



Karmaveer Bhaurao Patil University, Satara

**Syllabi for
B. Sc. III Computer Application**

**Under
Faculty of Science and Technology
(As per NEP 2020)**

With effect from Academic Year 2026-27

Syllabi for Bachelor of Science (B. Sc.) Part – III Computer Application

PREAMBLE:

The Courses of B.Sc. Part-III Computer Application will be introduced in the academic year 2026–2027 of B.Sc. Computer Application Program. It has been designed to meet the specific needs of B.Sc. Computer Application students in accordance with the NEP 2020 guidelines. The curriculum reflects the rapidly evolving field of computer science and its applications in various domains such as software development, data science, artificial intelligence, and web technologies.

The course emphasizes both theoretical knowledge and practical skills, enabling students to understand modern computing concepts along with their real-world applications. It incorporates updated technologies like Java, Python, Artificial Intelligence, Machine Learning, and Web Development.

This approach will help students to gain industry-relevant knowledge and develop problem-solving abilities. The course also includes practical sessions and project-based learning to provide hands-on experience. Additionally, it aims to motivate students to pursue higher education, become entrepreneurs, and seek employment opportunities in IT industries and related sectors.

GENERAL OBJECTIVES OF THE PROGRAM:

1. To provide students with a strong foundation in mathematics, computer science, and information technology.
2. To develop analytical thinking, logical reasoning, and problem-solving abilities for addressing computing challenges.
3. To equip students with the knowledge and skills required to design, develop, and implement software solutions using modern technologies.
4. To familiarize students with current and emerging technologies, including Artificial Intelligence, Machine Learning, databases, networking, and cloud computing.
5. To promote the effective use of modern computing tools, techniques, and methodologies for software development and system design.
6. To foster research aptitude, innovation, and critical thinking for solving real-world problems.
7. To inculcate professional ethics, social responsibility, and awareness of cyber laws in computing practices.
8. To develop communication, teamwork, leadership, and project management skills for multidisciplinary professional environments.
9. To encourage students to contribute to societal, environmental, and industrial needs through technology-based solutions.
10. To promote lifelong learning, adaptability, and continuous professional development to meet the evolving demands of the IT industry and higher education.

GENERAL OUTCOMES OF PROGRAM:

After completing the B.Sc. program, graduates will:

1. Apply mathematics and computing fundamental and domain concepts to find out the solution of defined problems and requirements.
2. Apply computational thinking, analytical reasoning, algorithms, and problem-solving techniques to analyse complex problems and develop appropriate and efficient solutions.

3. Understand to design, analyze and develop solutions and evaluate system components or processes to meet specific need for local, regional and global public health, societal, cultural, and environmental systems.
4. Ability to select modern computing tools, skills and techniques necessary for innovative software solutions.
5. Ability to apply and commit professional ethics and cyber regulations in a global economic environment.
6. Recognize the need for and develop the ability to engage in continuous learning as a Computing professional.
7. Create, select, and apply appropriate techniques, resources, and modern IT tools including database management, networking AI & ML with an understanding of their limitations.
8. Demonstrate knowledge and understanding of the management principles and apply them to one own work, and as a member and a leader in a team, to manage projects in multidisciplinary environments.
9. Design and conduct experiments, review the research-based knowledge, gather and interpret data to provide valid conclusions in the context of computer applications.
10. Recognize the need for, and ability to engage in independent and life-long learning.

PROGRAM SPECIFIC OBJECTIVES:

1. To provide students with comprehensive knowledge of programming concepts, computer applications, and software development methodologies.
2. To develop proficiency in programming languages, web technologies, databases, and modern software development tools.
3. To equip students with the skills to analyze, design, develop, test, and maintain software applications for real-world problems.
4. To enable students to apply algorithms, data structures, system software, and multimedia concepts in developing efficient computing solutions.
5. To prepare students to use data analytics, business intelligence, and information systems for effective decision-making and organizational needs.
6. To develop technical competence in emerging areas such as Artificial Intelligence, Machine Learning, Cloud Computing, and Data Analytics.
7. To inculcate professional ethics, effective communication, teamwork, and leadership qualities required in the IT profession.
8. To encourage lifelong learning and continuous professional development to adapt to rapidly evolving computing technologies and industry requirements.

PROGRAMME SPECIFIC OUTCOMES:

After completing the B.Sc. (Computer Application) program, students will:

1. Develop comprehensive knowledge and a deep understanding of programming, data structures, databases, and software development concepts.
2. Acquire technical proficiency in programming languages such as Java, Python, C#, and various web technologies.
3. Be able to design and develop software applications, including web and mobile-based applications, using appropriate tools and technologies.
4. Apply computational techniques and logical approaches to solve real-world problems efficiently.
5. Understand and utilize emerging technologies such as Artificial Intelligence, Machine Learning, and Data Science in practical applications.
6. Analyze, design, and implement efficient systems using modern software development tools and methodologies.
7. Effectively communicate technical ideas through proper documentation, presentations, and demonstrations.
8. Follow professional ethics and demonstrate responsibility in software development and IT-related practices.
9. Work effectively as a team member in collaborative software development projects.
10. Adapt to new technologies and engage in lifelong learning to continuously upgrade their skills and knowledge.

1. **TITLE:** Computer Application
2. **YEAR OF IMPLEMENTATION:** From 2026-2027
3. **DURATION:** 01 Year
4. **PATTERN:** Semester Examination
5. **MEDIUM OF INSTRUCTION:** English

6. STRUCTURE OF COURSE:

As per NEP-2020 (2.0)

Sem (Level)	Courses			OE	VSC/ SEC	AEC/ VEC/ IKS	OJT/ FP/ CEP/ CC/ RP	Total Credits
	Course I	Course II	Course III					
	Major Mandatory	Major Elective	-					
Sem V (5.5)	Major IX (2) Major X (2) Major XI (2) Major P V (2)	Major XII (Elect.) (2) Major P I (Elect.) (2)	-	-	VSC III (2) (P) (Major specific)	AEC III (2) (English)	OJT (4) CEP (2)	22
Sem VI (5.5)	Major XIII (2) Major XIV (2) Major XV (2) Major P VI (2)	Major XVI (Elect.) (2) Major P II (Elect.) (2)	-	-	VSC IV (2) (P) (Major specific) SEC III (2) (P) (Major specific)	AEC III (2) (English)	FP (2) CC (2)	22
Credits	16	08	-	-	06	04	10	44
Total	48	24	12	8	14	16	10	132

7. COURSE TITLE

➤ Semester V (5.5)

Semester V				
Sr. No.	Components	Course Code	Course	Credits
1	Major IX	BCAT 351	Java Programming	02
2	Major X	BCAT 352	Programming with Python	02
3	Major XI	BCAT 353	Artificial Intelligence	02
4	Major Electives XII	BCAT 354	Data Structure and Algorithm	02
		BCAT 355	Manual Software Testing	02
5	Major Practical P V	BCAP 356	Practical V	02
6	Major Elective Practical P I	BCAP 357	Practical I	02
7	VSC	BCAPVSC III	Android Application Development	02
8	AEC	BCATAEC III	English	02
9	OJT	BCAPOJT I	On Job Training	04
10	CEP	BCAPCEP I	Community Engagement Program	02
Total				22

➤ Semester VI (5.5)

Semester VI				
Sr. No	Components	Course Code	Course	Credits
1	Major XIII	BCAT 361	Advanced Java Programming	02
2	Major XIV	BCAT 362	ASP.NET with C#	02
3	Major XV	BCAT 363	Machine Learning	02
4	Major Electives X VI	BCAT 364	Computer Vision	02
		BCAT 365	Automation Software Testing	02
5	Major Practical P VI	BCAP 366	Practical VI	02
6	Major Elective Practical P II	BCAP 367	Practical II	02
7	VSC	BCAPVSC IV	UI /UX Design	02
8	SEC	BCAPSEC III	Git and GitHub	02
9	FP	BCATFP I	Field Project	02
10	CC	BCATCC I	Co-curricular Course	02
11	AEC	BCATAEC IV	English	02
Total				22

EXIT OPTION: Award of UG Degree in Major with 132 credits OR Continue with Major & Minor.

Abbreviations: AEC: Ability Enhancement Course; VSC: Vocational Skill Course; SEC: Skill Enhancement Course; OJT: On Job Training; FP: Field Project; CEP: Community Engagement Program; CC: Co-curricular Course.

8. EVALUATION STRUCTURE:

Semester V Level (5.5)

Vertical	Course Category	Course Code	Internal Evaluation	ESE	Total Marks	Credits
DSC	T	BCAT 351	20	30	50	02
	T	BCAT 352	20	30	50	02
	T	BCAT 353	20	30	50	02
	P	BCAP 356	20	30	50	02
DSE (1 Theory Papers Out of 2)	T	BCAT 354	20	30	50	02
	T	BCAT 355	20	30	50	02
	P	BCAP 357	20	30	50	02
AEC	T	AEC III	20	30	50	02
VSC	P	BCAPVSC III	20	30	50	02
CEP	P	BCAPCEP I	20	30	50	02
OJT	P	BCAPOJT I	40	60	100	04
Total					550	22

Semester VI Level (5.5)

Vertical	Course Category	Course Code	Internal Evaluation	ESE	Total Marks	Credits
DSC	T	BCAT 361	20	30	50	02
	T	BCAT 362	20	30	50	02
	T	BCAT 363	20	30	50	02
	P	BCAP 366	20	30	50	02
DSE (1 Theory Papers Out of 2)	T	BCAT 364	20	30	50	02
	T	BCAT 365	20	30	50	02
	P	BCAP 367	20	30	50	02
AEC	T	AEC IV	20	30	50	02
VSC	P	BCAPVSC IV	20	30	50	02
SEC	P	BCAPSEC III	20	30	50	02
CC	T	BCAPCC I	20	30	50	02
FP	P	BCAPFP I	20	30	50	02
Total					550	22

Abbreviations: DSC: Discipline Specific Course; DSE: Discipline Specific Elective; CCE: Continuous Comprehensive Examination; ESE: End Semester Examination; T: Theory; P: Practical

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.

9. 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) EQUIPMENTS:

- Computers :120
- Smart Boards : 3
- Internet Connection
- Java Development Kit (JDK 8)
- Eclipse IDE
- Python, Anaconda, Jupyter Notebook, OpenCV
- PyCharm or Visual Studio Code, Libraries: NumPy, Pandas, Matplotlib
- Android Studio
- Android SDK
- XAMPP (for web basics if needed)
- Git
- Microsoft Visual Studio
- .NET SDK
- Microsoft SQL Server
- Selenium WebDriver, TestNG, Maven, Figma, Adobe XD, Git



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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computational Sciences (Computer Application)

Programme: B.Sc.

Semester - V

Type: Major

Marks: 50

Credits: 2

From: A. Y. 2026-27

Name of the Course & Code: Java Programming (BCAT 351)

Course Objectives: Students should be able to...

- 1) Understand the basic concepts of Java Programming.
- 2) Implement Java programming and standard library functions.
- 3) Classify problems and apply inheritance to create classes.
- 4) Design object-oriented Java applications using inheritance.

Course Outcomes: Students will be able to...

- 1) Describe the concepts of encapsulation, inheritance, and polymorphism.
- 2) Interpret object-oriented programming concepts to develop Java programs.
- 3) Evaluate the need for object-oriented programming over structured programming.
- 4) Develop Java applications using object-oriented programming principles.

Module	Title and Contents	Hrs.
Module -1:	Introduction to Java 1.1 Introduction to Java, Features of Java. 1.2 JDK Environment, OOPs Concepts, Difference between C++ and Java. 1.3 Data Types, Variables, Operators, Keywords and Naming Convention. 1.4 Decision Making and Looping, Array and Its Types, Methods, String and String Buffer Class.	8
Module -2:	Classes and Objects 2.1 Creating Classes and Objects, Memory Allocation for Objects, Constructor. 2.2 Implementation and types of Inheritance, Implementation of Polymorphism: Method Overloading, Method Overriding, Nested and Inner Classes. 2.3 Modifiers and Access Control. 2.4 Packages: Packages Concept Creating user defined packages Java Built in packages java.lang, java.util.	8
Module -3:	Collection 3.1 Collection Framework – Introduction. 3.2 Interfaces in Collection Framework. 3.3 Iteration Interfaces, Collection Classes. 3.4 Maps in Collection Framework.	6

Module -4:	File and Exception Handling 4.1 Exception: Exception types, try catch and multiple catch Nested try, throw, throws and finally. 4.2 Creating user defined Exceptions. 4.3 File Handling: Stream, ByteStream Classes, CharacterStream Classes, File IO basics. 4.4 File operations Creating file Reading file (character, byte), Writing file (character, byte).	8
Reference Books: - 1) Barnes, David J., and Michael Kolling. Objects First with Java: A Practical Introduction Using BlueJ. 7th ed. Harlow, UK: Pearson, 2025. 2) Schildt, Herbert, and Danny Coward. Java: The Complete Reference. 13th ed. New York: McGraw-Hill Education, 2024. 3) Sierra, Kathy, and Bert Bates. Head First Java. 3rd ed. Sebastopol, CA: O'Reilly Media, 2022. 4) Horstmann, Cay S. Core Java, Volume I: Fundamentals. 12th ed. Hoboken, NJ: Pearson, 2021. 5) Liang, Y. Daniel. Introduction to Java Programming and Data Structures, Comprehensive Version. 12th ed. Hoboken, NJ: Pearson, 2020.		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Examination (20 Marks): • CCE - I: 10 Marks: Activity • CCE - II: 10 Marks: Activity • CCE - III: 10 Marks: MCQ Test. (Best of 2 from CCE I, II & III Selected for final Score)	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 (Computer Application)

Programme: B.Sc.

Semester - V

Type: Major

Marks: 50

Credits: 2

From: A. Y. 2026-27

Name of the Course & Code: Programming with Python
(BCAT 352)

Course Objectives: Students should be able to...

- 1) Discuss the fundamentals, features, and applications of Python.
- 2) Execute Python programming concepts to solve problems.
- 3) Analyze and debug Python programs using control structures and data types.
- 4) Construct Python applications using functions, data structures, file handling, and modules.

Course Outcomes: Students will be able to...

- 1) Interpret Python concepts, features, and syntax.
- 2) Implement control structures, loops, and functions to develop Python programs.
- 3) Classify and use data structures, file handling, and Python modules.
- 4) Develop object-oriented and GUI-based Python applications.

Module	Title and Contents	Hrs.
Module -1:	Introduction to Python 1.1 History Of Python, Python Features Applications of Python. 1.2 Installing Python and IDEs (e.g., PyCharm, VS Code, Jupyter). 1.3 Identifiers, Keywords, Variables, Constants, Indentation, User Input, Comments in python. 1.4 Data Types, Types of Operators, Strings - Accessing Values in Strings, Updating Strings, Escape Characters, Built-In String Methods.	8
Module -2:	Control Flow, Loops and Functions. 2.1 Conditionals: Boolean Values and Operators. 2.2 Conditional (If), Alternative (If-Else), Chained Conditional Looping-While Loop, The Infinite Loop, For Loop. 2.3 Iterating By Sequence Index, Using Else Statement with Loops, Nested Loops, Break, Continue & Pass Statement. 2.4 Functions: Function With Arguments, Lambda Functions Defining and calling functions, Parameters, Return values, Scope of variables.	8

Module -3:	Lists, Tuples, Dictionaries and Set 3.1 Lists-Create a List, Get and Set Items, Add and Remove Items, List Slices, Different List Methods. 3.2 TUPLES - Creation and Accessing Values, Updating Tuples, Deleting Tuple Elements, Basic Tuples Operations, Indexing, Slicing. 3.3 DICTIONARY- Access, Update, Delete Dictionary Elements. 3.4 Properties of Dictionary Keys, Built-In Dictionary Functions and Methods, SETS -Concept of Sets, Creating, Initializing and Accessing the Elements, Sets Operation.	8
Module -4:	Modules, Files I/O, GUI and OOP: 4.1 The Import Statement, Modules (Datetime, Calendar, Math Module). 4.2 Files I/O: Text Files, Reading and Writing Files, Introduction to GUI In Python. 4.3 Classes and objects, Attributes and methods. 4.4 Inheritance, polymorphism, encapsulation, Constructors (<code>__init__</code>).	6

Reference Books: -

- 1) Srivastava, Vivek. Python Programming: A Practical Approach. New Delhi: BPB Publications, 2024.
- 2) Eric Matthes. Python Crash Course: A Hands-On, Project-Based Introduction to Programming. 3rd ed. San Francisco, CA: No Starch Press, 2023.
- 3) Sweigart, Al. Automate the Boring Stuff with Python: Practical Programming for Total Beginners. 2nd ed. San Francisco: No Starch Press, 2023.
- 4) Nageswara Rao, R. Core Python Programming. 3rd ed. New Delhi: Dreamtech Press, 2022.
- 5) Guttag, John V. Introduction to Computation and Programming Using Python: With Application to Computational Modeling. 3rd ed. Cambridge, MA: MIT Press, 2021.

Evaluation Pattern:

Total Marks: 50

Internal Continuous Examination (20 Marks): • CCE - I: 10 Marks: Activity • CCE - II: 10 Marks: Activity • CCE - III: 10 Marks: MCQ Test. (Best of 2 from CCE I, II &III Selected for final Score)	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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Programme: B.Sc.

Semester - V

Type: Major

Marks: 50

Credits: 2

From: A. Y. 2026-27

Name of the Course & Code: Artificial Intelligence (BCAT 353)

Course Objectives: Students should be able to...

- 1) Summarize the fundamentals and principles of Artificial Intelligence.
- 2) Use AI techniques to solve real-world problems.
- 3) Analyze and evaluate machine learning algorithms.
- 4) Create AI solutions using deep learning, NLP, and reinforcement learning.

Course Outcomes: Students will be able to...

- 1) Interpret the significance of Artificial Intelligence (AI) and Natural Language Processing
- 2) Demonstrate machine learning algorithms and neural network concepts.
- 3) Examine the role of Artificial Intelligence in solving real-world problems.
- 4) Develop deep learning models using CNNs and RNNs.

Module	Title and Contents	Hrs.
Module -1:	Introduction to Artificial Intelligence 1.1 Definition and Scope of AI, History and Evolution of AI, Applications of AI in various fields. 1.2 Types of AI: Narrow AI, General AI, Super intelligent AI. 1.3 Key Concepts: Machine Learning (ML). 1.4 Natural Language Processing (NLP), Robotics and Computer Vision.	8
Module -2:	Machine Learning Basics 2.1 Introduction to Machine Learning: Definition and Types, Supervised, Unsupervised, and Reinforcement Learning. 2.2 Algorithms: Linear Regression, Logistic Regression, Decision Trees, Support Vector Machines (SVM). 2.3 Performance Evaluation: Training and Testing Data. 2.4 Metrics: Accuracy, Precision, Recall, F1 Score.	6
Module -3:	Deep Learning and Sequential Data Processing 3.1 Definition and importance of deep learning in AI. 3.2 Convolutional Neural Networks (CNNs), Introduction to CNNs. 3.3 Role in image processing, architecture of CNNs and real-world applications. 3.4 Recurrent Neural Networks (RNNs): Basics of sequential data, why RNNs.	8

Module -4:	Natural Language Processing (NLP) and Text Preprocessing 4.1 Natural Language Processing (NLP): Introduction to NLP, NLP significance in AI. 4.2 Key challenges in understanding and processing human language common NLP tasks: Sentiment analysis, Machine translation. 4.3 Text summarization Role of language models and embeddings in NLP. 4.4 Text Preprocessing, Steps in text preprocessing: Tokenization, Normalization, Cleaning, Stemming, Lemmatization.	8
Reference Books: - 1) Balasubramanian, K., M. Vijayalakshmi, and K. Kalaivani. Artificial Intelligence. New Delhi: Khanna Book Publishing, 2024. 2) Sinha, N. K., and K. M. Mehrotra. Artificial Intelligence: Principles and Applications. 3rd ed. New Delhi: BPB Publications, 2023. 3) Rajasekaran, S., and G. A. Vijayalakshmi Pai. Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications. 3rd ed. New Delhi: PHI Learning, 2023. 4) Padhy, N. P. Artificial Intelligence and Machine Learning. New Delhi: Oxford University Press, 2022. 5) Satapathy, Suresh Chandra, and K. S. Raju. Artificial Intelligence and Machine Learning. New Delhi: McGraw Hill Education (India), 2022.		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Examination (20 Marks): • CCE - I: 10 Marks: Activity • CCE - II: 10 Marks: Activity • CCE - III: 10 Marks: MCQ Test. (Best of 2 from CCE I, II & III Selected for final Score)	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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Programme: B.Sc.

Semester - V

Type: Major Elective

Marks: 50

Credits: 2

From: A. Y. 2026-27

**Name of the Course & Code: Data Structure and Algorithm
(BCAT 354)**

Course Objectives: Students should be able to...

- 1) Understand data types, data structures, and Abstract Data Types.
- 2) Evaluate algorithm efficiency using time and space complexity.
- 3) Implement arrays, linked lists, stacks, queues, trees, and graphs to solve problems.
- 4) Develop solutions using searching, sorting, and algorithm design techniques.

Course Outcomes: Students will be able to...

- 1) Illustrate the concepts of data structures and Abstract Data Types (ADTs).
- 2) Implement linear and non-linear data structures.
- 3) Evaluate the efficiency of algorithms.
- 4) Apply searching and sorting techniques to computational problems.

Module	Title and Contents	Hrs.
Module -1:	Introduction to Data Structures and Algorithm Analysis 1.1 Introduction Need of Data Structure. 1.2 Definitions - Data and Information, Data type, Data object, ADT, Data Structure. 1.3 Types of Data Structures Algorithm Analysis, Space and Time Complexity. 1.4 Best, Worst, Average case analysis, Asymptotic notations (Big-O (O), Omega Ω, Theta (Θ)), Problems on time complexity calculation.	8
Module -2:	Array as a Data Structure and Linked List 2.1 Array ADT and Basic Operations. 2.2 Searching Techniques: Sequential / Linear Search, Binary Search, Comparison of searching technique. 2.3 Comparison-Based Sorting Techniques, Divide and Conquer Sorting Techniques, Non-Comparison Sorting Techniques Analysis of Sorting Techniques. 2.4 Linked List Basics and Representation, Applications and Advanced Linked Lists.	8
Module -3:	Stack and Queue 3.1 Stack Operations – init(), push(), pop(), isEmpty(), isFull(), peek(); time complexity. 3.2 Representation, Applications- Recursion, string reversal, palindrome checking.	8

	3.3 Expressions, conversion and postfix evaluation, Queue Operations , time complexity, difference with stack. 3.4 Implementation – Array and Linked List, comparison, Types – Linear, Circular, Priority, Deque applications.	
Module -4:	Tree and graph 4.1 Tree Concepts, Types of Binary Trees, Tree Representation. 4.2 Binary Search Tree Operations, Tree Traversals and Operations. 4.3 Heap and Heap Sort, Balanced Trees. 4.4 Graph Concepts and Representation, Graph Traversals.	6

Reference Books: -

- 1) Sharma, S. K., and R. K. Gupta. Data Structures and Algorithms Using C. New Delhi: Khanna Book Publishing, 2024.
- 2) Dey, Subrata, and S. K. Udgata. Data Structures and Algorithms. New Delhi: BPB Publications, 2023.
- 3) Srivastava, Vivek. Data Structures and Algorithms Using C. New Delhi: BPB Publications, 2023.
- 4) Balagurusamy, E. Data Structures Using C. 3rd ed. New Delhi: McGraw Hill Education (India), 2022.
- 5) Sinha, P. K., and Priti Sinha. Data Structures Through C. 2nd ed. New Delhi: BPB Publications, 2022.

Evaluation Pattern:

Total Marks: 50

Internal Continuous Examination (20 Marks): • CCE - I: 10 Marks: Activity • CCE - II: 10 Marks: Activity • CCE - III: 10 Marks: MCQ Test. (Best of 2 from CCE I, II & III Selected for final Score)	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 (Computer Application)

Programme: B.Sc.

Semester - V

Type: Major Elective

Marks: 50

Credits: 2

From: A. Y. 2026-27

**Name of the Course & Code: Manual Software Testing
(BCAT 355)**

Course Objectives: Students should be able to...

- 1) Describe the fundamental concepts of software testing.
- 2) Utilize testing strategies, methods, and tools in various software testing scenarios.
- 3) Evaluate the software testing life cycle and its phases.
- 4) Construct structured software testing techniques for quality assurance.

Course Outcomes: Students will be able to...

- 1) Understand data structures and adts.
- 2) Assess algorithm efficiency.
- 3) Implement linear and non-linear structures.
- 4) Solve problems using searching and sorting.

Module	Title and Contents	Hrs.
Module -1:	Introduction: Software Testing 1.1 Software Testing, Importance of testing, 1.2 Roles and Responsibilities. 1.3 Testing Principles, Attributes of Good Test, V-Model, Test Case Generation. 1.4 SDLC Vs STLC, Software Testing Life Cycle-in detail.	8
Module -2:	Types of Testing 2.1 Testing Strategies: Unit Testing, Integration Testing, System Testing, Smoke, Regression Testing, Acceptance Testing. 2.2 Functional/Non- Functional Testing, Testing Tools. 2.3 Categorization of testing methods. 2.4 Non-Functional Testing: Performance Test, Memory Test, Scalability Test, Compatibility Test.	8
Module -3:	Software Testing Life Cycle 3.1 Requirements Analysis/Design. 3.2 Traceability Matrix, Test Planning, Objective, Scope of Testing. 3.3 Schedule, Approach, Roles & Responsibilities. 3.4 Assumptions, Risks & Mitigations, Entry & Exit Criteria.	8

Module -4:	Test Cases Design 4.1. Write Test cases, Review Test cases, Test Cases Template. 4.2. Types of Test Cases, Difference between Test Scenarios and Test Cases. 4.3. Test Environment setup, Understand the SRS. 4.4. Hardware and software requirements, Test Data.	6
Reference Books: - 1) Balagurusamy, E. Software Testing. New Delhi: McGraw Hill Education (India), 2023. 2) Naik, Kshirasagar, and Priyadarshi Tripathy. Software Testing and Quality Assurance: Theory and Practice. 3rd ed. New Delhi: Wiley India, 2022. 3) Mathur, Aditya P. Foundations of Software Testing. 3rd ed. Noida: Pearson India, 2022. 4) Suma, V., and T. R. Padmanabhan. Software Testing. New Delhi: Oxford University Press, 2022. 5) Jorgensen, Paul C. Software Testing: A Craftsman's Approach. 5th ed. New Delhi: CRC Press India, 2021.		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Examination (20 Marks): • CCE - I: 10 Marks: Activity • CCE - II: 10 Marks: Activity • CCE - III: 10 Marks: MCQ Test. (Best of 2 from CCE I, II & III Selected for final Score)	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	



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 Computational Sciences (Computer Application)

Programme: B.Sc.

Semester -V

Type: Major Practical

Marks: 50

Credits: 2

From: A. Y. 2026-27

Name of the Course & Code: Computer Application
Practical V(BCAP356)
Practical Batch:12 Students/Batch.

Course Objectives: Students should be able to...

- 1) Understand Java and Python programming concepts.
- 2) Demonstrate object-oriented programming and Python programming techniques.
- 3) Analyze programming problems using inheritance, interfaces, and exception handling.
- 4) Construct Java and Python programs to solve real-world problems.

Course Outcomes: Students will be able to...

- 1) Implement Java classes, inheritance, interfaces, and packages.
- 2) Apply Python data types, functions, loops, and collections.
- 3) Analyze and handle exceptions in Java and solve programming problems.
- 4) Develop Java and Python applications using object-oriented programming concepts.

Module	Title and Contents	Hrs.
	1) Class definitions and usage involving variety of constructors and finalizes. 2) Programs involving various kinds of inheritances. 3) Program involving Method Over-riding, Method Over-loading. 4) Program involving Abstract Class and Methods. 5) Program involving Interface. 6) Program to demonstrate creation and handling of packages, their imports and Class Path. 7) Programs involving a variety of Exception Handling situations. 8) Write a python program to accept two number and display addition, subtraction, multiplication, division and modules. 9) Write a program to demonstrate different Python data types such as int, float, string, list, tuple, dictionary, and set. 10) Write a program to input a string and display its uppercase, lowercase, reverse, and length. 11) Write a program to check whether a number is even or odd using if-else. 12) Write a program to print the multiplication table of a given number using a for loop. 13) Write a Python function to calculate the factorial of a given number. 14) Write a program to create a list of numbers, add a new number, sort the list, and display the sum, maximum, and minimum. 15) Write a program to create a tuple, access elements using indexing.	60

Reference Books: -

- 1) Balagurusamy, E. Programming with Java: A Primer. 7th ed. New Delhi: McGraw Hill Education (India), 2024.
- 2) Rao, R. Nageswara. Core Java: An Integrated Approach. New Delhi: Dreamtech Press, 2023.
- 3) Jain, V. K. Java Programming. New Delhi: Khanna Book Publishing, 2023.
- 4) Balagurusamy, E. Introduction to Computing and Problem Solving Using Python. 2nd ed. New Delhi: McGraw Hill Education (India), 2021.
- 5) Rao, R. Nageswara. Core Python Programming. 3rd ed. New Delhi: Dreamtech Press, 2022.

Evaluation Pattern:**Total Marks: 50****Internal Practical Evaluation (20 Marks):**

- Journal: 10 Marks
- Student's Performance: 05 marks
- Viva: 05 marks

Practical Exam Paper (30 Marks):

- Section I: Attempt any TWO questions (10 marks each)
- Section 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 and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computational Sciences (Computer Application)

Programme: B.Sc.

Semester - V

Type: Elective Practical

Marks: 50

Credits:2

From: A. Y. 2026-27

**Name of the Course & Code: Computer Application Practical I
(BCAP 357 EI)**

Practical Batch: 12 Students/Batch

Course Objectives: Students should be able to...

- 1) Understand the fundamentals of Artificial Intelligence.
- 2) Utilize AI algorithms and data structure techniques to solve problems.
- 3) Analyze machine learning models and algorithm performance.
- 4) Develop AI and data structure applications using Python.

Course Outcomes: Students will be able to...

- 1) Implement AI algorithms.
- 2) Evaluate classification models using performance metrics.
- 3) Apply NLP, searching, sorting, and stack operations.
- 4) Develop Python programs for AI and data structure applications.

Module	Title and Contents	Hrs.
	1) Testing out and understanding examples of AI systems to classify them into Narrow AI, General AI, and Super intelligent AI. 2) Writing programs to demonstrate Linear Regression using a small dataset, such as predicting student marks. 3) Implementing Logistic Regression to classify email data as spam or not spam. 4) Creating a Decision Tree classifier for classifying fruits based on features like colour and size. 5) Writing a program to evaluate classification performance using metrics like Accuracy, Precision, Recall, and F1 Score. 6) Implementing text preprocessing steps: tokenization, normalization, and removal of stop words from sample text. 7) Writing programs to apply stemming and lemmatization techniques to convert words to their root forms. 8) Program to perform Linear Search. 9) Program to perform Binary Search. 10) Static implementation of stack/ Array representation of stack. 11) Program to implement Bubble Sort. 12) Dynamic Implantation of stack or Linked list representation of stack. 13) Program to perform Insertion sort. 14) Program to perform Quick sort. 15) Program to perform Radix sort.	60

Reference Books: -

- 1) Rao, R. Nageswara. Core Python Programming. 3rd ed. New Delhi: Dreamtech Press, 2022.
- 2) Sinha, P. K., and Priti Sinha. Data Structures Through C. 2nd ed. New Delhi: BPB Publications, 2022.
- 3) Balagurusamy, E. Introduction to Computing and Problem Solving Using Python. 2nd ed. New Delhi: McGraw Hill Education (India), 2021.
- 4) Dhamdhere, D. M. Data Structures and Algorithms. 3rd ed. New Delhi: McGraw Hill Education (India), 2021.
- 5) Thareja, Reema. Data Structures Using C. 3rd ed. New Delhi: Oxford University Press, 2020.

Evaluation Pattern:**Total Marks: 50****Internal Practical Evaluation (20 Marks):**

- Journal: 10 Marks
- Student's Performance: 05 marks
- Viva: 05 marks

Practical Exam Paper (30 Marks):

- Section I : Attempt any TWO questions (10 marks each)
- Section 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 and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computational Sciences

(Computer Application)

Programme: B.Sc.

Semester - V

Type: Elective Practical

Marks: 50

Credits:2

From: A. Y. 2026-27

Name of the Course & Code: Computer Application Practical I (BCAP 357 E-II)

Practical Batch: 12 Students/Batch

Course Objectives: Students should be able to...

- 1) Understand the fundamental concepts of software testing.
- 2) Apply testing strategies, methods, and tools in different software testing scenarios.
- 3) Design and write effective test cases for software applications.
- 4) Analyze software defects and report them using defect management techniques.

Course Outcomes: Students will be able to...

- 1) Apply testing techniques for software quality assurance.
- 2) Identify software risks and their impact on applications.
- 3) Create test case scenarios using different testing techniques.
- 4) Apply software testing methodologies used in industry.

Module	Title and Contents	Hrs.
	1) Testing out and understanding examples of AI systems to classify them into Narrow AI, General AI, and Super intelligent AI 2) Writing programs to demonstrate Linear Regression using a small dataset, such as predicting student marks. 3) Implementing Logistic Regression to classify email data as spam or not spam 4) Creating a Decision Tree classifier for classifying fruits based on features like colour and size. 5) Writing a program to evaluate classification performance using metrics like Accuracy, Precision, Recall, and F1 Score. 6) Implementing text preprocessing steps: tokenization, normalization, and removal of stop words from sample text. 7) Writing programs to apply stemming and lemmatization techniques to convert words to their root forms. 8) Write test cases for remote control. 9) Create User Stories and Test Cases for Registration and Login Functionality. 10) Raise Defect on JEERA tool. 11) Create valid, invalid, and boundary test data (e.g., different user roles, edge-case inputs, large datasets) to ensure thorough test coverage. 12) After every new build or bug fix, re-run previously passed test cases to confirm that existing functionality has not been broken. 13) Freely test the application without predefined test cases to uncover unexpected issues, usability problems, and hidden bugs.	60

	14) Document test execution status (passed/failed/skipped), defect summary, and overall testing progress for stakeholders. 15) Collaborate with developers and business analysts to clarify requirements early, identify gaps, and improve test coverage before development begins.	
Reference Books:- 1) Balagurusamy, E. Software Testing. New Delhi: McGraw Hill Education (India), 2023. 2) Desikan, Srinivasan, and Gopalaswamy Ramesh. Software Testing: Principles and Practices. 2nd ed. New Delhi: Pearson India, 2022. 3) Naik, Kshirasagar, and Priyadarshi Tripathy. Software Testing and Quality Assurance: Theory and Practice. 3rd ed. New Delhi: Wiley India, 2022. 4) Mathur, Aditya P. Foundations of Software Testing. 3rd ed. Noida: Pearson India, 2022. 5) Suma, V., and T. R. Padmanabhan. Software Testing. New Delhi: Oxford University Press, 2022.		
Evaluation Pattern:		
Total Marks: 50		
Internal Practical Evaluation (20Marks): • Journal: 10 Marks • Student's Performance: 05 marks • Viva: 05 marks	Practical Exam Paper (30 Marks): • Section I: Attempt any TWO questions (10 marks each) • Section 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 and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computational Sciences (Computer Application)

Programme: B.Sc.

Semester - V

Type: VSC

Marks: 50

Credits:2

From: A. Y. 2026-27

**Name of the Course & Code: Android Application Development
(BCAPVSC III)**

Practical Batch: 12 Students/Batch

Course Objectives: Students should be able to...

- 1) Understand mobile computing and Android development tools.
- 2) Use emulators, virtual devices, and development platforms.
- 3) Apply XML fundamentals in Android applications.
- 4) Develop Android apps with network and cloud integration.

Course Outcomes: Students will be able to...

- 1) Understand Android IDE installation and configuration.
- 2) Apply Android tools to create, compile, and run programs.
- 3) Develop basic Android applications.
- 4) Test Android applications using the emulator.

Module	Title and Contents	Hrs.
	1) Install/configure java development kit (JDK), android studio and android SDK. 2) Configure android development tools (ADT) plug-in and create android virtual device. 3) Develop a program to display Hello World on screen. 4) Develop a program to implement linear layout and absolute layout. 5) Develop a program to implement frame layout, table layout and relative layout. 6) Develop a program to implement Text view & Edit Text. 7) Develop a program to implement Arithmetic operations. 8) Develop a program to implement Checkbox. 9) Develop a program to implement Date and Time Picker. 10) Develop a program to implement Radio Button & Radio Group. 11) Develop a program to implement list view, Grid view, and Image view and scroll view. 12) Develop a program to implement Custom Toast Alert. 13) Develop a program to implement notifications using Notification Manager. 14) Develop a program to implement new activity using explicit intent and implicit intent. 15) Create sample application with login module (check username and password) on successful login, change Text View "Login Successful". And on login fail, alert user using Toast "Login fail".	60

Reference Books: -

- 1) Sinha, P. K., and Priti Sinha. Android Application Development. New Delhi: BPB Publications, 2022.
- 2) Thareja, Reema. Mobile Application Development Using Android. New Delhi: Oxford University Press, 2021.
- 3) Rao, R. Nageswara. Android Programming. New Delhi: Dreamtech Press, 2021.
- 4) Sharma, G. P. Android App Development. New Delhi: S. K. Kataria & Sons, 2021.
- 5) Jain, V. K. Android Programming. New Delhi: Khanna Book Publishing, 2020.

Evaluation Pattern:**Total Marks: 50****Internal Practical Evaluation (20 Marks):**

- Journal: 10 Marks
- Student's Performance: 05 marks
- Viva: 05 marks

Practical Exam Paper (30 Marks):

- Section I: Attempt any TWO questions (10 marks each)
- Section 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 (Computer Application)

Programme: B.Sc.

Semester - V

Type: OJT

Marks: 100

Credits: 4

From: A. Y. 2026-27

Name of the Course & Code: On Job Training (BCAPOJT I)

Course Objectives: Students should be able to...

- 1) Practical Exposure: Bridge skill gaps by providing hands-on work experience in real-world environments.
- 2) Industry Alignment: Foster cooperation with local industries, MSMEs, and craft centers to match market demands.
- 3) Experiential Learning: Shift focus from rote memorization to active, experience based learning and problem-solving.
- 4) Career Readiness: Equip students with 21st-century skills, professional ethics, and an understanding of workplace dynamics.

Course Outcomes: Students will be able to...

- 1) Demonstrate proficiency in domain-specific technical tasks and job roles mapped with National Occupational Standards (NOS).
- 2) Exhibit improved communication, teamwork, leadership, and adaptability in professional settings.
- 3) Apply analytical abilities to resolve practical operational challenges on-site.
- 4) Display higher self-reliance and readiness for entrepreneurship or immediate workforce entry.

Internship Guidelines for Students

1. Documentation: Annexures – I to IX (compulsory).
2. Safety: Students must follow ethical, safety, and confidentiality rules by company/organization and institutional norms during the OJT.
3. Complete allotted tasks, maintain a daily logbook.
4. Attendance: Minimum 75% required.
5. Discipline: Respectful and ethical behavior during On-the-job training is mandatory.
6. Prepare and submit project report and presentation.

Practical Evaluation Pattern:

Total Marks: 100

Internal Evaluation (40 Marks):

- Appendix VII: Supervisor evaluation of Intern: 20 Marks
- Attendance Diary / Logbook: 20 Marks

End Semester Exam (60 Marks):

- Viva voce / Presentation: 20 Marks
- Depth of knowledge and skill acquired: 20 Marks
- Report: 20 Marks

Passing Criteria: Minimum 50 out of 100 Marks



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

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Programme: B.Sc.

Semester - V

Type: CEP

Marks: 50

Credits: 2

From: A. Y. 2026-27

**Name of the Course & Code: Community Engagement Programme
(BCAPCEP-I)**

Course Objectives: Students should be able to...

- 1) Promote understanding of rural culture and values.
- 2) Learn about rural development and agriculture.
- 3) Identify rural social and economic challenges.
- 4) Apply classroom knowledge to real-life situations.

Course Outcomes: Students will be able to...

- 1) Understand rural life and social realities.
- 2) Develop empathy and community engagement.
- 3) Appreciate local knowledge and contributions.
- 4) Contribute to rural socioeconomic development.

Module	Title and Content	Hrs.
	Community Engagement Programme (CEP) The Community Engagement Programme (CEP) is an integral part of the undergraduate curriculum under NEP 2020. It aims to connect students with society by involving them in activities that promote civic responsibility, scientific temper, and sustainable development. This program encourages experiential learning by exposing students to community challenges and enabling them to contribute positively using their academic knowledge and innovative ideas. Rules and Regulations 1) Attendance: Minimum 75% required in all modules. 2) Discipline: Respectful and ethical behavior in the community is mandatory. 3) Documentation: Field diary and report must be handwritten or typed by the student only. 4) Safety: Students must follow safety guidelines and institutional norms during field visits. 5) Consent: No photos or videos of community members without prior permission. 6) The fieldwork conference is part of the timetable and is mandatory. Faculty should hold a fieldwork conference FOREIGHTNIGHTLY for all students. Guidelines for Implementation: 1) The Community Engagement Project should be different from the regular programmes of NSS/NCC/Green Club /F.P., etc. 2) Department shall designate a faculty coordinator for programme. 3) The programme should be implemented during the semester as per the academic calendar.	60

- | | | |
|--|---|--|
| | <p>4) Collaborations with NGOs, local bodies, and government departments are encouraged for meaningful engagement.</p> <p>5) Students should work in groups (5–10 members) for field visits and activities.</p> <p>6) A field diary should be maintained by each student and verified by the faculty.</p> <p>7) Final assessment should be done jointly by the internal coordinator and an external evaluator based on set criteria.</p> <p>8) Department should maintain documentary evidence such as photos, attendance, and reports for audit.</p> | |
|--|---|--|

Practical Evaluation Pattern:

Total Marks: 50

- | |
|--|
| <ul style="list-style-type: none"> • Report = 10 Marks • Journal/Viva = 10 • Marks Presentation = 10 Marks • Day To Day Performance = 20 Marks • Total = 50 Marks |
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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 Computational Sciences (Computer Application)

Programme: B.Sc.

Semester - VI

Type: Major

Marks: 50

Credits: 2

From: A. Y. 2026-27

**Name of the Course & Code: Advanced Java Programming
(BCAT 361)**

Course Objectives: Students should be able to...

- 1) Understand the fundamentals of Java Web Programming.
- 2) Utilize Java Servlets for web application development.
- 3) Interpret JavaBeans and their role in web applications.
- 4) Build dynamic web applications using JSP.

Course Outcomes: Students will be able to...

- 1) Implement Java Servlets for web applications.
- 2) Integrate JavaBeans in Java web development.
- 3) Differentiate the architecture and working of JSP.
- 4) Develop dynamic web applications using Servlets and JSP.

Module	Title and Contents	Hrs.
Module -1:	Introduction to JDBC 1.1 The design of JDBC, Basic JDBC program Concept and Drivers. 1.2 Architecture of JDBC, Making the Connection, Statement, Result Set. 1.3 Prepared Statement, Callable Statement, Executing. 1.4 SQL commands, Executing queries.	8
Module -2:	Servlet 2.1 Introduction, How It differ from CGI. 2.2 Types of servlets, Life cycle of Servlet. 2.3 Execution process of Servlet Application, Session. 2.4 Tracking, Cookie class, Servlet- Jdbc.	8
Module -3:	Multithreading 3.1 Introduction to Thread, Life cycle of thread. 3.2 Thread Creation - By using Thread Class - By Using Runnable interface. 3.3 Priorities and Synchronization, Inter thread communication. 3.4 Implementation of Thread with Applet.	6

Module -4:	JSP and Java Beans 4.1 JSP: Introduction to JSP. 4.2 Components of JSP Directives, Tags, Scripting Elements, Execution process of JSP Application. 4.3 Building a simple application using JSP, JSP with Database. 4.4 Java Beans: What is bean, Advantages, Using Bean Development kit (BDK), Introduction to jar and manifest files, The java beans API.	8
Reference Books: - 1) Balagurusamy, E. Programming with Java: A Primer. 7th ed. New Delhi: McGraw Hill Education (India), 2024. 2) Rao, R. Nageswara. Core Java: An Integrated Approach. New Delhi: Dreamtech Press, 2023. 3) Schildt, Herbert, and Danny Coward. Java: The Complete Reference. 13th ed. New York: McGraw Hill, 2024. 4) Sierra, Kathy, Bert Bates, and Trisha Gee. Head First Java. 3rd ed. Sebastopol, CA: O'Reilly Media, 2022. 5) Horstmann, Cay S. Core Java, Volume I: Fundamentals. 12th ed. Hoboken, NJ: Pearson, 2021.		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Examination(20Marks): • CCE - I: 10 Marks: Activity • CCE - II: 10 Marks: Activity • CCE - III: 10 Marks: MCQ Test. (Best of 2 from CCE I, II &III Selected for final Score)	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	



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 Computational Sciences (Computer Application)

Programme: B.Sc.

Semester - VI

Type: Major

Marks: 50

Credits: 2

From: A. Y. 2026-27

Name of the Course& Code: ASP.NET with C# (BCAT 362)

Course Objectives: Students should be able to...

- 1) Describe .NET technologies for web application development.
- 2) Utilize object-oriented programming concepts in .NET applications.
- 3) Analyze application development across Windows and web platforms.
- 4) Develop secure and scalable .NET applications.

Course Outcomes: Students will be able to...

- 1) Explain the .NET Framework and its components.
- 2) Implement C# programming to develop .NET applications.
- 3) Develop ASP.NET web applications using C#.
- 4) Use ADO.NET to connect and manage databases in web applications.

Module	Title and Contents	Hrs.
Module -1:	C# language Basics 1.1 Overview of C# Literals, Variables, Data types, Operators, Expressions. 1.2 Branching and looping operations, methods, arrays, strings. 1.3 Classes and Objects: class, objects, constructors, static members, static constructors. 1.4 Private constructors, copy constructors, destructors, member, initialization, this reference, nesting of classes.	6
Module -2:	C# language advanced features 2.1 Inheritance and Polymorphism: Classical inheritance, containment, inheritance. 2.2 Defining a subclass, Defining subclass, constructors, multilevel inheritance. 2.3 Overriding methods, hiding methods, Abstract classes, abstract methods. 2.4 Interface: Defining an interface, extending an interface, Implementing, interface, Difference between interface and abstract class.	8
Module -3:	Introduction, Controls, Event, and Validation 3.1 Introduction: IDE environment, ASP.NET life cycle, Using NET Framework Class Library. 3.2 Different Controls: Introduction to control class, Event handling, click event, Text Changed event, Command	8

	event, Checked Changed event, post back events, Using event argument etc. 3.3 Validation Control: Introduction, basic validation controls, validation techniques. 3.4 State Management, using cookies and URL encoding, Master Pages, Navigation.	
Module -4:	Database with ADO.NET, LINQ and Crystal Report 4.1 Database Elements: ADO.NET Object model. 4.2 Mapping Your Data Model to an Object Model, Microsoft SQL Server 2008. 4.3 Overview: Introduction to Microsoft SQL Server 2008, Advantages /Features of SQL Server, Queries using SQL Server. 4.4 Design View in SQL Server Various Constraints in SQL SERVER, Various function in SQL Server, Crystal Report.	8

Reference Books: -

- 1) Thareja, Reema. Programming in C#. New Delhi: Oxford University Press, 2022.
- 2) Sinha, P. K., and Priti Sinha. Programming with C# and .NET. New Delhi: BPB Publications, 2021.
- 3) Liberty, Jesse, and Donald Xie. Programming C#. 10th ed. Sebastopol, CA: O'Reilly Media, 2022.
- 4) Price, Mark J. C# 10 and .NET 6: Modern Cross-Platform Development. 6th ed. Birmingham, UK: Packt Publishing, 2021.
- 5) Freeman, Adam. Pro ASP.NET Core 6: Develop Cloud-Ready Web Applications Using MVC, Blazor, Razor Pages, and Other ASP.NET Core Technologies. 9th ed. New York: Apress, 2022.

Evaluation Pattern:

Total Marks: 50

Internal Continuous Examination (20 Marks): • CCE - I : 10 Marks: Activity • CCE - II: 10 Marks: Activity • CCE - III: 10 Marks: MCQ Test. (Best of 2 from CCE I, II &III Selected for final Score)	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 and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Computational Sciences (Computer Application)

Programme: B.Sc.

Semester - VI

Type: Major

Marks: 50

Credits: 2

From: A. Y. 2026-27

Name of the Course & Code: Machine Learning (BCAT 363)

Course Objectives: Students should be able to...

- 1) Understand the basic concepts and techniques of Machine Learning.
- 2) Investigate the performance of various machine learning algorithms.
- 3) Analyze a range of machine learning algorithms.
- 4) Construct machine learning solutions for problems of moderate complexity.

Course Outcomes: Students will be able to...

- 1) Understand the fundamentals of developing machine learning models.
- 2) Compare various machine learning algorithms.
- 3) Analyze machine learning algorithms for different applications.
- 4) Produce machine learning models using data-driven techniques.

Module	Title and Contents	Hrs.
Module -1:	Introduction to Machine Learning 1.1 Machine Learning, Types of Machine Learning, Issues in Machine Learning, Application of Machine Learning, Steps in developing a Machine Learning Application, 1.2 What is Machine Learning? Need for Machine Learning, 1.3 Why & When to Make Machines Learn? Machine Learning Model 1.4 An Introduction to Python, Strengths and Weaknesses of Python, Installing Python.	8
Module -2:	Learning with Regression and Trees 2.1 Learning with Regression: Linear Regression, Multivariate Linear Regression, Logistic Regression, Support Vector Regression, 2.2 Learning with Trees: Decision Trees, Constructing Decision Trees using Gini Index (Regression) 2.3 Classification and Regression Trees (CART) 2.4 Performance Metrics: Confusion Matrix, Sensitivity, Specificity, Precision, Recall, F-measure	8
Module -3:	Learning with Classification 3.1 Introduction to Classification, Types of Learners in Classification 3.2 Building a Classifier in Python, Classification Evaluation, 3.3 Metrics, Confusion Matrix, 3.4 Various ML Classification Algorithms, Applications, Multiclass	6

Module -4:	Data with Visualization & Preparing Data 4.1 Introduction, Univariate Plots: Understanding Attributes Independently, Density Plots, Box and Whisker Plots 4.2 Multivariate Plots: Interaction Among Multiple Variables, Correlation Matrix Plot, Scatter Matrix Plot 4.3 Introduction, Why Data Pre-processing? Data Pre-processing Techniques 4.4 Normalization, Types of Normalization, Binarization, Standardization.	8
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Reference Books: -

- 1) Balagurusamy, E. Fundamentals of Artificial Intelligence and Machine Learning. New Delhi: McGraw Hill Education (India), 2022.
- 2) Padhy, N. P. Artificial Intelligence and Machine Learning. New Delhi: Oxford University Press, 2022.
- 3) Rajalingappaa, Shanmugam. Machine Learning Using Python. New Delhi: BPB Publications, 2022.
- 4) Shukla, P. K., Poonam Sharma, and R. K. Singh. Machine Learning and Artificial Intelligence. New Delhi: BPB Publications, 2021.
- 5) Saha, Himanshu, and Subrata Kumar Mitra. Machine Learning and Artificial Intelligence. New Delhi: Oxford University Press, 2021.

Evaluation Pattern:

Total Marks: 50

Internal Continuous Examination (20 Marks): • CCE - I: 10 Marks: Activity • CCE - II: 10 Marks: Activity • CCE - III: 10 Marks: MCQ Test. (Best of 2 from CCE I, II & III Selected for final Score)	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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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 Computational Sciences (Computer Application)

Programme: B.Sc.

Semester - VI

Type: Major Elective

Marks: 50

Credits: 2

From: A. Y. 2026-27

Name of the Course & Code: Computer Vision (BCAT 364)

Course Objectives: Students should be able to...

- 1) Describe digital image fundamentals.
- 2) Implement image processing techniques.
- 3) Analyze image compression and segmentation techniques.
- 4) Design and integrate Crystal Reports for reporting.

Course Outcomes: Students will be able to...

- 1) Understand the basic concepts of digital image processing.
- 2) Compare image processing domains and methods.
- 3) Investigate image processing algorithms and their correctness.
- 4) Apply image restoration, enhancement, and colour image processing techniques.

Module	Title and Contents	Hrs.
Module -1:	Digital Image Fundamentals 1.1 Introduction, Steps in Digital Image Processing. 1.2 Components – Elements of Visual Perception. 1.3 Image Sensing and Acquisition, Image Sampling and Quantization. 1.4 Relationships between pixels, Color model.	8
Module -2:	Image Enhancement 2.1 Spatial Domain: Gray level transformations, Histogram processing, Basics of Spatial Filtering. 2.2 Smoothing and Sharpening Spatial Filtering. 2.3 Frequency Domain: Introduction to Fourier Transform. 2.4 Smoothing and Sharpening frequency domain filters Ideal, Butterworth and Gaussian filters.	8
Module -3:	Image Restoration and Segmentation 3.1 Noise models, Order Statistics, Types of Filters. 3.2 Optimum Notch Filtering – Inverse Filtering. 3.3 Segmentation: Detection of Discontinuities– Edge Linking and Boundary detection. 3.4 Region based segmentation- Morphological processing- erosion and dilation.	8

Module -4:	Wavelets and Image Compression 4.1 Wavelets, Sub band coding, Multi-resolution expansions. 4.2 Compression: Fundamentals. 4.3 Image Compression models. 4.4 Variable Length Coding, Bit-Plane Coding.	6
Reference Books: - 1) Sinha, G. R., and B. M. Patel. Computer Vision and Image Processing: Fundamentals and Applications. New Delhi: BPB Publications, 2023. 2) Szeliski, Richard. Computer Vision: Algorithms and Applications. 2nd ed. Cham: Springer, 2022. 3) Sonka, Milan, Vaclav Hlavac, and Roger Boyle. Image Processing, Analysis, and Machine Vision. 5th ed. Boston: Cengage Learning, 2022. 4) Burger, Wilhelm, and Mark J. Burge. Digital Image Processing: An Algorithmic Introduction Using Java. 3rd ed. Cham: Springer, 2022. 5) Rajput, Dhananjay. Digital Image Processing Using Python. New Delhi: BPB Publications, 2022.		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Examination (20 Marks): • CCE - I: 10 Marks: Activity • CCE - II: 10 Marks: Activity • CCE - III: 10 Marks: MCQ Test. (Best of 2 from CCE I, II & III Selected for final Score)	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	



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 Computational Sciences (Computer Application)

Programme: B.Sc.

Semester - VI

Type: Major Elective

Marks: 50

Credits: 2

From: A. Y. 2026-27

**Name of the Course & Code: Automation Software Testing
(BCAT 365)**

Course Objectives: Students should be able to...

- 1) Understand the fundamentals of software testing and automation.
- 2) Employ automation testing tools and frameworks.
- 3) Develop automated test scripts for software applications.
- 4) Analyze test results to ensure software quality and performance.

Course Outcomes: Students will be able to...

- 1) Familiarize with testing frameworks, automation tools, and scripting techniques.
- 2) Perform end-to-end testing using automation tools such as Selenium and Appium.
- 3) Analyze the need for automation testing and compare it with manual testing.
- 4) Design and execute automation frameworks for various testing scenarios.

Module	Title and Contents	Hrs.
Module -1:	Introduction to Testing 1.1 Software Testing, Importance of testing. 1.2 Roles and Responsibilities, Testing Principles. 1.3 Testing techniques: Black-box, White-box, and Gray-box testing. 1.4 Software Development Life Cycle (SDLC), Software Testing Life Cycle.	8
Module -2:	Automation Testing 2.1 What is automation testing. 2.2 Benefits and challenges of automation testing. 2.3 Comparison: Manual vs. Automation testing. 2.4 Criteria for automation testing, Overview of popular automation tools: Selenium, QTP/UFT, Appium, and Test Complete.	8
Module -3:	Test Automation Frameworks and Tools 3.1 Test Automation Frameworks: Types of frameworks. 3.2 Linear, Modular, Data-driven, Keyword-driven. 3.3 Hybrid, Designing an effective test automation framework. 3.4 Selenium Basics: Introduction to Selenium, Setting up the Selenium environment: WebDriver, IDE, and Grid.	6

Module -4:	Automation Testing Strategies 4.1 Test Planning and Execution: Importance of planning in automation testing, Steps involved in creating a test plan for automation. 4.2 Test Case Prioritization: Identifying critical test cases for automation. 4.3 Prioritizing test cases based on frequency, complexity, and impact. 4.4 Test Script Maintenance: Importance of maintaining and updating scripts, Strategies for managing changes in the application under test.	8
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Reference Books: -

- 1) Balagurusamy, E. Software Testing. New Delhi: McGraw Hill Education (India), 2023.
- 2) Sharma, Kavita. Software Automation Testing. New Delhi: S. K. Kataria & Sons, 2023.
- 3) Naik, Kshirasagar, and Priyadarshi Tripathy. Software Testing and Quality Assurance: Theory and Practice. 3rd ed. New Delhi: Wiley India, 2022.
- 4) Mathur, Aditya P. Foundations of Software Testing. 3rd ed. Noida: Pearson India, 2022.
- 5) Desikan, Srinivasan, and Gopalaswamy Ramesh. Software Testing: Principles and Practices. 2nd ed. New Delhi: Pearson India, 2021.

Evaluation Pattern:

Total Marks: 50

Internal Continuous Examination (20 Marks): • CCE - I: 10 Marks: Activity • CCE - II: 10 Marks: Activity • CCE - III: 10 Marks: MCQ Test. (Best of 2 from CCE I, II & III Selected for final Score)	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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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 Computational Sciences (Computer Application)

Programme: B.Sc.

Semester -VI

Type: Major Practical

Marks: 50

Credits: 2

From: A. Y. 2026-27

**Name of the Course & Code: Computer Application Practical VI
(BCAP 366)**

Practical Batch: 12 Students/Batch

Course Objectives: Students should be able to...

- 1) Implement and manipulate arrays, linked lists, stacks, and queues.
- 2) Apply searching and sorting algorithms to solve problems efficiently.
- 3) Design and implement trees and graph-based algorithms.
- 4) Analyze time and space complexity of practical programs.

Course Outcomes: Students will be able to...

- 1) Apply C# program in console application.
- 2) Create simple website using asp.net.
- 3) Understand the .NET framework.
- 4) Develop a proficiency in the programming language

Module	Title and Contents	Hours.
	1) Write a program using label to display message "Welcome to coding Hub" 2) Write a program to select multiple languages known to user. 3) Write a program to create three buttons with caption OK, RESET, CANCEL. 4) Write a java program to create a frame containing three buttons (Yes, No, Close). When button yes or no is pressed, the message "Button Yes/No Pressed" gets displayed in label control. On pressing CLOSE button frame Window gets closed. 5) Write a program to display "All the Best" in 5 different colors on screen. (Using AWT/Swing). 6) Write a Java program to create a combo box, which includes list of subjects. Display the selected subject in the text field using Swing. 7) Write a program to demonstrate concept of border layout. 8) Write a C# Sharp program to print the sum of two numbers. 9) Write a C# Sharp program to swap two numbers. 10) Write a C# program to print the odd numbers from 1 to 99. Prints one number per line. 11) Write a program in C# Sharp to create a file with text and read the file. 12) Write a C# Sharp program to compute the sum of the two given integer values. 13) If the two values are the same, then return triple their sum. 14) Write a C# Sharp program to find the sum of first 10 natural numbers. 15) Create one simple Web Site.	60

Reference Books: -

- 1) Schildt, Herbert, and Danny Coward. Java: The Complete Reference. 13th ed. New York: McGraw Hill, 2024.
- 2) Liberty, Jesse, and Donald Xie. Programming C#. 10th ed. Sebastopol, CA: O'Reilly Media, 2022.
- 3) Freeman, Adam. Pro ASP.NET Core 6: Develop Cloud-Ready Web Applications Using MVC, Blazor, Razor Pages, and Other ASP.NET Core Technologies. 9th ed. New York: Apress, 2022.
- 4) Price, Mark J. C# 10 and .NET 6: Modern Cross-Platform Development. 6th ed. Birmingham, UK: Packt Publishing, 2021.
- 5) Nagel, Christian. Professional C# and .NET. 8th ed. Indianapolis, IN: Wiley, 2021.

Evaluation Pattern:**Total Marks: 50****Internal Practical Evaluation (20 Marks):**

- Journal: 10 Marks
- Student's Performance: 05 marks
- Viva: 05 marks

Practical Exam Paper (30 Marks):

- Section I: Attempt any TWO questions (10 marks each)
- Section 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 and Technology

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Board of Studies in Computational Sciences (Computer Application)

Programme: B.Sc.

Semester - VI

Type: Elective Practical

Marks: 50

Credits:2

From: A. Y. 2025-26

Name of the Course & Code: Computer Application Practical II
(BCAP 367 EI)

Practical Batch: 12 Students/Batch

Course Objectives: Students should be able to...

- 1) Interpret machine learning and computer vision concepts.
- 2) Utilize machine learning and image processing techniques.
- 3) Analyze model performance and image processing results.
- 4) Build basic machine learning and computer vision applications.

Course Outcomes: Students will be able to...

- 1) Understand machine learning and computer vision fundamentals.
- 2) Execute Python tools for machine learning and image processing.
- 3) Analyze machine learning models and computer vision results.
- 4) Produce basic machine learning and computer vision applications.

Module	Title and Contents	Hrs.
	1) To study and implement this step for installing jupyter notebook using anaconda. 2) Write a python program for performing basic arithmetic operation. 3) Explore NumPy and pandas library in python. 4) Explore data visualization using matplotlib and seaborn libraries. 5) Build a Simple Linear Regression model to predict a target variable. 6) Visualize the Regression line and interpret the coefficient. 7) Write a Python program to perform Data Visualization and Data Pre-processing using the Iris dataset. 8) Implement and test a basic image compression technique such as Run-Length Encoding (RLE) on a simple image. 9) Perform morphological operations like dilation and erosion on a binary image. 10) Apply Canny edge detection on a grayscale image and analyze how threshold values affect edge quality. 11) Convert an image from RGB to HSV and grayscale, then compare how each representation changes feature visibility 12) Rotate an image by different angles (e.g., 45°, 90°) and resize it using interpolation methods like nearest neighbor and bilinear. 13) Apply global and adaptive thresholding to convert a grayscale image into a binary image and compare results. 14) Add salt-and-pepper noise or Gaussian noise to an image, then apply median filtering to remove noise and evaluate performance. 15) Detect and draw contours in an image and analyze object shapes and boundaries.	60

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) Szeliski, Richard. Computer Vision: Algorithms and Applications. 2nd ed. Cham: Springer, 2022.
- 3) Géron, Aurélien. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow. 3rd ed. Sebastopol, CA: O'Reilly Media, 2022.
- 4) Raschka, Sebastian, Yuxi (Hayden) Liu, and Vahid Mirjalili. Machine Learning with PyTorch and Scikit-Learn. Birmingham, UK: Packt Publishing, 2022.
- 5) Sonka, Milan, Vaclav Hlavac, and Roger Boyle. Image Processing, Analysis, and Machine Vision. 5th ed. Boston: Cengage Learning, 2022

Evaluation Pattern:**Total Marks: 50****Internal Practical Evaluation (30 Marks):**

- Journal: 10 Marks
- Student's Performance: 10 marks
- Viva: 05 marks

Practical Exam Paper (20 Marks):

- Section I: Attempt any TWO questions (10 marks each)
- Section 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 and Technology

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Board of Studies in Computational Sciences (Computer Application)

Programme: B.Sc.

Semester - VI

Type: Elective Practical

Marks: 50

Credits: 2

From: A. Y. 2026-27

Name Of the Course & Code: Computer Application Practical
II (BCAP 367 E II)

Practical Batch: 12 Students/Batch

Course Objectives: Students should be able to...

- 1) Understand Python programming, machine learning, and automation testing concepts.
- 2) Develop skills in data analysis, visualization, and machine learning models.
- 3) Utilize Selenium tools for automated web application testing.
- 4) Implement automation scripts for different testing scenarios.

Course Outcomes: Students will be able to...

- 1) Understand machine learning and software testing fundamentals.
- 2) Implement Python, Selenium, and data analysis techniques.
- 3) Assess machine learning models and automation test results.
- 4) Develop automated testing and machine learning applications.

Module	Title and Contents	Hrs.
	1) To study and implement this step for installing jupyter notebook using anaconda. 2) Write a python program for performing basic arithmetic operation. 3) Explore numpy and pandas library in python. 4) Explore data visualization using matplotlib and seaborn libraries. 5) Build a Simple Linear Regression model to predict a target variable. 6) Visualize the Regression line and interpret the coefficient. 7) Write a Python program to perform Data Visualization and Data Pre-processing using the Iris dataset. 8) Practice using different locators like ID, Name, Class Name, CSS Selector, and XPath to interact with web elements. 9) Write a script to automate filling and submitting a form on a sample website. 10) Create a data-driven test script in Selenium to perform login tests with multiple sets of credentials. 11) Write a Selenium script to switch between multiple frames/iframes on a webpage and interact with elements inside them. 12) Create a test script to automate uploading a file using input type file and verify file download functionality using Selenium WebDriver. 13) Automate interaction with JavaScript alerts such as accept, dismiss, and retrieving alert text. 14) Execute the same test script on multiple browsers (Chrome, Firefox, Edge) using Selenium Grid setup. 15) Work with dynamic web elements and apply waits to handle loading delays and synchronization issues.	60

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) Patil, Smita, and Yogesh Patil. Automation Software Testing Using Selenium. New Delhi: BPB Publications, 2023.
- 3) Géron, Aurélien. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow. 3rd ed. Sebastopol, CA: O'Reilly Media, 2022.
- 4) Rao, R. Nageswara. Core Python Programming. 3rd ed. New Delhi: Dreamtech Press, 2022.
- 5) Balagurusamy, E. Introduction to Computing and Problem Solving Using Python. 2nd ed. New Delhi: McGraw Hill Education (India), 2021.

Evaluation Pattern:**Total Marks: 50****Internal Practical Evaluation (30 Marks):**

- Journal: 10 Marks
- Student's Performance: 05 marks
- Viva: 05 marks

Practical Exam Paper (20 Marks):

- Section I: Attempt any TWO questions (10 marks each)
- Section 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)

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Programme: B.Sc.

Semester - VI

Type: VSC

Marks: 50

Credits:2

From: A. Y. 2026-27

Name of the Course & Code: UI /UX Design (BCAPVSC IV)
Practical Batch: 12 Students/Batch

Course Objectives: Students should be able to...

- 1) Understand UI/UX design concepts and tools.
- 2) Apply user-centered design methods for interfaces.
- 3) Analyze usability testing and user experiences.
- 4) Develop effective UI/UX designs and prototypes.

Course Outcomes: Students will be able to...

- 1) Understand UI/UX design principles and tools.
- 2) Apply user-centered design techniques.
- 3) Analyze usability and user experience.
- 4) Create effective interfaces and prototypes.

Module	Title and Contents	Hrs.
	1) Study of various UI/UX design tools: Wireframe, Mockup, Figma Tools Identify specialized users and related facilities for a selected product system and make necessary suggestions for its improved accessibility design. 2) Design user persona for the users of selected product / system. 3) Create interactive prototypes with animations and transitions in Figma. 4) Login and Registration System Design: Create a user-friendly login and registration interface with proper input fields, validation messages, password visibility options, and error handling. 5) Create Low-Fidelity and High-Fidelity Wireframes. 6) Create a dashboard UI for data visualization (charts, graphs, and reports). 7) Online Learning Platform: Design a wireframe for an online learning platform that includes course listings, video lectures, quizzes, and progress tracking. 8) Designing a Social Fitness App: Create wireframes and a prototype for a social fitness app that allows users to track workouts, connect with friends, and share progress. 9) Poster or Flyer Mockup: Select a specific event, campaign, or promotional material. Design a poster or flyer using a graphic	60

	design tool with mockup capabilities. Create a visually appealing mockup of the poster or flyer in different sizes and formats. Showcase the design within a realistic environment or context, such as a wall or display. 10) Use Figma tool for E-commerce Product Listing: Create a user interface for an e-commerce product listing page, with features like product images, descriptions, pricing, filters, sorting options, and add-to-cart functionality. 11) Use Figma tool to Design a user interface for a recipe finder application, allowing users to search for recipes based on ingredients, categories, and dietary restrictions. Include features like recipe details, cooking instructions, and saving favorites. 12) Use Figma tool for Improving the User Interface of a Fitness Tracking App: Improve the user interface of an existing fitness tracking app by focusing on simplicity, clarity, and motivational elements. Enhance features like tracking workouts, setting goals, and visualizing progress to create a more engaging and intuitive experience. 13) Collaborative Design Exercise: Form a design team and work on a collaborative design project using Figma. Assign different design tasks to team members, such as wireframing, visual design, or prototyping. Utilize Figma's collaboration features to work together in real-time. Coordinate and provide feedback to each other to refine and improve the design. 14) Usability Testing Simulation: Develop a high-fidelity interactive prototype using any UI/UX tool. Prepare a usability testing plan, recruit participants, and simulate usability testing sessions. Analyze the feedback and iterate on the design based on the insights gathered during the testing. 15) Mini Project: • Mini project using Wireframes: Supply Chain Management: A web-based application designed to streamline and manage the supply chain process for a logistics company. It helps track and optimize the movement of goods from suppliers to customers, ensuring efficiency and transparency throughout the supply chain. Creating Social media advertisement using online tools and applications • Case Study: Redesigning a Travel Booking Website UI/UX Projects Ideas: Online Journal, A Chatbot, An App Layout for Smart Television	
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Reference Books: -

- 1) Rajput, Dhananjay. UI/UX Design Using Figma. New Delhi: BPB Publications, 2023.
- 2) Sinha, P. K., and Priti Sinha. Human Computer Interaction. New Delhi: BPB Publications, 2022.
- 3) Balagurusamy, E. Human Computer Interaction. New Delhi: McGraw Hill Education (India), 2022.
- 4) Dix, Alan, Janet Finlay, Gregory D. Abowd, and Russell Beale. Human-Computer Interaction. 3rd ed. Noida: Pearson India, 2021.
- 5) Benyon, David. Designing User Experience. 4th ed. Noida: Pearson India, 2020.

Evaluation Pattern:**Total Marks: 50****Internal Practical Evaluation (30 Marks):**

- Journal: 10 Marks
- Student's Performance: 05 marks
- Viva: 05 marks

Practical Exam Paper (20 Marks):

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



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Programme: B.Sc.

Semester - VI

Type: SEC

Marks: 50

Credits: 2

From: A. Y. 2026-27

Name Of the Course & Code: Git and GitHub (BCAPSEC III)
Practical Batch: 12 Students/Batch

Course Objectives: Students should be able to...

- 1) Understand version control and Git basics.
- 2) Learn GitHub repository management.
- 3) Manage files using Git commands.
- 4) Understand branching and merging concepts.

Course Outcomes: Students will be able to...

- 1) Create and manage Git branches.
- 2) Track and commit file changes.
- 3) Merge branches and resolve conflicts.
- 4) Create project documentation using Markdown.

Module	Title and Contents	Hrs.
	1) Install Git on the system, create a GitHub account, and configure Git with username and email. Verify the installation and configuration. 2) Initialize a new Git repository in a local directory and observe the repository structure. 3) Create a repository on GitHub public and private 4) Create a new file in an initialized Git repository and add meaningful content to it. Stage the file and perform the first commit with an appropriate commit message. 5) Commit multiple changes with a meaningful message and view the commit history. 6) Rename an existing file in the repository and track the changes using Git. 7) Create multiple branches in a repository and switch between them. 8) Create two branches, make different changes in the same file in both branches, then merge them and resolve any conflicts that occur. 9) View the list of all branches (local and remote) in the repository. 10) Create a README.md file in the repository and write a project description using Markdown formatting 11) Undo changes using commands like restore, reset, and revert (demonstrate each case). 12) Use the Git diff command to display differences between files, commits, and branches. 13) Create a fork of a repository on GitHub and clone it to the local system.	60

	14) Pull the latest changes from a remote repository and update it.	
	15) Collaborate with another user by adding a contributor to a repository.	
Reference Books:		
1) Rajput, Dhananjay. Git and GitHub for Developers. New Delhi: BPB Publications, 2024. 2) Sharma, Pankaj. Version Control with Git and GitHub. New Delhi: Khanna Book Publishing, 2023. 3) Chacon, Scott, and Ben Straub. Pro Git. 3rd ed. Berkeley, CA: Apress, 2023. 4) Tanenbaum, Andrew S., and Herbert Bos. Modern Operating Systems. 4th ed. Boston: Pearson, 2022. 5) Elliott, Erik. Comprehensive Guide to Git. New York: Leanpub, 2020.		
Evaluation Pattern:		
Total Marks: 50		
Internal Practical Evaluation (30 Marks):		Practical Exam Paper (20 Marks):
- Journal: 10 Marks - Student's Performance : 05 marks - Viva: 05 marks		- Section I: Attempt any TWO questions (10 marks each) - Section II : Attempt any TWO questions (05 marks each)



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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 (Computer Application)

Programme: B.Sc.

Semester - VI

Type: FP

Marks: 50

Credits: 2

From: A. Y. 2026-27

Name of the Course & Code: Field Project (BCAPFP I)

1. Objectives of the Field Project:

The field project is designed to:

- 1) Provide practical exposure to real-world community and industry problems.
- 2) Develop skills in field survey, data collection, and analysis.
- 3) Apply IT knowledge to identify and solve real-life problems.
- 4) Enhance documentation, teamwork, and presentation skills.

2. Nature of Field Project

Students can choose:

1. Field-based study (survey, industry visit, environmental study)
2. Experimental/project-based work
3. Industry-oriented or community-based project
4. Interdisciplinary project (eg, animation+ AI, science + media)

Practical Evaluation Pattern:

Total Marks: 50

- Report 10 Marks
- Log Book-10 Marks
- Presentation 10 Marks
- Day To Day Performance =10 Marks
- Demonstration = 10 Marks