggs, Computational Mathematics I, 2nd edition, Oxford University Press, 2013.
4. R. Johnsonbaugh, Computational Mathematics I, 8th edition, Pearson, 2013.
5. R. M. Somasundaram, Discrete Mathematical Structures, PHI Learning Pvt. Ltd., 2003.
6. K. H. Rosen, Discrete Mathematics and its Application, McGraw Hill, 2002.
7. Susanna S., Discrete Mathematics with Applications, PWS Publishing Company, 1995.

Evaluation Pattern:	
Total Marks: 50	
Internal Continuous Evaluation (20Marks): • CCE – I: 10 Marks: Objective • CCE – II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective on to 20 Marks	**End Semester Examination (30 Marks):** • Question -1: Solve the following questions (Five question of 2 Marks) • Question -2: Attempt any two questions (Three question of 10 Marks) Question -3: Attempt any two questions (Five question 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 Computer Science

Programme: B.Sc	**Semester** - I
Type : Course III	**Marks:** 50
Credits : 2	**From:** A. Y. 2025-26

Name of the Course: BDST 118 Computational Mathematics - II

Course Objectives: Student should be able to learn…

1) Understand the basic concepts of statistics.
2) Compute various measures of central tendency and dispersion.
3) Analyze the data and interpret the results.
4) Study the Correlation and Regression.

Course Outcomes:

1) Apply various types of sampling methods to data collection.
2) Display data graphically and interpret graphs.
3) Recognize, describe, and calculate the measures of central tendency and dispersion.
4) Measure the correlation between two variables and estimate the value.

Module	Title and Contents	Hrs
Module -1:	**Module -1: Data Condensation and Measures of Central Tendency** **1.1** Definition, importance, scope and limitations of Statistics, Data Condensation: Qualitative & Quantitative, Scales of measurement: Nominal, Ordinal, Interval and Ratio, **1.2** Raw data, Attributes and variables, discrete and continuous variables, Organization of data, Collection of data, **1.3** classification and construction of frequency distribution, Graphical Representation: Histogram, Frequency polygon, Frequency curve, Ogive Curves, Boxplot, Examples, **1.4** Measures of Central tendency: Concept of central tendency, Criteria for good measures of central tendency, **1.5** Types: Arithmetic mean, G.M., H.M., Median, Mode, Quintiles, Combined Mean, Weighted Mean, Corrected Mean, Examples.	6
Module -2:	**Module -2: Measures of Dispersion and Moments** **2.1** Concept of dispersion and measures of dispersion, absolute and relative measures of dispersion' **2.2** Types: Range, Quartile Deviation, Mean Deviation, S.D. and Variance, **2.3** Moments: Concept of moments, Types: Raw moment, Central moment, and moment about any arbitrary point "a" for ungrouped and grouped data (only first four moments), **2.4** relation between central and raw moments (statement only), Skewness: Types of skewness, Pearson's and Bowley's coefficient of skewness, **2.5** Measures of skewness based on moments, Kurtosis: Types of kurtosis, Measures of kurtosis based on moments.	8
Module -3:	**Module -3: Correlation** **3.1** Concept of bivariate data, scatter diagram, **3.2** Concept of correlation, positive correlation, negative correlation, **3.3** cause and effect relation, Karl Pearson's coefficient of correlation, **3.4** Properties of correlation coefficient, interpretation of correlation coefficient, **3.5** Spearman's Rank Correlation coefficient (formula with and without ties).	7

Module -4:	**Module -4: Regression** **4.1** Concept of regression, **4.2** Derivation of lines of regression by method of least squares, **4.3** Regression Coefficients, and their significance, **4.4** Properties of regression coefficients, **4.5** Point of intersection and acute angle between regression lines.	9

Reference Books:-

1) S. C. Gupta and V. K. Kapoor, Fundamental of Mathematical Statistics (12th Edition), Delhi, Sultan Chand and Sons, 2020
2) T.C. Gupta. Fundamental of Statistics (7th Edition), Mumbai, Himalaya Publishing House, 2018.
3) Gentle, E. James, Numerical Linear Algebra for Applications in Statistics. Springer, 2018.
4) Efron, Bradley, Hastie Trevor, Computer Age Statistical Inference: Algorithms, Evidence, and Data Science. Cambridge University Press, 2016.
5) S. P. Gupta, Sultan Chand, Statistical Methods, Delhi, 2014
6) B. L. Agarwal Basic Statistics (6th Edition), New Age International Private Ltd, Delhi, 2013.
7) Christian P. Robert, and Casella, George. Carlo Monte Statistical Methods. Springer, 2004.
8) A. M. Goon, M. K. Gupta, B. Das Gupta. Fundamentals of Statistics, The World Press Private Ltd., Calcutta, 1968.

Evaluation Pattern:

Total Marks: 100 / 50

Internal Continuous Evaluation (20Marks):	**End Semester Examination (30 Marks):**
• CCE – I: 10 Marks: Objective • CCE – II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective on to 20 Marks	• Question -1: Solve the following questions (Five question of 2 Marks) • Question -2: Attempt any two questions (Three question of 10 Marks) Question -3: Attempt any two questions (Five question of 5 Marks) • Note: Conversion of 50 marks of ESE evaluation to 30 Marks

Karmaveer Bhaurao Patil University, Satara

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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc	**Semester** - I
Type : Course III	**Marks:** 50
Credits : 2	**From:** A. Y. 2025-26

Name of the Course: BDSP 119 Practical III

Course Objectives: Student should be able to learn…

1) Learn the basic concepts of Computational Mathematics.
2) Understand the uses of Matrices in various fields
3) Learn the fundamental properties of matrices and their applications.
4) Analyze the data and interpret the results.

Course Outcomes:

1) Understand the fundamental concepts in discrete mathematics, including sets, logic, proof techniques etc.
2) Apply mathematical reasoning and formal logic to construct valid arguments, analyze prepositions and solve problems.
3) Analyze the efficiency of algorithms using concept from discrete mathematics.
4) Evaluate complex problems by applying appropriate mathematical techniques and arrive at logical solutions.

Module	Title and Contents	Hrs
Module -1: **Module -2:**	**Module -1: BDST 117: Computational Mathematics – I** **1.1** Eigenvalues and Eigen vectors of matrix. **1.2** Caley's-Hamilton theorem. **1.3** Interco version of a Number system to another number system. **1.4** 1's and 2's complement with an example. **1.5** Number system and their conversion. **1.6** Degree of vertices and graph. **1.7** Matrix representation of graph. **1.8** Minimal spanning trees. **1.9** Kruskal's Algorithm. **1.10** Maximal flow algorithm.	30
Module -3: **Module -4:**	**Module -2: BDST 118: Computational Mathematics –II** **2.1** Construction of Discrete frequency distribution. **2.2** Construction of continuous Frequency distribution. **2.3** Graphical and diagrammatical representation. **2.4** Compute Mean, Median, Mode and quartile for Individual data. **2.5** Compute Mean, Median, Mode and quartile for discrete frequency distribution. **2.6** Compute Mean, Median, Mode and quartile for continuous frequency distribution. **2.7** Compute Range, S.D., variance and its relative measures for Individual data. **2.8** Compute Range, S.D., variance and its relative measures for Discrete and Continuous frequency distribution. **2.9** Correlation (for ungrouped data) **2.10** Regression (for ungrouped data)	30

Reference Books:-

1) S. Lipschutz and M. Lipson, Computational Mathematics I, Schaum's Outlines Series, Tata
2) McGraw Hill, 2017.
3) C. L. Liu and D. P. Mohapatra, Elements of Discrete Mathematics, 4th edition, McGraw
4) Hill Education, 2017.
5) N. L. Biggs, Computational Mathematics I, 2nd edition, Oxford University Press, 2013.
6) R. Johnsonbaugh, Computational Mathematics I, 8th edition, Pearson, 2013.
7) R. M. Somasundaram, Discrete Mathematical Structures, PHI Learning Pvt. Ltd., 2003.
8) K. H. Rosen, Discrete Mathematics and its Application, McGraw Hill, 2002.
9) Susanna S., Discrete Mathematics with Applications, PWS Publishing Company, 1995

Evaluation Pattern:	
Total Marks: 50	
Journal and Students Performance Viva (10 M) • Journal: 5 marks • Student's Performance: 5marks	**Practical Exam Paper (40 M):** • Question -1 Attempt any two question (20 M) (write Two questions of 10 marks out of three questions based on BDST117) • Question -2 Attempt any one question (20 M) • (write Two questions of 10 marks out of three questions based on BDST118)

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Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc	**Semester** - II
Type : Course I	**Marks:** 50
Credits : 2	**From:** A. Y. 2025-26

Name of the Course: BDST 121 Data Storage Technology

Course Objectives: Student should be able to learn…

1) To understand storage systems
2) To learn data storage technologies
3) To understand storage networking fundamentals
4) To acquaint learners with knowledge of how to secure storage infrastructure.

Course Outcomes:

1) Describe storage system architecture, its elements, and characteristics.
2) Compare intelligent storage systems and select one for a storage application.
3) Demonstrate storage virtualization using Xen or KVM
4) Demonstrate the functioning of SAN and NAS using open-source simulators.

Module	Title and Contents	Hrs
Module -1:	Module -1: Introduction to storage system **1.1** Introduction to Information Storage - Information Storage, **1.2** Functions and Importance of Data Storage , **1.3** Challenges to effective data storage , Data, Types of Data, **1.4** Big Data, Information, Storage, **1.5** Evolution of Storage Architecture.	6
Module -2:	Module -2: Data Center Infrastructure **2.1** Core Elements of a Data Center, **2.2** Key Characteristics of a Data Center, **2.3** managing a Data Center, Data Center Environment – Application, Storage, **2.4** Disk Drive Components, Disk Drive Performance, **2.5** Storage Design Based on Application, Introduction to Flash Drives.	8
Module -3:	Module -3: Intelligent Storage Systems and Virtualization **3.1** ISS- Front end, Cache, Back End, Physical disk, **3.2** Storage Provisioning- Traditional Storage Provisioning, **3.3** Comparison between Virtual and Traditional Storage Provisioning, **3.4** Types of Intelligent Storage Systems, High-End Storage Systems, **3.5** Server and Storage I/O Fundamentals- Server and I/O Architectures.	7
Module -4:	Module -4: Securing the Storage Infrastructure **4.1** Storage Hierarchy, Disk Storage Fundamentals, **4.2** Initiators and Targets, How write and read from a Storage Device, **4.3** Storage Sharing , Data Sharing, I/O Connectivity and Networking **4.4** Fundamentals, IT Clouds, Virtualization: Servers, Storage, and Networking, **4.5** Virtualization and Storage Services, Data and Storage Access	9

Reference Books:-

1) Prachi S. Deshpande (Author), Subhash C. Sharma (Author), Sateesh K. Peddoju ,"Security and Data Storage Aspect in Cloud Computing" (Studies in Big Data, 52) 1st ed. 2019 Edition, Springer, 2019
2) Gustavo Santana, Data Center Virtualization Fundamentals: Understanding Techniques and Designs for Highly Efficient Data Centers with Cisco Nexus, UCS, MDS, and Beyond, Cisco Press; 1 edition, 2013.
3) G. Somasundaram, Alok Shrivastava, Information Storage and Management, EMC Education Series, Wiley, Publishing Inc., 2011.
4) S. N. Piramanayagam (Editor), Tow C. Chong, "Developments in Data Storage: Materials Perspective" 1st Edition, Kindle Edition (2011)
5) Greg Schulz, "The Green and Virtual Data Center", CRC Press 1st Edition,2009.

<table>
<tr><td colspan="2">6) Ulf Troppens, Wolfgang Muller-Friedt, Rainer Erkens, and Nils Haustein "Storage Networks: The Complete Reference" Springer 1st Edition 2003
7) Richard Barker, Paul Massiglia, Wiley “Storage area network essentials” (2002)</td></tr>
<tr><td colspan="2">Evaluation Pattern:</td></tr>
<tr><td colspan="2">Total Marks: 50</td></tr>
<tr><td>Internal Continuous Evaluation (20Marks):

• CCE – I: 10 Marks: Objective
• CCE – II: 10 Marks: Objective
• Mid Semester Exam: 20 Marks: Subjective
on to 20 Marks</td><td>End Semester Examination (30 Marks):
• Question -1: Solve the following questions
(Five question of 2 Marks)
• Question -2: Attempt any two questions
(Three question of 10 Marks)
Question -3: Attempt any two questions
(Five question of 5 Marks)
• Note: Conversion of 50 marks of ESE evaluation to 30 Marks</td></tr>
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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc	**Semester** - II
Type : Course I	**Marks:** 50
Credits : 2	**From:** A. Y. 2025-26

Name of the Course: BDST 122 Relational Database Management System

Course Objectives: Student should be able to learn…

1) Develop a deep understanding of Relational Database concepts.
2) Master advanced SQL querying techniques.
3) Acquire skills for data modelling and efficient database design.
4) Familiarize with various Database Management Systems (DBMS).

Course Outcomes:

1) Ability to design and implement complex database schemas efficiently.
2) Proficiency in crafting advanced SQL queries, including sub queries and joins.
3) Skills to optimize database performance through indexing and query tuning.
4) Understanding of database security and access control mechanisms.

Module	Title and Contents	Hrs
Module -1:	**Module -1: Foundations of SQL and Database Design** **1.1** Introduction to Advanced Database Design, Understanding the importance of advanced database design, **1.2** Key principles of good database design, Review of SQL Basics, **1.3** Querying data with SELECT, JOIN, and WHERE, Data modification with INSERT, UPDATE, and DELETE , **1.4** Introduction to normalization and denormalization, normalization vs. denormalization **1.5** ,Advanced SQL Data Types-Date and time data types.	6
Module -2:	**Module -2: Advanced SQL Techniques and Performance Optimization** **2.1** Complex Queries and Subqueries-Subquery types: scalar, table, correlated, Using EXISTS and IN, Common table expressions (CTEs), **2.2** SQL Window Functions- Introduction to window functions, **2.3** PARTITION BY and ORDER BY clauses, Examples of ranking, aggregation, and analytic functions, **2.4** SQL Indexing and Performance-Index types: B-tree, hash, and bitmap, Query optimization and indexing strategies, Understanding execution plans, **2.5** Transactions and Concurrency Control-ACID properties and transactions, Locking and isolation levels, Deadlocks and transaction management	8
Module -3:	**Module -3: Advanced Database Design and Management** **3.1** Designing schemas for complex data structures, **3.2** Schema versioning and migration, Schema security and access control, **3.3** Unique and check constraints, Trigger creation and usage, **3.4** Cursor Creation PL Block ,real-world case studies, **3.5** Designing databases for specific industry domains, Lessons from successful database design projects	7
Module -4:	**Module -4: Database Management and Security** **4.1** Database encryption and data privacy, Access control and permissions, **4.2** Auditing and compliance, Peer and instructor evaluations Guidelines for the project, **4.3** Project proposal and topic selection, **4.4** Capstone Project Presentation and Evaluation, **4.5** Capstone Project Presentation and Evaluation	9

Reference Books:-

1) Lewis, Toby J. Mining the Social Web: Data Mining Facebook, Twitter, LinkedIn, Google+, GitHub, and More. O'Reilly Media, 2019.
2) Silberschatz, Abraham, Henry F. Korth, and S. Sudarshan. Database System Concepts. McGraw-Hill, 2019.
3) Elmasri, Ramez, and Shamkant B. Navathe. Fundamentals of Database Systems. Pearson, 2015.
4) Teorey, Toby J., Sam S. Lightstone, and Tom Nadeau. Database Modeling and Design: Logical Design. Morgan Kaufmann, 2011.
5) Garcia-Molina, Hector, Jeffrey D. Ullman, and Jennifer Widom. Database Systems: The Complete Book. Pearson, 2008.
6) Date, C. J. An Introduction to Database Systems. Addison-Wesley, 2003.
7) Ramakrishnan, Raghu, and Johannes Gehrke. Database Management Systems. McGraw-Hill, 2003.
8) Melton, Jim, and Alan R. Simon. SQL:1999 - Understanding Relational Language Components. Morgan Kaufmann, 2001.

Evaluation Pattern:

Total Marks: 50

Internal Continuous Evaluation (20Marks):	**End Semester Examination (30 Marks):**
• CCE – I: 10 Marks: Objective • CCE – II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective on to 20 Marks	• Question -1: Solve the following questions (Five question of 2 Marks) • Question -2: Attempt any two questions (Three question of 10 Marks) Question -3: Attempt any two questions (Five question of 5 Marks) • Note: Conversion of 50 marks of ESE evaluation to 30 Marks

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Programme: B.Sc	**Semester** - I
Type : Course I	**Marks:** 50
Credits : 2	**From:** A. Y. 2025-26

Name of the Course: BDSP 123 Practical I

Course Objectives: Student should be able to learn…

1) Fundamental concepts of Data Science.
2) Study basic principles of Data Science.
3) Develop skills for Data Management.
4) Think through the ethics surrounding privacy, data sharing.

Course Outcomes:

1) Explore the fundamental concepts of data science.
2) Understand data analysis techniques for applications handling large data.
3) Understand various machine learning algorithms used in data science process.
4) Visualize and present the inference using various tools.

Module	Title and Contents	Hrs
	Module -1: BDST 121: Data Storage Technology **1.1** Case study on Data Storage Technology**.** **1.2** Case Study on Data Center Management. **1.3** Case Study on issues in Data Center Management. **1.4** Case Study on Data Center Management in Banking System. **1.5** Case study on ISS. **1.6** Demonstration of Comparison between Virtual and Traditional Storage Provisioning. **1.7** Demonstration of Server and I/O Architectures. **1.8** Demonstration of Impact of Intelligent Storage Systems on Enterprise Data Management. **1.9** Demonstration of High-End Storage Systems in Data Centers. **1.10** Demonstration of IT Clouds.	30
	Module -2: BDST 122: Relational Database Management System **2.1** Installation of PG SQL. **2.2** To Perform operation on DDL & DML Commands. **2.3** To Perform operation on DISTINCT Statement, WHERE Clause, AND Operator, OR Operator, BETWEEN Operator. **2.4** To Perform operation on PRIMARY KEY, FOREIGN KEY. **2.5** To Perform operation on NULL Operator, NOT NULL Operator, NOT Operator, Aliases, CHECK Constraint. **2.6** To Perform operation on Aggregate Functions. **2.7** To Perform operation SQL LIKE Operator, Wildcard Characters, IN Operator. **2.8** To Perform Operation Joins **2.9** To Perform operation on UNION Operator, GROUP BY Statement, HAVING Clause. **2.10** To Perform operation on Sub query.	30

Reference Books:-

1) Lewis, Toby J. Mining the Social Web: Data Mining Facebook, Twitter, LinkedIn, Google+, GitHub, and More. O'Reilly Media, 2019.
2) Silberschatz, Abraham, Henry F. Korth, and S. Sudarshan. Database System Concepts. McGraw-Hill, 2019.
3) Elmasri, Ramez, and Shamkant B. Navathe. Fundamentals of Database Systems. Pearson, 2015.
4) Teorey, Toby J., Sam S. Lightstone, and Tom Nadeau. Database Modeling and Design: Logical Design. Morgan Kaufmann, 2011.
5) Garcia-Molina, Hector, Jeffrey D. Ullman, and Jennifer Widom. Database Systems: The Complete Book. Pearson, 2008.
6) Date, C. J. An Introduction to Database Systems. Addison-Wesley, 2003.
7) Ramakrishnan, Raghu, and Johannes Gehrke. Database Management Systems. McGraw-Hill, 2003.
8) Melton, Jim, and Alan R. Simon. SQL:1999 - Understanding Relational Language Components. Morgan Kaufmann, 2001.

Evaluation Pattern:

Total Marks: 50

Journal and Students Performance Viva (10 M)	**Practical Exam Paper (40 M):**
• Journal: 5 marks • Student's Performance: 5marks	• Question -1 Attempt any two question (20 M) (write Two questions of 10 marks out of three questions based on BDST121) • Question -2 Attempt any one question (20 M) • (write Two questions of 10 marks out of three questions based on BDST122)

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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc	**Semester** - II
Type : Course II	**Marks:** 50
Credits : 2	**From:** A. Y. 2025-26

Name of the Course: BDST 124 Web Development

Course Objectives: Student should be able to learn…

1) Understand the fundamental concepts of web development.
2) Understand principles of HTML & CSS.
3) Design website using HTML and CSS.
4) Understand HTML and HTML

Course Outcomes:

1) Understand basics of website and web development life cycle.
2) Design website using HTML and CSS.
3) Implement client side scripting for website development.
4) Understand importance and working of HTML.

Module	Title and Contents	Hrs
Module -1:	**Module -1: Fundamentals of Internet & Website** **1.1** Internet-Basics, Internet Protocols(HTTP,FTP,IP) , **1.2** World Wide Web(WWW),HTTP, DNS, IP Address, **1.3** Working of Website ,Web Browser, Web Server, **1.4** Types of Websites(Static and Dynamic Websites), **1.5** Web Development lifecycle ,Basics of web hosting.	6
Module -2:	**Module -2: Web Development Concepts** **2.1** Introduction to web development, **2.2** Application and programming language use for web development, **2.3** Benefits of web development, **2.4** Difference between HTML and HTML5.	8
Module -3:	**Module -3: HTML for Web Development** **3.1** Introduction to HTML, **3.2** History, and Features HTML tags & attributes, **3.3** HTML Form elements, **3.4** HTML Frameset, Limitations of HTML, **3.5** Basics of CSS, Syntax, HTML table creation.	7
Module -4:	**Module -4: CSS for Web Development** **4.1** Introduction to CSS, **4.2** Types of CSS, **4.3** Importance of CSS,CSS Selectors-Group, id, class, **4.4** CSS properties- Border, background, list, image, margins, **4.5** Advantages and limitations of CSS.	9

Reference Books:-

1) Complete HTML-Thomas Powell
2) HTML and JavaScript–Ivan Bayross
3) Javascript:The Complete Reference by ThomasPowell, FritzSchneider
4) Introducing HTML-BruceLawson,RemySharp
5) 5.HTML BlackBook- Steven Holzner
6) 6.HTML&CSS- Castro Elizabeth 7thEdition
7) 7.Web Development and Design Foundations with HTML- Terry A.Felke-Morris

Evaluation Pattern:

Total Marks: 50	
Internal Continuous Evaluation (20Marks): • CCE – I: 10 Marks: Objective • CCE – II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective on to 20 Marks	**End Semester Examination (30 Marks):** • Question -1: Solve the following questions (Five question of 2 Marks) • Question -2: Attempt any two questions (Three question of 10 Marks) Question -3: Attempt any two questions (Five question of 5 Marks) • Note: Conversion of 50 marks of ESE evaluation to 30 Marks

Karmaveer Bhaurao Patil University, Satara

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

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc	**Semester** - II
Type : Course II	**Marks:** 50
Credits : 2	**From:** A. Y. 2025-26

Name of the Course: BDST 125 Operating system concept

Course Objectives: Student should be able to learn…

1) Provide basic knowledge of computer operating system structures and functioning.
2) Compare several different approaches to memory management, file management and process management
3) Understand various problems related to concurrent operations and their solutions.
4) Understand the fundamental concepts of Operating System.

Course Outcomes:

1) Outline the basic concept of operating systems CO
2) Analyze the working of operating system CO
3) Examine the working of various scheduling/allocation approaches CO
4) Measure the performance of various scheduling/allocation approaches

Module	Title and Contents	Hrs
Module -1:	**Module -1: Operating system Concepts** **1.1** Definition, Types of Operating system, **1.2** Real-Time operating system, System Components- System Services, **1.3** Systems Calls, System Programs, System structure, **1.4** Virtual Machines, System Design and Implementation, **1.5** System Generations.	6
Module -2:	**Module -2: Processes and CPU Scheduling** **2.1** Process Concept, Process Scheduling, **2.2** Operation on process, Cooperating processes, **2.3** Threads, Inter-process Communication, Scheduling criteria, **2.4** scheduling Algorithms, Multiple-Processor Scheduling, **2.5** Real-Time Scheduling, Scheduling Algorithms and performance evaluation	8
Module -3:	**Module -3: Process Synchronization** **3.1** The critical-section problem, **3.2** Critical regions, **3.3** Synchronization Hardware, Semaphores, **3.4** Classical Problems of synchronization, and **3.5** Monitors Synchronizations in Solaris.	7
Module -4:	**Module -4: Memory Management** **4.1** Basic concept, Logical and Physical address map, **4.2** Memory allocation: Continuous Memory Allocation, **4.3** Fixed and variable partition, Internal and external fragmentation and compaction, **4.4** Paging: Principle of operation, Page allocation - Hardware support for paging, **4.5** Protection and sharing, Disadvantages of paging	9

Reference Books:-

1) Emmanuel Simeu ,Kosai Raoof Optimizing the performance of synchronization process Paperback – Illustrated, 7 June 2013
2) Francky Catthoor Custom Memory Management Methodology: Exploration of Memory Organisation for Embedded Multimedia System Design Hardcover – Illustrated, 30 September 1998
3) IRESH A. DHOTRE Introduction to Operating Systems for BE Anna University R21CBCS (IV - CSE / IT - CS3451) & Operating Systems for BE Anna University R21CBCS (IV - AI&DS / CS&BS - AL3452) Paperback – 25 December 2022
4) Abraham Silberschatz (Author), Peter Baer Galvin (Author), Greg Gagne (Author)Operating System Concepts:8th Edition Wiley Student Edition Paperback – 13 February 2009
5) Emmanuel Simeu (Author), Kosai Raoof (Author)Optimizing the performance of synchronization process

Evaluation Pattern:	
Total Marks: 50	
Internal Continuous Evaluation (20Marks): • CCE – I: 10 Marks: Objective • CCE – II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective on to 20 Marks	**End Semester Examination (30 Marks):** • Question -1: Solve the following questions (Five question of 2 Marks) • Question -2: Attempt any two questions (Three question of 10 Marks) Question -3: Attempt any two questions (Five question of 5 Marks) • Note: Conversion of 50 marks of ESE evaluation to 30 Marks

Karmaveer Bhaurao Patil University, Satara

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

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc	**Semester** - II
Type : Course II	**Marks:** 50
Credits : 2	**From:** A. Y. 2025-26

Name of the Course: BDSP 126 Practical II

Course Objectives: Student should be able to learn…

1) Provide basic knowledge of computer operating system structures and functioning.
2) Compare several different approaches to memory management, file management and process management
3) Understand various problems related to concurrent operations and their solutions.
4) Understand the fundamental concepts of Operating System.

Course Outcomes:

1) Outline the basic concept of operating systems CO
2) Analyze the working of operating system CO
3) Examine the working of various scheduling/allocation approaches CO
4) Measure the performance of various scheduling/allocation

Module	Title and Contents	Hrs
Module -1:	**Module -1: BDST 124: Web Development** **1.1** Design web page using heading and formatting tags in HTML **1.2** Design web page using tags-marquee, Image tags, hyperlink, list **1.3** Create Railway timetable using Table tag **1.4** Create HTML form for students registration **1.5** Create your class timetable using table tag. **1.6** Design a web page of your home town with an attractive background color, text color, an Image, font etc. (use internal CSS). **1.7** Use Inline CSS to format your resume that you created. **1.8** Use External CSS to format your class timetable as you created. **1.9** Use External, Internal, and Inline CSS to format college web page that you created. **1.10** Design a web page of your home town with a background color, text color, an Image, font etc. (use internal CSS).	30
Module -3:	**Module -3: BDST 125: Operating system concept** **2.1** To perform introduction to Ubuntu Linux operating system. **2.2** To perform how to install ubuntu. **2.3** To perform how to install Ubuntu Linux operating system in VMware step by step. **2.4** To perform how to use Ubuntu Linux operating system step by step. **2.5** To perform how to use Ubuntu Linux commands. **2.6** To perform how to fix repository in Ubuntu Linux and install any package. **2.7** To perform basic commands, editors, permission step by step. **2.8** To perform how to manage SSD services, disk, user, permission management. **2.9** To perform how to install and configure apache web server in ubuntu. **2.10** To perform file system hierarchy in ubuntu.	30

Reference Books:-

1) Emmanuel Simeu ,Kosai Raoof Optimizing the performance of synchronization process Paperback – Illustrated, 7 June 2013
2) Francky Catthoor Custom Memory Management Methodology: Exploration of Memory Organization for Embedded Multimedia System Design Hardcover – Illustrated, 30 September 1998
3) IRESH A. DHOTRE Introduction to Operating Systems for BE Anna University R21CBCS (IV - CSE / IT - CS3451) & Operating Systems for BE Anna University R21CBCS (IV - AI&DS / CS&BS - AL3452) Paperback – 25 December 2022

<table>
<tr><td colspan="2">4) Abraham Silberschatz (Author), Peter Baer Galvin (Author), Greg Gagne (Author)Operating System Concepts:8th Edition Wiley Student Edition Paperback – 13 February 2009
5) Emmanuel Simeu (Author), Kosai Raoof (Author)Optimizing the performance of synchronization process</td></tr>
<tr><td colspan="2">Evaluation Pattern:</td></tr>
<tr><td colspan="2">Total Marks: 50</td></tr>
<tr><td>Journal and Students Performance Viva (10 M)

• Journal: 5 marks
• Student’s Performance: 5marks</td><td>Practical Exam Paper (40 M):
• Question -1 Attempt any two question (20 M) (write Two questions of 10 marks out of three questions based on BDST124)
• Question -2 Attempt any one question (20 M) (write Two questions of 10 marks out of three questions based on BDST125)</td></tr>
</table>

Karmaveer Bhaurao Patil University, Satara

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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc	**Semester** - II
Type : Course III	**Marks:** 50
Credits : 2	**From:** A. Y. 2025-26

Name of the Course: BDST 127 Computational Mathematics - III

Course Objectives: Student should be able to learn…

1) Understand recursive techniques to count element of set and knowledge of set theory.
2) Solve simple application problems related to computer based on these.
3) Construct simple mathematical proofs and possess ability to verify them
4) Learn the concept of Divisibility of integers

Course Outcomes:

1) Apply logic when creating systems.
2) Demonstrate mathematical skills, analytical and critical thinking abilities.
3) Analyze the types of relations and function.
4) Measure the performance of various scheduling/allocation.

Module	Title and Contents	Hrs
Module -1:	**Module -1: Mathematical Logic** **1.1** Introduction, Definition: Statement (Proposition), Types of Statements: Simple and compound statements, **1.2** Truth values of a statement, Truth Tables and construction of truth tables, Logical Operations: Negation, Conjunction, Disjunction, **1.3** Implication, Double Implication, Equivalence of Logical statements, **1.4** Statement forms: Tautology, Contradiction, and Contingency, Laws of logic: Idempotent laws, Commutative laws, **1.5** Associative laws, Distributive laws, Complement laws, De Morgan's laws.	6
Module -2:	**Module -2: Set Theory** **2.1** Introduction, definition of set, subset, Methods of describing of a set: Tabular form, Set builder form, **2.2** Cardinality of set, types of set: Finite set, Infinite set, Empty set, Universal set, Equal sets, Disjoint sets, complementary set, **2.3** Operation on Sets: Union of sets, Intersection of sets, **2.4** Difference of sets, De Morgan's Laws, Cartesian product of two sets, **2.5** Properties of set operations: Commutative law, Associative law, Distributive law.	8
Module -3:	**Module -3: Function and Relation** **3.1** Introduction of function, Domain, **3.2** Codomain, Range of Function, Operation on function, **3.3** Definition of Relation, Reflexive relation, **3.4** Symmetric relation, Transitive relation, **3.5** Inverse Relation, Equivalence Relation, Identity Relation.	7
Module -4:	**Module -4: Divisibility of integers** **4.1** Introduction, Divisibility Definition and Properties, **4.2** Division algorithm. Greatest common Divisor (GCD), **4.3** Least common multiple (LCM), **4.4** Prime number Euclidean algorithm **4.5** Fundamental thermos of Arithmetic (Statement).	9

Reference Books:-

1) S.R. Patil and others "A text book of Discrete mathematics" (India : NIRALI Prakashan .2008).
2) Oscar Levin, Discrete Mathematics – An Open Introduction (Greekly University of Northen Colorado Press,2013).
3) Gaisi Takeuti,SAML (2018), "Advances in Mathematical Logic by professor ".

4) S.C. Malik and Savita Arora, "Mathematical Analysis (Fifth Edition)", New Age International (P) Limited, 2017(UNIT I, II, III, IV).
5) Davender Malik, "Discrete Mathematics (India: Indian Binding House, 2009), Unit 1: 226-262, Unit 3: 413-442, Unit 4:263-291".
6) Ken Levasseur, Al Doerr, "Applied Discrete Structures (Pearson Education, Inc. 2012), Unit 1: 20-33, Unit 2: 100-133, Unit 3:343-361, Unit 4:149-159".
7) U.Langote, "Discrete Mathematics (Pune: Tech-Max Publications, 2009), Unit 1: 6.1-7.3 , Unit 2: 8.1-9.5 , Unit 3:10.1-10.4".

Evaluation Pattern:

Total Marks: 50

Internal Continuous Evaluation (20Marks):	**End Semester Examination (30 Marks):**
• CCE – I: 10 Marks: Objective • CCE – II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective on to 20 Marks	• Question -1: Solve the following questions (Five question of 2 Marks) • Question -2: Attempt any two questions (Three question of 10 Marks) Question -3: Attempt any two questions (Five question of 5 Marks) • Note: Conversion of 50 marks of ESE evaluation to 30 Marks

Karmaveer Bhaurao Patil University, Satara

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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc	**Semester** - II
Type : Course III	**Marks:** 50
Credits : 2	**From:** A. Y. 2025-26

Name of the Course: BDST 128 Computational Mathematics - IV

Course Objectives: Student should be able to learn…

1) Understand the fundamental concepts of probability theory, including experiments, sample spaces, and event types.
2) Develop the essential skills to understanding of discrete random variables and key probability distributions.
3) Learn techniques for analyzing time series data and identifying its components.
4) Familiarize students with hypothesis testing and the interpretation of p-values.

Course Outcomes:

1) Define and distinguish between different types of events and apply probability definitions.
2) Identify, calculate, and interpret discrete random variables and probability distributions.
3) Analyze time series data and apply methods for measuring trends and variations.
4) Formulate and test hypotheses, interpret errors, and conduct statistical tests.

Module	Title and Contents	Hrs
Module -1:	**Module -1: Probability** **1.1** Concepts of experiments and random experiments, Definitions: Sample space, Discrete sample space (finite and countably infinite), **1.2** Event, Elementary event, Compound event favorable event Definitions of Mutually exclusive events, **1.3** Exhaustive events, Impossible events, certain event. Power set $\|P(\Omega)\|$ Equally likely outcomes (events), **1.4** Apriori (classical) definition of probability of an event, Axiomatic definition of probability with reference to a finite and countably infinite sample space, **1.5** Definition of conditional probability of an event, Partition of sample space. Idea of Posteriori probability, Baye's theorem (Statement Only).	6
Module -2:	**Module -2: Probability Distributions** **2.1** Definition of discrete random variable, **2.2** Probability mass function (p.m.f.) and cumulative distribution function (c.d.f.) of a discrete random variable, **2.3** Properties of c.d.f. (statements only), **2.4** Probability distribution of function of random variable, **2.5** Introduction to Bernoulli, Binomial, Normal, Poisson, Negative Binomial, t, f,Chi-Square distribution.	8
Module -3:	**Module -3: Time Series Analysis** **3.1** Meaning and need of time series analysis, **3.2** components of times (i) Secular trend (ii) Seasonal Variation (iii) Cyclical Variation (iv) Irregular Variation, **3.3** Additive and Multiplicative model, **3.4** Utility of time series, **3.5** Measurement of trend: (i) Moving averages method (ii) Progressive average method (iii) Least square method. (iv) Measurement of seasonal indices by simple average method	7
Module -4:	**Module -4: Testing of Hypothesis** **4.1** Notion of Population, Sample, Parameter, Statistic, **4.2** Sampling distribution of Statistic, hypothesis, **4.3** Simple and composite hypothesis, Null and alternative hypothesis, **4.4** type I and type II errors, Critical region, **4.5** level of significance, pvalue.one and two tailed test, power of test.	9

Reference Books:-

1) Gupta, S.C., and V.K. Kapoor. Fundamentals of Mathematical Statistics. 11th ed. New Delhi: Sultan Chand & Sons, 2014.
2) T.C. Gupta. Fundamental of Statistics (7th Edition), Mumbai, Himalaya Publishing House, 2018.
3) B. L. Agarwal Basic Statistics (6th Edition), New Age International Private Ltd, Delhi, 2013.
4) Parimal Mukhopadhyaya, An Introduction to the Theory of Probability, World Scientific Publishing,2011 Veerarajan, T. Probability, Statistics, and Random Processes. 4th ed. New Delhi: Tata McGraw-Hill, 2008.
5) Chatfield, Chris. The Analysis of Time Series: An Introduction. 6th ed. Boca Raton: CRC Press, 2003.
6) A. M. Goon, M. K. Gupta, B. Das Gupta. Fundamentals of Statistics, The World Press Private Ltd., Calcutta, 1968.

Evaluation Pattern:

Total Marks: 50

Internal Continuous Evaluation (20Marks):	**End Semester Examination (30 Marks):**
• CCE – I: 10 Marks: Objective • CCE – II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective on to 20 Marks	• Question -1: Solve the following questions (Five question of 2 Marks) • Question -2: Attempt any two questions (Three question of 10 Marks) Question -3: Attempt any two questions (Five question of 5 Marks) • Note: Conversion of 50 marks of ESE evaluation to 30 Marks

Karmaveer Bhaurao Patil University, Satara

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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc	**Semester** - II
Type : Course III	**Marks:** 50
Credits : 2	**From:** A. Y. 2025-26

Name of the Course: BDSP 129 Practical III

Course Objectives: Student should be able to learn…

1) Learn the basic concepts of Computational Mathematics.
2) Understand the uses of Matrices in various fields
3) Learn the fundamental properties of matrices and their applications.
4) Learn the concept of Divisibility of integers.

Course Outcomes:

1) Define and distinguish between different types of events and apply probability definitions.
2) Identify, calculate, and interpret discrete random variables and probability distributions.
3) Analyze the types of relations and function.
4) Measure the performance of various scheduling/allocation

Module	Title and Contents	Hrs
Module -1:	**Module -1: Computational Mathematics-III** **1.1** Problems on Logical operation. **1.2** Laws of logic with an example. **1.3** Examples on Tautology, Contradiction, and Contingency. **1.4** De Morgan's law with an example. **1.5** Cartesian product of set and Difference of set with an example. **1.6** Example of Functions and Relation. **1.7** Greatest common divisor and Least common Multiplier with an **1.8** Example. **1.9** Examples of Operations and function. **1.10** Examples of Tautology, Contradiction and contingency.	30
Module -3:	**Module -3: Computational Mathematics-IV** **2.1** Computations of probabilities **2.2** Time Series-I Trend by Progressive averages **2.3** Time Series-II Trend by Moving average **2.4** Time Series-III Trend by least square methods **2.5** Tests based on t distribution **2.6** Test based on F distribution **2.7** Test based on Chi square distribution **2.8** Applications of Normal Distribution **2.9** Applications of Binomial Distribution **2.10** Large and small sample	30

Reference Books:-

1) Gupta, S.C., and V.K. Kapoor. Fundamentals of Mathematical Statistics. 11th ed. New Delhi: Sultan Chand & Sons, 2014.
2) T.C. Gupta. Fundamental of Statistics (7th Edition), Mumbai, Himalaya Publishing House, 2018.
3) B. L. Agarwal Basic Statistics (6th Edition), New Age International Private Ltd, Delhi, 2013.
4) Parimal Mukhopadhyaya, An Introduction to the Theory of Probability, World Scientific Publishing,2011 Veerarajan, T. Probability, Statistics, and Random Processes. 4th ed. New Delhi: Tata McGraw-Hill, 2008.
5) Chatfield, Chris. The Analysis of Time Series: An Introduction. 6th ed. Boca Raton: CRC Press, 2003.
6) A. M. Goon, M. K. Gupta, B. Das Gupta. Fundamentals of Statistics, The World Press Private Ltd., Calcutta, 1968.

Evaluation Pattern:	
Total Marks: 50	
Journal and Students Performance Viva (10 M) • Journal: 5 marks • Student's Performance: 5marks	**Practical Exam Paper (40 M):** • Question -1 Attempt any two question (20 M) (write Two questions of 10 marks out of three questions based on BDST127) • Question -2 Attempt any one question (20 M) (write Two questions of 10 marks out of three questions based on BDST128)

Karmaveer Bhaurao Patil University, Satara

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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computer Science

Programme: B.Sc	**Semester** - II
Type : VEC	**Marks:** 50
Credits : 2	**From:** A. Y. 2025-26

Name of the Course: BDSTVEC I Democracy, Election and Indian Constitution

Course Objectives: Student should be able to learn…

1) Introduce the meaning of democracy and it's important.
2) Understand the election procedure in India.
3) Introduce the Philosophy of Constitution of India.
4) Learn the Fundamental Rights and Duties.

Course Outcomes:

1) Explain the meaning of democracy and it's important.
2) Examine critically election process in the country.
3) Explain the Philosophy of Constitution of India.
4) Define the Fundamental Rights and Duties.

Module	Title and Contents	Hrs
Module -1:	**Module -1: Democracy in India** **1.1** Introduction: Meaning, Definition of democracy **1.2** Classification: Direct democracy and representative democracy, **1.3** features of direct and representative democracy **1.4** Dimensions of Democracy: Social, **1.5** Economic and Political Decentralization: Grassroots Level Democracy	6
Module -2:	**Module -2: Election** **2.1** 73rd and 74th Constitutional Amendment Acts: Institutions at the local level and Role of State Election commission, **2.2** Local Body Elections: Urban & Rural, **2.3** Duties of an Individual towards electoral process	8
Module -3:	**Module -3: Philosophy Of The Indian Constitution** **3.1** Constitutional History of India, Role of Dr. B.R. Ambedkar in Constituent Assembly **3.2** Preamble - Source and Objects, Sovereign and Republic, Socialist and Secular **3.3** Democratic - Social and Economic Democracy, Justice - Social, Economic and Political **3.4** Liberty - Thought, Expression, Belief, Faith and Worship, Equality - Status and Opportunity **3.5** Fraternity, Human Dignity, Unity and Integrity of the Nation	7
Module -4:	**Module -4: Testing of Hypothesis** **4.1** Right to equality, Right to freedoms, Right against exploitation **4.2** Right to freedom of religion, Cultural and educational rights, Right to constitutional remedies **4.3** Duty to abide by the Constitution, Duty to cherish and follow the noble ideals, Duty· to defend the country and render national service **4.4** Duty to value and preserve the rich heritage of our composite culture, Duty to develop scientific temper, humanism, the spirit of inquiry & reform **4.5** Duty to safeguard public property and abjure violence, Duty to strive towards excellence	9

Reference Books:-

1) D. D. Basu, Introduction to the Constitution of India, LexisNexis
2) Granville Austin, The Constitution of India: Cornerstone of a Nation, Oxford University Press
3) Subhash Kashyap, Our Constitution, National Book Trust
4) M.P. Jain, Indian Constitutional Law, LexisNexis
5) V.N.Shukla, Constitution of India, Eastern Book Company
6) P.M. Bakshi, The Constitution of India, Universal Law Publishing
7) M.V.Pylee, Constitutional Government in India, S. Chand

Evaluation Pattern:

Total Marks: 50

Internal Continuous Evaluation (20Marks):	**End Semester Examination (30 Marks):**
• CCE – I: 10 Marks: Objective • CCE – II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective on to 20 Marks	• Question -1: Solve the following questions (Five question of 2 Marks) • Question -2: Attempt any two questions (Three question of 10 Marks) Question -3: Attempt any two questions (Five question of 5 Marks) • Note: Conversion of 50 marks of ESE evaluation to 30 Marks