



**Karmaveer Bhaurao Patil University,
Satara**

Syllabus for

B. Sc. III Computer Application

Under

Faculty of Science and Technology

(As per NEP 2020)

With effect from Academic Year 2025-2026

➤ Course Structure

Class	Level	Sem	DSC		DSE		VSC	FP	CEP	OJT	Total
			T	P	T	P					
B.Sc. III	5.5	V	4 (2 Theory Papers)	4 (2 Practical Papers)	4 (2 Theory Papers Out of Four)	2 (1 Practical Papers)	4 (1 Practical Papers)	2	2	-	22
		VI	4 (2 Theory Papers)	4 (2 Practical Papers)	4 (2 Theory Papers Out of Four)	2 (2 Practical Papers)	2 (1 Practical Papers)	2	-	4	22

➤ Evaluation Structure

Type	Credit	CCE				ESE	Total
		CCE - I	CCE-II	Mid-term	Total		
Theory	2	5	5	10	20	30	50

Type	Credit	Journal	Vival	Stidents Performace	Exam	Total
Practical	2	10	5	5	30	50

	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 Application	
	Programme: B.Sc.	Semester - V
	Type: Major	Marks: 50
	Credits: 2	From: A. Y. 2025-26
Name of the Course: BCAT 351 Java Programming		
Course Objectives: 1) To understand how to use programming in day-to-day applications. 2) To learn the basic concept of Java Programming. 3) Inculcate concepts of inheritance to create new classes from existing one & design the classes needed given a problem specification. 4) Able to use standard library functions in Java Programming.		
Course Outcomes: 1) Analyze the necessity for Object Oriented Programming paradigm over structured programming and become 2) Familiar with the fundamental concepts in OOP like encapsulation, Inheritance and Polymorphism 3) Design and develop java programs. 4) Analyze, and interpret object-oriented data and report results.		
Module	Title and Contents	Hrs.
Module -1:	Module -1: Introduction to Java 1.1 Introduction, Features of java 1.2 JDK Environment 1.3 OOPs Concepts: Class, Abstraction, Encapsulation, Inheritance, Polymorphism 1.4 Difference between C++ and JAVA 1.5 Structure of java program, Data types, Variables, Operators, Keywords, Naming Convention 1.6 Decision Making, Looping, Array and it's Types, 1.7 Methods – String and String Buffer class.	8
Module -2:	Module -2: Classes and Objects 2.1 Creating Classes and objects, Memory allocation for objects, Constructor 2.2 Implementation of Inheritance Simple, Multilevel, Interfaces, Abstract classes and methods, Implementation of Polymorphism 2.3 Method Overloading, Method Overriding, Nested and Inner classes 2.4 Modifiers and Access Control 2.5 Packages- Packages Concept Creating user defined packages Java Built in packages java.lang, java.util.	8

Module -3:	Module -3: Collection 3.1 Collection Framework: Interfaces – Collection, List, Set, SortedSet, Enumeration, Iterator, ListIterator, Classes – LinkedList, ArrayList, Vector, HashSet, TreeSet, Hashtable 3.2 Working with maps: Map interface, Map classes, HashMap, TreeMap	8
Module -4:	Module -4: File and Exception Handling 4.1 Exception: Exception types, Using try catch and multiple catch Nested try, throw, throws and finally, Creating user defined Exceptions. 4.2 File Handling: Stream, ByteStream Classes, CharacterStream Classes, File IO basics, File operations Creating file Reading file (character, byte), Writing file (character, byte)	6
Reference Books: - 1) Herbert Scheldt, Java2: The Complete Reference, Tata McGraw-Hill 2) Object Oriented Programming with JAVA Essentials and Applications, McGraw-Hill 3) Core and Advanced Java, Black Book - dreamtech 4) Programming with JAVA-EBalagurusamy 5) Herbert Schildt, Java 2: The Complete Reference ,9th Edition, McGraw Hill ,2017. 6) E. Balagurusamy, Programming with Java A primer, 3rd Edition, McGraw Hill,1998		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): • CCE - I: 10 Marks: Objective • CCE - II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective Note: Conversion of 40 marks of internal evaluation to 20 Marks	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 Computer Application

Programme: B.Sc.

Semester - V

Type: Major

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course: BCAT 352 Programming with Python

Course Objectives:

- 1) Impart fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- 2) Inculcate concepts of inheritance to create new classes from existing one & design the classes needed given a problem specification;
- 3) Familiarize the concepts of packages and interfaces.
- 4) Facilitate students in handling exceptions.
- 5) Demonstrate the concept of event handling used in GUI.

Course Outcomes:

- 1) Impart fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- 2) Inculcate concepts of inheritance to create new classes from existing one & design the classes needed given a problem specification;
- 3) Familiarize the concepts of packages and interfaces.
- 4) Facilitate students in handling exceptions.
- 5) Demonstrate the concept of event handling used in GUI.

Module	Title and Contents	Hrs.
Module -1:	Module -1: Introduction to Python 1.1 Installation, Spyder IDE, Python Interpreter, History of Python, Python Features, Applications of Python, Data Types 1.2 Types Of Operators, Operators Precedence, Expressions, Statements, Functions, Comment, 1.3 Strings - Accessing Values in Strings, Updating Strings, Escape Characters, Built-In String Methods, User Input	4
Module -2:	Module -2: Control Flow and Loops 2.1 Conditionals: Boolean Values and Operators, Conditional (If), Alternative (If-Else), Chained Conditional (If-Elif-Else) 2.2 Looping-While Loop, The Infinite Loop, For Loop, Iterating by Sequence Index, Using Else Statement with Loops, Nested Loops, Break, Continue & Pass Statement 2.3 Functions: Function with Arguments, Lambda Functions	10
Module -3:	Module -3: Lists, Tuples, Dictionaries and Set	8

	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- Accessing Values in Dictionary, Updating Dictionary, Delete Dictionary Elements, Properties of Dictionary Keys, Built-In Dictionary Functions and Methods. 3.4 SETS -Concept of Sets, Creating, Initializing and Accessing the Elements, Sets Operation	
Module -4:	Module -4: Modules, Files I/O, GUI 4.1 The Import Statement, 4.2 Modules (Datetime, Calendar, Math Module) 4.3 Files I/O: Text Files, Reading and Writing Files 4.4 Introduction to GUI In Python	8
Reference Books: - 1) R. NageswaraRao, “Core Programming with”, Dreamtech 2) Paul Gries, Jennifer Campbell, Jason Montojo, Practical Programming: An introduction to Computer Science Using Python, 2nd edition, The Pragmatic Bookshelf. 3) Michael Dawson, Programming with python, A users Book, Cengage Learning. 4) Sweigart, Al. “Automate the Boring Stuff with Python.” Latest Edition: 2019 (2nd Edition). 5) Slatkin, Brett. “Effective Python: 90 Specific Ways to Write Better Python.” Latest Edition: 2019 (2nd Edition).		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): • CCE - I: 10 Marks: Objective • CCE - II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective Note: Conversion of 40 marks of internal evaluation to 20 Marks		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 Computer Application		
	Programme: B.Sc.	Semester -V	
	Type: Major Practical	Marks: 50	
	Credits: 2	From: A. Y. 2025-26	
	Name of the Course: BCAP 357 Lab Course Based on BCAT 351		
Course Objectives: 1) Impart fundamentals of object-oriented programming in Java, including defining Classes, invoking methods, using class libraries, etc. 2) Inculcate concepts of inheritance to create new classes from existing one & Design the classes needed given a problem specification; 3) Familiarize the concepts of packages and interfaces. 4) Facilitate students in handling exceptions. 5) Demonstrate the concept of event handling used in GUI.			
Course Outcomes: 1) To study Basic Java Programs 2) To Implement Class, object and methods in Java 3) To study use of Array, collection of Java 4) To implement the Inheritance, packages and interfaces. 5) To use of the Exception handling and multithreading.			
Module	Title and Contents		Module
Section I:	List of Practical 1) Testing out and interpreting a variety of simple programs to demonstrate the syntax and use of the following features of the language: basic data types, operators and control structures.Modelsampling from Cauchy distribution. 2) Class definitions and usage involving variety of constructors and finalizes. 3) Programs involving various kinds of inheritances. 4) Program involving Method Over-riding, Method Over-loading 5) Program involving Abstract Class and Methods 6) Program involving Interface 7) Program to demonstrate creation and handling of packages, their imports and Class Path. 8) Programs involving a variety of Exception Handling situations 9) Program to define a class that generates Exceptions and using objects of the class. 10) Program involving creating and handling threads in applications and applets 11) Programs to demonstrate methods of various i/o classes		60

	12) Programs to demonstrate methods of string class 13) Programs to demonstrate event handling 14) Program to demonstrate AWT/Swing graphic methods	
Reference Books: - 1) Object Oriented Programming with JAVA Essentials and Applications, McGraw-Hill 2) Herbert Scheldt, Java2: The Complete Reference, Tata McGraw-Hill 3) Core and Advanced Java, Black Book - dreamtech 4) Programming with JAVA- E Balagurusamy. 5) E. Balagurusamy, Programming with Java A primer, 3rd Edition, McGraw Hill,1998		
Evaluation Pattern:		
Total Marks: 50		
Journal, Students' Performance Viva, Project (20 Marks): • Journal: 10 Marks • Students' Performance: 05 Marks Viva: 05 Marks	Practical Exam Paper (30 Marks): • Section I: Attempt any three questions (Five questions of 10 Marks)	

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	Programme: B.Sc.	Semester -V	
	Type: Major Practical	Marks: 50	
	Credits: 1	From: A. Y. 2025-26	
Name of the Course: BCAP 358 Lab Course Based on BCAT 352			
Course Objectives: 1) Understand the basic concepts of scripting and the contributions of scripting language. 2) Ability to explore python data structures like Lists, Tuples 3) Ability to create practical and contemporary applications using Functions, Modules and Regular Expressions			
Course Outcomes: 1) Demonstrate and use different Datatypes in Python. 2) Apply various built looping statements and Modules provided by Python. 3) Design a model of recommendation system based on the content of the data. 4) Apply standard clustering methods to analyze social network graph.			
Module	Title and Contents		Module
Section I:	List of Practical 1) Program to display name and address 2) Program to Accept two number and display addition, subtraction, multiplication, division and modules 3) Program to calculate factorial of given number. 4) Program to create a list of 100 numbers and separate those numbers in two different list one includes odd number other even. 5) Program to display maximum number and minimum number from given list 6) Program to demonstrate slicing. 7) Program to demonstrate set operators (union, intersection, minus) 8) Program to print current date and time. 9) Program to Today's Year, Month, and Date 10) Program to convert Date to String 11) Program to display the Calendar of a given month. 12) Program to display calendar of the given year. 13) Program to demonstrate File input. 14) Program to demonstrate file output 15) Program two add two numbers using GUI.		60
Reference Books: - 1) R. NageswaraRao, "Core Programming with", Dreamtech 2) Paul Gries, Jennifer Campbell, Jason Montojo, Practical Programming: An introduction to Computer Science Using Python, 2nd edition, The Pragmatic Bookshelf. 3) Michael Dawson, Programming with python, A users Book, Cengage Learning. 4) Sweigart, Al. "Automate the Boring Stuff with Python." Latest Edition: 2019 (2nd Edition). 5) Slatkin, Brett. "Effective Python: 90 Specific Ways to Write Better Python." Latest Edition: 2019 (2nd Edition).			

Evaluation Pattern:	
Total Marks: 50	
Journal, Students' Performance Viva, Project (20 Marks): • Journal: 10 Marks • Students' Performance: 05 Marks Viva: 05 Marks	Practical Exam Paper (30 Marks): • Section I: Attempt any three questions (Five questions of 10 Marks)

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	Programme: B.Sc.	Semester - V
	Type: Elective	Marks: 50
	Credits: 2	From: A. Y. 2025-26
	Name of the Course: BCAT 353 Software Testing-I	
Course Objectives: 1) Study fundamental concepts of software testing. 2) Understand application in various scenarios with the help different testing strategies, methods and tools. 3) Understand the testing life cycle. 4) Understand structured software testing		
Course Outcomes: 1) Apply testing techniques in software quality management and assurance 2) Identify various types of software risks and its impact on different software application. 3) Create test case scenarios for different application software’s using various testing techniques. 4) Apply different testing methodologies used in industries for software testing.		
Module	Title and Contents	Hrs.
Module -1:	Module -1: Introduction: Software Testing 1.1 Software Testing, Importance of testing, Roles and Responsibilities 1.2 Testing Principles, Attributes of Good Test 1.3 V-Model, Test Case Generation 1.4 SDLC Vs STLC 1.5 Software Testing Life Cycle-in detail.	8
Module -2:	Module -2: Types of Testing 2.1 Testing Strategies: Unit Testing, Integration Testing, System Testing, Smoke, Regression Testing, Acceptance Testing. Functional/Non- Functional Testing. 2.2 Testing Tools, Categorization of testing methods. 2.3 Non-Functional Testing: Performance Test, Memory Test, Scalability Test, Compatibility Test	8
Module -3:	Module -3: Software Testing Life Cycle 3.1 Requirements Analysis/Design, Traceability Matrix, Test Planning, Objective, Scope of Testing, Schedule, Approach 3.2 Roles & Responsibilities, Assumptions 3.3 Risks & Mitigations 3.4 Entry & Exit Criteria 3.5 Test Automation, Deliverables	8
Module -4:	Module -4: Test Cases Design	6

	4.1 Write Test cases, Review Test cases 4.2 Test Cases Template 4.3 Types of Test Cases 4.4 Difference between Test Scenarios and Test Cases. 4.5 Test Environment setup, Understand the SRS, 4.6 Hardware and software requirements, Test Data	
Reference Books:- 1) Roger S. Pressman, Software engineering- A practitioner's Approach, McGraw-Hill International Editions 2018 2) Ian Sommerville, Software engineering, Pearson education Asia 2019 3) Software Testing Techniques, 2nd edition, Boris Beizer, 1990 4) Software Testing: Principles and Practices by Srinivasan Desikan 5) Software Testing and Quality Assurance: Theory and Practice by Kshirasagar Naik and Priyadarshi Tripathy 2018		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): • CCE - I : 10 Marks: Objective • CCE - II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective Note: Conversion of 40 marks of internal evaluation to 20 Marks	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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	Yashavantrao Chavan Institute of Science, Satara		
	Board of Studies in Computer Application		
	Programme: B.Sc.	Semester -V	
	Type: Elective Practical	Marks: 50	
	Credits: 1	From: A. Y. 2025-26	
Name of the Course: BCAP 359 Lab Course Based on BCAT 355			
Course Objectives: 1) Study fundamental concepts of software testing. 2) Understand application in various scenarios with the help different testing strategies, methods and tools. 3) Understand writing Test Cases. 4) Understand how to raise defect.			
Course Outcomes: 1) Apply testing techniques in software quality management and assurance 2) Identify various types of software risks and its impact on different software application. 3) Create test case scenarios for different application software’s using various testing techniques. 4) Apply different testing methodologies used in industries for software testing.			
Module	Title and Contents		Module
Section I:	List of Practical 1) Read and understand the software project documentation/guides. Also, study the Application under Test (AUT) if available. 2) Draft Test cases that cover all the requirements mentioned in the documentation. 3) Review and baseline the test cases with Team Lead, Client (as applicable). 4) Execute the test cases on the AUT. 5) Report bugs. 6) Once bugs are fixed, again execute the failing test cases to verify they pass 7) Write test cases for MTM Machine. 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.		30
Reference Books: - 1) Roger S. Pressman, Software engineering- A practitioner’s Approach, McGraw-Hill International Editions 2018 2) Ian Sommerville, Software engineering, Pearson education Asia 2019 3) Software Testing Techniques, 2nd edition, Boris Beizer, 1990 4) Software Testing: Principles and Practices by Srinivasan Desikan 5) Software Testing and Quality Assurance: Theory and Practice by Kshirasagar Naik and Priyadarshi Tripathy 2018.			
Evaluation Pattern:			
Total Marks: 50			

Journal, Students' Performance Viva, Project (10 Marks): • Journal: 5 Marks • Students' Performance: 05 Marks	Practical Exam Paper (15 Marks): • Section I: Attempt any three questions (Five questions of 5 Marks)
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	Yashavantrao Chavan Institute of Science, Satara		
	Board of Studies in Computer Application		
	Programme: B.Sc.	Semester - V	
	Type: Elective	Marks: 50	
	Credits: 2	From: A. Y. 2025-26	
Name of the Course: BCAT 354 Artificial Intelligence			
Course Objectives: 1) Learn the basic concepts and foundational principles of Artificial Intelligence. 2) Understand the application of AI techniques in real-world scenarios and various industries. 3) Explore and implement key machine learning algorithms and evaluate their performance. 4) Gain knowledge of advanced AI topics, including deep learning, NLP, and reinforcement learning			
Course Outcomes: 1) Analyse the foundational concepts of Artificial Intelligence (AI) and its role in solving real-world problems. 2) Familiarize with the basics of machine learning, including key algorithms and neural network concepts. 3) Design and develop deep learning models using techniques like CNNs and RNNs 4) Understand the significance of Natural Language Processing (NLP).			
Module	Title and Contents		Hrs.
Module -1:	Module -1: Introduction to Artificial Intelligence 1.1 Definition and Scope of AI, History and Evolution of AI 1.2 Applications of AI in various fields 1.3 Types of AI: Narrow AI, General AI, Superintelligent AI 1.4 Key Concepts: Machine Learning (ML) 1.5 Natural Language Processing (NLP) 1.6 Robotics and Computer Vision		8
Module -2:	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 2.3 Support Vector Machines (SVM) 2.4 Performance Evaluation: Training and Testing Data 2.5 Metrics: Accuracy, Precision, Recall, F1 Score.		8
Module -3:	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, Role in image processing, architecture of CNNs and real-world applications. 3.3 Recurrent Neural Networks (RNNs): Basics of sequential data, why RNNs		8

	are essential, Structure of RNNs: input, hidden, and output layers, recurrence.	
Module -4:	Module -4: Natural Language Processing (NLP) and Text Preprocessing 4.1 Natural Language Processing (NLP): i) Introduction to NLP ii) NLP significance in AI iii) Key challenges in understanding and processing human language iv) common NLP tasks: Sentiment analysis, Machine translation, Text summarization v) Role of language models and embeddings in NLP. 4.2 Text Preprocessing: Steps in text preprocessing: Tokenization, Normalization, Cleaning, Stemming, Lemmatization.	6
Reference Books: - 1) Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 4th Edition, Pearson, 2020. 2) Ian Goodfellow, Yoshua Bengio, and Aaron Courville, Deep Learning, MIT Press, 2016. 3) Tom Mitchell, Machine Learning, McGraw Hill, 1997. 4) Russell, Stuart J., Norvig, Peter. "Artificial Intelligence: A Modern Approach." Latest Edition: 2021 (4th Edition). 5) Luger, George F. "Artificial Intelligence: Structures and Strategies for Complex Problem Solving." Latest Edition: 2008 (6th Edition).		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): • CCE - I: 10 Marks: Objective • CCE - II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective Note: Conversion of 40 marks of internal evaluation to 20 Marks	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 Computer Application		
	Programme: B.Sc.	Semester -V	
	Type: Elective Practical	Marks: 50	
	Credits: 1	From: A. Y. 2025-26	
Name of the Course: BCAP 359 Lab Course Based on BCAT 355			
Course Objectives: 1) Impart fundamental knowledge of Artificial Intelligence concepts 2) Inculcate the ability to implement basic machine learning algorithms 3) Familiarize the students with text preprocessing techniques. 4) Facilitate understanding of evaluation metrics 5) Develop skills in handling sequential data, text summarization			
Course Outcomes: 1) Analyze the necessity for Artificial Intelligence and its applications in solving real-world problems. 2) Familiarize with the fundamental concepts of Machine Learning, including Linear Regression, Logistic Regression, and Decision Trees. 3) Design and implement machine learning models and evaluate their performance using standard metrics such as Accuracy, Precision, Recall, and F1 Score. 4) Familiarize with basic natural language processing tasks, including text summarization and machine translation. 5) Develop proficiency in using AI frameworks and tools like TensorFlow or PyTorch for building practical AI models			
Module	Title and Contents		Module
Section I:	List of Practical 1) Testing out and understanding examples of AI systems to classify them into Narrow AI, General AI, and Superintelligent 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) Performing sentiment analysis on a small dataset (e.g., product reviews) to classify reviews as positive or negative. 9) Using a pre-trained CNN model to classify images into categories such as cats and dogs. 10) Writing a simple program to predict the next number in a sequence using RNNs.		30

	11) Translating an English sentence into another language using a pre-trained NLP model or library. 12) Summarizing a paragraph of text into a concise version using a text summarization tool or method 13) Exploring machine learning frameworks like TensorFlow or PyTorch for basic operations. 14) Combining preprocessing and sentiment analysis to analyze the sentiment of social media comments or reviews.	
Reference Books: - 1) Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 4th Edition, Pearson, 2020. 2) Ian Goodfellow, Yoshua Bengio, and Aaron Courville, Deep Learning, MIT Press, 2016. 3) Tom Mitchell, Machine Learning, McGraw Hill, 1997. 4) Russell, Stuart J., Norvig, Peter. "Artificial Intelligence: A Modern Approach." Latest Edition: 2021 (4th Edition). 5) Luger, George F. "Artificial Intelligence: Structures and Strategies for Complex Problem Solving." Latest Edition: 2008 (6th Edition).		
Evaluation Pattern:		
Total Marks: 50		
Journal, Students' Performance Viva, Project (10 Marks): • Journal: 5 Marks • Students' Performance: 05 Marks	Practical Exam Paper (15 Marks): Section I: Attempt any three questions (Five questions of 5 Marks)	

	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 Computer Application	
	Programme: B.Sc.	Semester - V
	Type: Elective	Marks: 50
	Credits: 2	From: A. Y. 2025-26
Name of the Course: BCAT 355 Cloud Computing		
Course Objectives: 1) Study fundamental concepts of software testing. 2) Understand application in various scenarios with the help different testing strategies, methods and tools. 3) Understand the testing life cycle. 4) Understand structured software testing		
Course Outcomes: 1) Explain the core concepts of cloud computing and its benefits and limitations. 2) Identify and compare different cloud computing models, services, and deployment types. 3) Describe the architecture and storage mechanisms in cloud systems and their practical applications. 4) Illustrate the role of virtualization in cloud computing and its advantages in modern IT environments		
Module	Title and Contents	Hrs.
Module -1:	Module -1: Introduction to Cloud Computing 1.1 Evolution and History of Cloud Computing, Introduction to Cloud Computing, 1.2 Why Cloud Computing is Becoming Highly Important, Features of Cloud Computing, 1.3 Cloud Computing for various users, Advantages of Cloud Computing, Limitations of Cloud Computing	10
Module -2:	Module -2: Cloud Computing Models and Services 2.1 Cloud Models and Types: The NIST Model, Cloud Cube Model, Deployment Models, 2.2 Service Models: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS). 2.3 Layers and Types of Cloud, Components of Cloud Computing, Cloud Computing Service Providers	8
Module -3:	Module -3: Cloud Architecture and Storage 3.1 Introduction to Cloud Architecture: how cloud systems are structured. 3.2 Cloud Storage: Block Storage, Object Storage, and File Storage. 3.3 Data Management in Cloud: Basics of storing, retrieving, and managing data in the cloud. 3.4 Cloud Security Basics: Introduction to securing data in the cloud, encryption and access controls. 3.5 Popular Cloud Platforms: AWS, Azure, and Google Cloud.	8
Module -4:	Module -4: Virtualization 4.1Introduction to Virtualization and its Technical Evolution, History of Virtualization	6

	4.2 Types of Virtual Machines, Advantages of Virtualization, Components of Virtualization, Types of Virtualizations	
Reference Books:- 1) Rajkumar Buyya, James Broberg, Andrzej M. Goscinski – Cloud Computing: Principles and Paradigms, Wiley, 2011. 2) Anthony T. Velte, Toby J. Velte, Robert Elsenpeter – Cloud Computing: A Practical Approach, McGraw-Hill, 2010. 3) Michael J. Kavis – Architecting the Cloud: Design Decisions for Cloud Computing Service Models (IaaS, PaaS, SaaS), Wiley, 2014. 4) Software Testing and Quality Assurance: Theory and Practice by Kshirasagar Naik and Priyadarshi Tripathy 2018. 5) Sharma, Ramesh. “Cloud Computing: Concepts, Technology & Architecture.” Latest Edition: 2020.		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): • CCE - I: 10 Marks: Objective • CCE - II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective Note: Conversion of 40 marks of internal evaluation to 20 Marks	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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	Yashavantrao Chavan Institute of Science, Satara		
	Board of Studies in Computer Application		
	Programme: B.Sc.	Semester -V	
	Type: Elective Practical	Marks: 50	
	Credits: 1	From: A. Y. 2025-26	
Name of the Course: BCAP 359 Lab Course Based on BCAT 355			
Course Objectives: 1) Gain hands-on experience in using cloud storage services and document management. 2) Develop presentations and applications using cloud platforms and tools. 3) Understand and implement identity and security management features in cloud systems. 4) Analyse real-world cloud service applications through case studies and hands-on examples.			
Course Outcomes: 1) Demonstrate the ability to use cloud storage for document and presentation management. 2) Create and manage virtual environments using OpenStack and ownCloud. 3) Implement basic cloud services such as identity and security management. 4) Apply cloud concepts to develop simple applications using web technologies. 5) Analyse and present real-world case studies of cloud service providers such as AWS and Microsoft Azure.			
Module	Title and Contents		Module
Section I:	List of Practical 1) Create a word document of your class time table and store locally and on cloud with doc and pdf format. 2) Prepare a PowerPoint on cloud on topic of your choice. 3) Create your resume in a neat format using Google and Zoho cloud. 4) Install OpenStack and use it as Infrastructure as a Service and use technology ownCloud. 5) Installing and using identity management feature of OpenStack. 6) Write a program for web feed using PHP, HTML. 7) Installing and using JOSSO. 8) Installing and using security feature of own Cloud. 9) Installing and using administrative features of own Cloud. 10) Case study on Amazon EC2 11) Case study on Microsoft azure Simple application using JSP		30
Reference Books :- 1) Rajkumar Buyya, James Broberg, Andrzej M. Goscinski – Cloud Computing: Principles and Paradigms, Wiley, 2011. 2) Anthony T. Velte, Toby J. Velte, Robert Elsenpeter – Cloud Computing: A Practical Approach, McGraw-Hill, 2010. 3) Michael J. Kavis – Architecting the Cloud: Design Decisions for Cloud Computing Service Models (IaaS, PaaS, SaaS), Wiley, 2014. 4) Software Testing and Quality Assurance: Theory and Practice by Kshirasagar Naik and Priyadarshi Tripathy 2018			

5) Sharma, Ramesh. “Cloud Computing: Concepts, Technology & Architecture.” Latest Edition: 2020.	
Evaluation Pattern:	
Total Marks: 50	
Journal, Students' Performance Viva, Project (10 Marks): - Journal1: 5 Marks - Students' Performance: 05 Marks	Practical Exam Paper (15 Marks): Section I: Attempt any three questions (Five questions of 5 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 Application	
	Programme: B.Sc.	Semester - V
	Type: Elective	Marks: 50
	Credits: 2	From: A. Y. 2025-26
Name of the Course: BST 356 Data Structure and Algorithm		
Course Objectives: 1) To understand basics data structure and algorithms 2) To solve problems using data structures such as linked lists, stacks, queues, hash tables, trees, heaps and graphs 3) To understand various programming techniques such as brute force, greedy, dynamic 4) programming, divide-conquer and backtracking		
Course Outcomes: 1) Demonstrate linear data structures linked list, stack and queue 2) Implement tree, graph, hash table and heap data structures 3) Apply brute force and backtracking techniques 4) Demonstrate greedy and divide-conquer approaches 5) Implement dynamic programming technique		
Module	Title and Contents	Hrs.
Module -1:	Module -1: Linked List, Stack and Queues 1.1 Singly Linked List, Doubly Linked List 1.2 Linked List implementation of Stack 1.3 Linked List implementation of Queue, Circular Queue, Priority Queue	10
Module -2:	Module -2: Tree & Graph 2.1 Binary Search Tree, AVL Tree, Red-Black Tree 2.2 Segment Tree - with min/max/sum range queries, 2.3 Fenwick Tree (Binary Indexed Tree), 2.4 Directed and Undirected Graph, Graph Representations 2.5 Adjacency Matrix, Adjacency List, Graph Traversals, BFS, DFS	8
Module -3:	Module -3: Hash Table, Heaps and Brute Force 3.1 Hash Table, Hash Function, Hash function approaches 3.2 Handling the collisions, 3.3 Heap: Min heap and Max heap 3.4 Linear Search, Rain Terraces, Recursive Staircase 3.5 Maximum Subarray, Travelling Salesman Problem, Discrete Fourier Transform	8
Module -4:	Module -4: Divide and Conquer 4.1 Jump Game, 4.2 Unbound Knapsack Problem 4.3 Dijkstra Algorithm, Prim's Algorithm	6

	4.4 Kruskal's Algorithm, Binary Search 4.5 Tower of Hanoi, Pascal's Triangle 4.6 Euclidean Algorithm, Merge Sort, Quicksort, Fast Powering	
Reference Books: - 1) Lipschutz Schaum's, "Data Structure", Outline Series, MH 2) D. Samanta, "Classical Data Structure", PHI, 3) Practical Approach to Data Structures by Hanumanthappa. 4) Data Structure and Algorithms in C++ by Joshi Brijendra Kumar 5) Data Structures with C++: Schaum's Outlines by Hubbard John Bressard, 6) Horowitz/Sahani, Fundamental of Algorithm. PHI, Galgotia. 7) Magnifying Data Structures, Arpita Gopal, PHI Publications		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): • CCE - I : 10 Marks: Objective • CCE - II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective Note: Conversion of 40 marks of internal evaluation to 20 Marks	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 Computer Application		
	Programme: B.Sc.	Semester - V	
	Type: Elective Practical	Marks: 50	
	Credits:1	From: A. Y. 2025-26	
Name of the Course: BSP 359 Lab Course Based on BCAT 356			
Course Objectives: 1) Develop presentations and applications using cloud platforms and tools. 2) Understand and implement identity and security management features in cloud systems. 3) Analyse real-world cloud service applications through case studies and hands-on examples. 4) Gain hands-on experience in using cloud storage services and document management.			
Course Outcomes: 1) Demonstrate linear data structures linked list, stack and queue 2) Implement tree, graph, hash table and heap data structures 3) Apply brute force and backtracking techniques 4) Demonstrate greedy and divide-conquer approaches 5) Implement dynamic programming technique.			
Module	Title and Contents	Hrs.	
Section I:	List of Practical 1) Write a program that uses functions to perform the following operations on singly linked list i) Creation ii) Insertion iii) Deletion iv) Traversal. 2) Write a program that uses functions to perform the following operations on doubly linked list i) Creation ii) Insertion iii) Deletion iv) Traversal. 3) Write a program that uses functions to perform the following operations on circular linked List i) Creation ii) Insertion iii) Deletion iv) Traversal. 4) Write a program that implement stack (its operations) using i) Arrays ii) Linked list(Pointers). 5) Write a program that implement Queue (its operations) using i) Arrays ii) Linked list(Pointers). 6) Write a program that implement Circular Queue (its operations) using Arrays . 7) Write a program that uses both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers: a) Linear search b) Binary search. 8) Write a program that implements the following sorting i) Bubble sort ii) Selection sort iii)Quick sort. 9) Write a program that implements the following i) Insertion sort ii) Merge sort iii)Heap sort. 10) Write a program to implement all the functions of a dictionary (ADT)using Linked List. 11) Write a program to perform the following operations: a) Insert an element into a binary search tree. b) Delete an element from a binary search tree. c) Search for a	30	

	key element in a binary search tree. 12) Write a program to implement the tree traversal methods. 13) Write a program to perform the following operations: a) Insert an element into a AVL tree. b) Delete an element from a AVL tree. c) Search for a key element in a AVL tree.	
Reference Books:- 1) Lipschutz Schaum's, "Data Structure", Outline Series, MH 2) D. Samanta, "Classical Data Structure", PHI, 3) Practical Approach to Data Structures by Hanumanthappa. 4) Data Structure and Algorithms in C++ by Joshi Brijendra Kumar 5) Data Structures with C++: Schaum's Outlines by Hubbard JohnBressard, 6) Horowitz/Sahani, Fundamental of Algorithm. PHI, Galgotia. 7) Magnifying Data Structures, Arpita Gopal, PHI Publications		
Evaluation Pattern:		
Total Marks: 50		
Journal, Students' Performance Viva, Project (10 Marks): • Journal: 05 Marks • Students' Performance: 05 Marks	Practical Exam Paper (15 Marks): • Section I: Attempt any three questions (Five questions of 5 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 Application		
	Programme: B.Sc.	Semester - V	
	Type: VSC	Marks: 50	
	Credits:2	From: A. Y. 2025-26	
Name of the Course: BCAPVSC 3 Power Bi			
Course Objectives: 1) Understand the concepts of data analytics and data visualization using Power BI. 2) Install, configure, and navigate the Power BI Desktop environment efficiently. 3) Import, clean, and transform data from various sources using Power Query Editor. 4) Create interactive and visually appealing reports using Power BI visual elements. 5) Implement data modeling techniques and establish relationships between datasets.			
Course Outcomes: 1) Demonstrate a clear understanding of data analytics concepts and Power BI capabilities. 2) Efficiently install and navigate the Power BI Desktop interface and import datasets from various sources. 3) Perform data cleaning, transformation, and integration using Power Query Editor. 4) Develop data models with proper relationships and data formatting techniques. 5) Create basic visualizations such as tables, matrices, bar charts, and pie charts.			
Module	Title and Contents	Hrs.	
Section I:	List of Practical 1) Installing and Setting up Power BI Desktop 2) Loading Data from Multiple Sources 3) Data Cleaning and Transformation using Power Query Editor 4) Combining Data from Multiple Tables 5) Creating a Data Model and Managing Relationships 6) Creating Table and Matrix Visuals 7) Designing Bar, Column, Line, and Area Charts 8) Creating Pie and Donut Charts for Categorical Data 9) Using Cards and KPIs for Summary Metrics 10) Creating Advanced Charts: Scatter, Bubble, and Waterfall 11) Map-based Visualization and Geo-Data Mapping 12) Using Slicers and Filters for Data Interactivity 13) Creating Measures and Calculated Columns 14) Time Intelligence: Year-to-Date, Month-over-Month, and Rolling Averages 15) Designing and Publishing a Dashboard	60	
Reference Books:- 1) Brian Larson, "Microsoft Power BI Dashboards Step by Step", Published by Microsoft Press (June 2016). 2) Dan Clark, "Beginning Power BI: A Practical Guide to Self-Service Data Analytics with Excel 2016 and Power BI Desktop", Published by Apress (September 2017). 3) Reza Rad, "Power BI From Rookie to Rock Star", Independently Published (2016).			

- 4) Greg Deckler, "Learn Power BI: A beginner's guide to developing interactive business intelligence solutions using Microsoft Power BI", Published by Packt Publishing (October 2019).
- 5) Carlson, Brian. "Power BI Data Analyst Certification Guide: Exam PL-300." Latest Edition: 2023.

Evaluation Pattern:

Total Marks: 50

Journal, Students' Performance Viva, Project (20 Marks):

- Project Part I : 10 Marks
- Students' Performance: 05 Marks
- Viva: 05 Marks

Practical Exam Paper (30 Marks):

- Section I: Attempt any three questions
(Five questions of 10 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 Application		
	Programme: B.Sc.	Semester - V	
	Type: VSC	Marks: 50	
	Credits:2	From: A. Y. 2025-26	
Name of the Course: BCAPVSC 4 UI /UX Design			
Course Objectives: 1) To study various tools of UI/UX Design 2) To develop skills in creating visually appealing and cohesive user interfaces. 3) To learn to conduct usability testing and evaluation 4) To understand the role of prototyping in the design process 5) To study collaborative features of UI/ UX Tool 6) To gain awareness of ethical considerations in UI/UX design			
Course Outcomes: 1) Apply user-centered design methodologies 2) Create effective user interfaces / user experiences 3) Develop proficiency in design tools 4) Design for multiple platforms and devices 5) Conduct usability testing and analysis 6) Develop a portfolio of UI/UX design projects			
Module	Title and Contents	Hrs.	
Section I:	List of Practical 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 What is UI UX Design? UI UX Design for Beginners UI UX Design Certification Course Edureka - YouTube 2) Design user persona for the users of selected product / system. How To Create A User Persona (Video Guide) - YouTube How to Create A User Persona in 2022 [FULL GUIDE] - YouTube 3) Create Low-Fidelity and High Fidelity Wireframes: Refine High-Fidelity Wireframes: https://youtu.be/UU_eyUGWIEI 4) Online Learning Platform: Design a wireframe for an online learning platform that includes course listings, video lectures, quizzes, and progress tracking. E-learning Website Design in Figma - YouTube 5)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.	0	

Design the user interface for logging exercises, setting goals, and incorporating social features.

[Fitness App Design In Figma || Figma Tutorial || Design & Prototyping - YouTube](#)

6) Wireframes & Mockups: task is to create at least one wireframe, and one mockup of a web application. Your wireframe(s) and mockup will need to be responsive and take into account a desktop view and a mobile view.

[UI / UX Design Tutorial – Wireframe, Mockup & Design in Figma - YouTube](#)

7) Product Packaging Mockup: Choose a product and create a mockup of its packaging design. Use a mockup tool that specializes in packaging design or graphic design. Design the product packaging, including the layout, colors, logos, and product visuals. Showcase the packaging design from different angles and perspectives.

[Packaging Mockup | Artboard Studio Mockups | Figma Tutorial - YouTube](#)

8) Poster or Flyer Mockup: Select a specific event, campaign, or promotional material. Design a poster or flyer using a graphic 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.

9) 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.

[ECommerce Website UI Design | Figma - Part 1 - YouTube](#)

10) 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.

[Create a Food & Drink Recipe app with reviews from Figma no code - YouTube](#)

11) 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.

[Figma Fitness mobile app Design | design a Fitness app in Figma | UIUX Design 2021 | Techno- fine - YouTube](#)

12) 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.

[Create Teams in Figma & Real-Time Collaboration in Figma for Designers - YouTube](#)

13) 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. Usability Testing in UX Design Thinking Process - YouTube 14) Analyze an existing App and defining your Apps function step by step using Figma tool Evaluate an existing mobile banking application. Identify its strengths and weaknesses in terms of interface design. Discuss any legal issues that may be present, such as privacy concerns or compliance with regulations. 15) Mini Project: 1) Miniproject 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 2) 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) Alan Cooper, Robert Reimann, David Cronin, Christopher Noessel, "About Face: The Essentials of Interaction Design, Fourth Edition", Published by Wiley (5 September 2014).
- 2) Don Norman, "The Design of Everyday Things: Revised and Expanded Edition", Published by Basic Books (5 November 2013).
- 3) Steve Krug, "Don't Make Me Think, revisited: A Common-Sense Approach to Web Usability, Third Edition", Published by New Riders (5 December 2013).
- 4) Jesse James Garrett, "The Elements of User Experience: User-Centered Design for the Web and Beyond, Second Edition", Published by New Riders (18 December 2010).
- 5) Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven Jacobs, "Designing the User Interface: Strategies for Effective Human-Computer Interaction, Sixth Edition", Published by Pearson (10 October 2016).

Evaluation Pattern:

Total Marks: 50

Journal, Students' Performance Viva, Project (20 Marks): • Journal: 10 Marks • Students' Performance: 05 Marks • Viva: 05 Marks	Practical Exam Paper (30 Marks): • Section I: Question I. Attempt any one question (Two questions of 10 Marks) • Section I: Question II. Attempt any one question (Two questions of 5 Marks) • Section II: Question I. Attempt any one question (Two questions of 10 Marks) • Section II: Question II. Attempt any one question (Two questions of 5 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 Computer Application		
	Programme: B.Sc.	Semester - VI	
	Type: Major	Marks: 50	
	Credits: 2	From: A. Y. 2025-26	
	Name of the Course: BCAT 361 Advanced Java Programming		
Course Objectives: 1) Understand working of Java. 2) Learn Java Servlets Development Kit, creating, Compiling and running servlet 3) Understand Java Beans. Advantage, Installing / Starting/ Using BDk 4) Imbibe JSP Architecture, JSP Access Model, JSP Syntax Basic.			
Course Outcomes: 1) Demonstrate working of Java. 2) Apply Java Servlets Development Kit, creating, Compiling and running servlet. 3) Use Java Beans. Advantage, Installing / Starting/ Using BDk. 4) Create Java programming.			
Module	Title and Contents		Hrs.
Module -1:	Module -1: Introduction to JDBC 1.1 The design of JDBC, Basic JDBC program Concept, Drivers 1.2 Architecture of JDBC, Making the Connection, 1.3 Statement, ResultSet , Prepared Statement, Collable Statement 1.4 Executing SQL commands, Executing queries		8
Module -2:	Module -2: Servlet 2.1 Introduction, How It differ from CGI, 2.2 Types of servlets 2.3 Life cycle of Servlet, 2.4 Execution process of Servlet Application 2.5 Session Tracking, Cookie class, Servlet- Jdbc		8
Module -3:	Module -3: Multithreading 3.1 Introduction to Thread 3.2 Life cycle of thread 3.3 Thread Creation - By using Thread Class - By Using Runnable interface, Priorities and Synchronization 3.4 Inter thread communication, Implementation of Thread with Applet		8
Module -4:	Module -4: JSP and Java Beans 4.1 JSP: Introduction to JSP, Components of JSP Directives, Tags, Scripting Elements, Execution process of JSP Application, building a simple application		6

	using JSP, JSP with Database	
	4.2 Java Beans: What is bean, Advantages, Using Bean Development kit(BDK), Introduction to jar and manifest files, The java beans API	
Reference Books :- 1) Uttam K. Roy, <i>Advanced Java Programming Textbook</i>, 1 January 2018, Dreamtech Press. 2) Clark Nathan, <i>Java: Advanced Features and Programming Techniques Book</i>, 1 January 2014, Dreamtech Press. 3) Y. Daniel Liang, <i>Introduction to Java Programming and Data Structures: Comprehensive Version</i>, Pearson, 12th Edition, 2021. 4) Bloch, Joshua. "Effective Java." Latest Edition: 2018 (3rd Edition). 5) Ravindran, P. "Advanced Java Programming." Latest Edition: 2020.		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): • CCE - I : 10 Marks: Objective • CCE - II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective Note: Conversion of 40 marks of internal evaluation to 20 Marks	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 Computer Application		
	Programme: B.Sc.	Semester - VI	
	Type: Major	Marks: 50	
	Credits: 2	From: A. Y. 2025-26	
Name of the Course: BCAT 362 ASP.NET with C#			
Course Objectives: 1) To explore .NET technologies for designing and developing dynamic, interactive and responsive web applications 2) Provide a consistent, object-oriented programming environment whether object code is stored and executed locally. 3) Make the developer experience consistent across widely varying types of apps, such as Windows- based apps and Web-based apps.			
Course Outcomes: 1) Understand the .NET framework. 2) Develop a proficiency in the programming language 3) Proficiently develop ASP.NET applications using C# 4) Use ADO.NET for data persistence in a web application. 5) Create Crystal report.			
Module	Title and Contents		Hrs.
Module -1:	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 1.4 static constructors, private constructors, copy constructors, destructors, member, initialization, this reference, nesting of classes.		4
Module -2:	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.		10
Module -3:	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 controlclass. 3.3 Event handling, Click event, Text Changed event, Command event, Checked Changed event, post back events, Using event argument etc. 3.4 Validation Control: Introduction, basic validation controls, validation techniques, State Management, using cookies and URL encoding, Master Pages, Navigation.		8

Module -4:	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 4.3 Microsoft SQL Server 2008 Overview: Introduction to Microsoft SQL Server 2008, Advantages /Features of SQL Server, Queries using SQL Server performing create, select, update, delete. 4.4 Design View in SQL Server Various Constraints in SQL SERVER, Various Function in SQL Server. 4.5 Crystal Report: Adding a Crystal Report to an ASP.NET.	8
Reference Books:- 1) Herbert Schildt, C# 2.0: The Complete Reference, McGraw-Hill, 2005. 2) Fritz Onion, Essential ASP.NET with Examples in C#, Addison-Wesley Professional, 2003. 3) Dino Esposito, Programming Microsoft ASP.NET MVC, 3rd Edition, Microsoft Press, 2014. 4) Andrew Troelsen, Pro C# 5.0 and the .NET 4.5 Framework, Apress, 2012. 5) Stephen Walther, ASP.NET Unleashed, 3rd Edition, Sams Publishing, 2007.		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): • CCE - I : 10 Marks: Objective • CCE - II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective Note: Conversion of 40 marks of internal evaluation to 20 Marks	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 Computer Application

Programme: B.Sc.

Semester -VI

Type: Major Practical

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course: BCAP 367 Lab Course Based on BCAT 361

Course Objectives:

- 1) Understand program on swing.
- 2) Study about AWT.
- 3) Imbibe database connection.
- 4) Understand knowledge about cookies and session.

Course Outcomes:

- 1) Use working of swing in JAVA.
- 2) Develop Java program using Servlets JDBC.
- 3) Demonstrate Java Beans. Advantage, Installing / Starting/ Using BDK
- 4) Analyze JSP Architecture, JSP Access Model.

Module	Title and Contents	Module
Section I:	List of Practical 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 program to demonstrate concept of grid layout. 9) Write a program on Servlet JDBC. 10) Simple application using JSP.	60

Reference Books :-

- 1) Uttam K. Roy, Advanced Java Programming Textbook, 1 January 2018, Dreamtech Press.
- 2) Clark Nathan, Java: Advanced Features and Programming Techniques Book, 1 January 2014, Dreamtech Press.
- 3) Y. Daniel Liang, Introduction to Java Programming and Data Structures: Comprehensive Version,

Pearson, 12th Edition, 2021. 4) Bloch, Joshua. "Effective Java." Latest Edition: 2018 (3rd Edition). 5) Ravindran, P. "Advanced Java Programming." Latest Edition: 2020.	
Evaluation Pattern:	
Total Marks: 50	
Journal, Students' Performance Viva, Project (20 Marks): - Journal1: 10 Marks - Students' Performance: 05 Marks Viva: 05 Marks	Practical Exam Paper (30 Marks): Section I: Attempt any three questions (Five questions of 10 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 Application

Programme: B.Sc.

Semester -VI

Type: Major Practical

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course: BCAP 368 Lab Course Based on BCAT 362

Course Objectives:

- 1) Understand code solutions and compile C# projects within the .NET framework.
- 2) Design and develop professional console and window based .NET application
- 3) Demonstrate knowledge of object-oriented concepts Design user experience and functional requirements C#.NET application.
- 4) Construct classes, methods, and assessors, and instantiate objects.
- 5) Understand and implement string manipulation, events and exception handling within .NET application environment.

Course Outcomes:

- 1) Apply C# program in console application.
- 2) Create simple website using asp.net.
- 3) Implement dynamic web page using C#.net in Web Application.
- 4) Apply Database Connection using ADO. Net in Application.

Module	Title and Contents	Module
Section I:	List of Practical 1) Write a C# Sharp program to print the sum of two numbers. 2) Write a C# Sharp program to swap two numbers 3) Write a C# program to print the odd numbers from 1 to 99. Prints one number per line. 4) Write a program in C# Sharp to create a file with text and read the file. 5) Write a C# Sharp program to compute the sum of the two given integer values. 6) If the two values are the same, then return triple their sum. 7) Write a C# Sharp program to find the sum of first 10 natural numbers. 8) Write a C# Sharp program to check whether a given number is even or odd. 9) Write a program in C# Sharp to read a specific line from a file 10) Create one simple Web Site. 11) Create one simple Registration Form with SAVE, DELETE, UPDATE, SEARCH Record using SQL database.	60

Reference Books :-

- 1) Herbert Schildt, C# 2.0: The Complete Reference, McGraw-Hill, 2005.
- 2) Fritz Onion, Essential ASP.NET with Examples in C#, Addison-Wesley Professional, 2003.
- 3) Dino Esposito, Programming Microsoft ASP.NET MVC, 3rd Edition, Microsoft Press, 2014.

- 4) Andrew Troelsen, Pro C# 5.0 and the .NET 4.5 Framework, Apress, 2012.
- 5) Stephen Walther, ASP.NET Unleashed, 3rd Edition, Sams Publishing, 2007.

Evaluation Pattern:

Total Marks: 50

**Journal, Students' Performance Viva, Project
(20 Marks):**

- Journal: 10 Marks
- Students' Performance: 05 Marks

Viva: 05 Marks

Practical Exam Paper (30 Marks):

- Section I: Attempt any three questions
(Five questions of 10 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 Application	
	Programme: B.Sc.	Semester - VI
	Type: Elective	Marks: 50
	Credits: 2	From: A. Y. 2025-26
Name of the Course: BCAT 363 Software Testing-II		
Course Objectives: 1) Understand the fundamentals of software testing, its necessity, and the automation approach. 2) Learn the concepts, tools, and frameworks used in automation testing. 3) Develop skills to design and execute automated test scripts for various applications. 4) Analyse and interpret test results to ensure software quality and performance		
Course Outcomes: 1) Analyse the need for automation testing and compare it with manual testing. 2) Familiarize with testing frameworks, automation tools, and scripting techniques. 3) Design and execute automation frameworks for various testing scenarios. 4) Perform end-to-end testing using tools like Selenium and Appium		
Module	Title and Contents	Hrs.
Module -1:	Module -1: Introduction to Testing 1.1 Software Testing, Importance of testing, Roles and Responsibilities, Testing Principles, 1.2 Testing techniques: Black-box, White-box, and Gray-box testing 1.3 Software Development Life Cycle (SDLC), Software Testing Life Cycle.	8
Module -2:	Module -2: Automation Testing 2.1 What is automation testing, Benefits and challenges of automation testing 2.2 Comparison: Manual vs. Automation testing 2.3 Criteria for automation testing 2.4 Overview of popular automation tools: Selenium, QTP/UFT, Appium, and Test Complete	8
Module -3:	Module -3: Test Automation Frameworks and Tools 3.1 Test Automation Frameworks: Types of frameworks: Linear, Modular, Data-driven, Keyword-driven, and Hybrid, Designing an effective test automation framework. 3.2 Selenium Basics: Introduction to Selenium and its components, Setting up the Selenium environment: WebDriver, IDE, and Grid.	8
Module -4:	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, Prioritizing test cases based on frequency, complexity, and impact.	6

	4.3 Test Script Maintenance: Importance of maintaining and updating scripts, Strategies for managing changes in the application under test	
Reference Books :- 1) Roger S. Pressman, Software Engineering: A Practitioner’s Approach, McGraw-Hill International Editions, 2018. 2) Ian Sommerville, Software Engineering, Pearson Education Asia, 2019. 3) Boris Beizer, Software Testing Techniques, 2nd Edition, Dreamtech Press, 1990. 4) Srinivasan Desikan, Software Testing: Principles and Practices, Pearson Education, 2006. 5) Ajay Kumar Jena, Automated Software Testing with Selenium and Python, BPB Publications, 2021. 6) Narayanan Palani, Software Automation Testing Secrets Revealed, 1st Edition, Narayanan Palani Publishing, 2016. 7) Software Testing and Quality Assurance: Theory and Practice by Kshirasagar Naik and Priyadarshi Tripathy 2018		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): • CCE - I : 10 Marks: Objective • CCE - II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective Note: Conversion of 40 marks of internal evaluation to 20 Marks	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 Computer Application	
	Programme: B.Sc.	Semester -VI
	Type: Elective Practical	Marks: 50
	Credits: 1	From: A. Y. 2025-26
	Name of the Course: BCAP 369 Lab Course Based on BCAT 363	

Course Objectives:

- 1) Understand the fundamental concepts of software testing and its life cycle.
- 2) Explore various testing techniques, strategies, and tools for manual and automation testing.
- 3) Learn to write, execute, and maintain test cases effectively.
- 4) Set up and work with automation tools like Selenium for real-world applications.
- 5) Analyse and compare automation frameworks and design simple test automation scripts.
- 6) Generate and interpret test reports for automated testing.

Course Outcomes:

- 1) Analyse and apply the fundamental concepts of software testing in various testing scenarios.
- 2) Develop and execute test cases for manual and automated testing processes.
- 3) Install and configure automation tools like Selenium and demonstrate their usage.
- 4) Design simple automation scripts for functional and data-driven testing.
- 5) Identify, prioritize, and automate critical test cases for software applications.
- 6) Generate and evaluate automation test reports for assessing test results.
- 7) Compare and apply different test automation frameworks in practical applications.

Module	Title and Contents	Module
Section I:	List of Practical 1) Study the steps involved in STLC and document the roles and responsibilities for each phase. 2) Draft and execute test cases for a basic login functionality of an application.. 3) Prepare a comparison chart of Black-box, White-box, and Gray-box testing. 4) Choose a project and identify the testing activities performed at each stage of the SDLC. 5) Execute a simple test case manually and automate the same using Selenium IDE.. 6) Install and configure Selenium WebDriver, IDE, and Grid on your local machine. 7) Write a Selenium WebDriver script to automate the login process of a web application 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) List and prioritize test cases for a shopping cart module based on frequency and impact	60

	12) Automate a test case and simulate a scenario where the script needs updates due to changes in the application. 13) Use a test reporting tool (like TestNG or ExtentReports) to generate and analyze test results 14) Analyse an existing test automation framework and identify its type (Linear, Modular, Data-driven, etc.)	
Reference Books :- 1) Roger S. Pressman, Software Engineering: A Practitioner's Approach, McGraw-Hill International Editions, 2018. 2) Ian Sommerville, Software Engineering, Pearson Education Asia, 2019. 3) Boris Beizer, Software Testing Techniques, 2nd Edition, Dreamtech Press, 1990. 4) Srinivasan Desikan, Software Testing: Principles and Practices, Pearson Education, 2006. 5) Ajay Kumar Jena, Automated Software Testing with Selenium and Python, BPB Publications, 2021. 6) Narayanan Palani, Software Automation Testing Secrets Revealed, 1st Edition, Narayanan Palani Publishing, 2016.		
Evaluation Pattern:		
Total Marks: 50		
Journal, Students' Performance Viva, Project (10 Marks): • Journal: 05 Marks • Students' Performance: 05 Marks	Practical Exam Paper (15 Marks): • Section I: Attempt any three questions (Five questions of 5 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 Application	
	Programme: B.Sc.	Semester - VI
	Type: Elective	Marks: 50
	Credits: 2	From: A. Y. 2025-26
Name of the Course: BCAT 364 Machine Learning		
Course Objectives: 1) To introduce the basic concepts and techniques of Machine Learning. 2) Formulate machine learning problems corresponding to different applications. 3) Understand a range of machine learning algorithms. 4) Study machine learning algorithms to solve problems of moderate complexity.		
Course Outcomes: 1) To acquire fundamental knowledge of developing machine learning models. 2) Apply structured thinking to unstructured problems. 3) Create very broad collection of machine learning algorithms and problems 4) Develop an appreciation for what is involved in learning from data.		
Module	Title and Contents	Hrs.
Module -1:	Module -1: Introduction to Machine Learning 1.1 Machine Learning, Types of Machine Learning, Issues in Machine Learning, Application of Machine Learning, 1.2 Steps in developing a Machine Learning Application, 1.3 What is Machine Learning? Need for Machine Learning, 1.4 Why & When to Make Machines Learn? Machine Learning Model 1.5 An Introduction to Python, Strengths and Weaknesses of Python, Installing Python.	8
Module -2:	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:	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	8

	Classification.	
Module -4:	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.	6
Reference Books: - 1) Shalev-Shwartz, Shai, and Shai Ben-David. "Understanding Machine Learning: From Theory to Algorithms," Cambridge University Press, 2014. 2) Alpaydin, Ethem. "Introduction to Machine Learning," MIT Press, 2020. 3) Sutton, Richard S., and Andrew G. Barto. "Reinforcement Learning: An Introduction," MIT Press, 2018. 4) Vapnik, Vladimir N. "The Nature of Statistical Learning Theory," Springer, 1995. 5) Mohri, Mehryar, Afshin Rostamizadeh, and Ameet Talwalkar. "Foundations of Machine Learning," MIT Press, 2018.		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): • CCE - I : 10 Marks: Objective • CCE - II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective Note: Conversion of 40 marks of internal evaluation to 20 Marks		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 Computer Application		
	Programme: B.Sc.	Semester -VI	
	Type: Elective Practical	Marks: 50	
	Credits: 1	From: A. Y. 2025-26	
Name of the Course: BCAP 369 Lab Course Based on BCAT 364			
Course Objectives: 1) To learn how to install python. 2) Understand the basic theory underlying machine learning. 3) Formulate machine learning problems corresponding to different applications. 4) Study machine learning algorithms to solve problems of moderate complexity.			
Course Outcomes: 1) To acquire fundamental knowledge of developing machine learning models. 2) To demonstrate ensemble techniques to combine predictions from different models. 3) Create very broad collection of machine learning algorithms and problems. 4) Build a simple linear regression model to predict a target variable.			
Module	Title and Contents		Module
Section I:	List of Practical 1) Install Python and set up an environment. 2) Write a simple Python program for mathematical operations. 3) Install and explore popular libraries. 4) Build a simple linear regression model to predict a target variable. 5) Visualize the regression line and interpret the coefficients. 6) Implement a simple supervised learning algorithm on a dataset. 7) Implement an unsupervised learning algorithm. 8) Implement a logistic regression model to classify a binary target variable. 9) Implement a decision tree classifier for a binary classification problem. 10) Visualize the decision tree and evaluate the model using a confusion matrix. 11) Implement KNN for both classification and regression tasks. 12) Implement a random forest classifier for a multi-class classification problem. 13) Evaluate the model using cross-validation and confusion matrix. 14) Create scatter plots, pair plots, and correlation matrix plots to visualize interactions among multiple variables.		30
Reference Books: - 1) Shalev-Shwartz, Shai, and Shai Ben-David. "Understanding Machine Learning: From Theory to Algorithms," Cambridge University Press, 2014. 2) Alpaydin, Ethem. "Introduction to Machine Learning," MIT Press, 2020. 3) Sutton, Richard S., and Andrew G. Barto. "Reinforcement Learning: An Introduction," MIT Press, 2018. 4) Vapnik, Vladimir N. "The Nature of Statistical Learning Theory," Springer, 1995. 5) Mohri, Mehryar, Afshin Rostamizadeh, and Ameet Talwalkar. "Foundations of Machine Learning," MIT Press, 2018., I., Bengio, Y., and Courville, A. "Deep Learning," MIT Press, 2016.			
Evaluation Pattern:			

Total Marks: 50	
Journal, Students' Performance Viva, Project (20 Marks): - Journal: 5 Marks - Students' Performance: 05 Marks	Practical Exam Paper (15 Marks): Section I: Attempt any three questions (Five questions of 5 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 Application	
	Programme: B.Sc.	Semester - VI
	Type: Elective	Marks: 50
	Credits: 2	From: A. Y. 2025-26
Name of the Course: BCAT 365 Computer Vision		
Course Objectives: 1) To learn digital image fundamentals. 2) To be exposed to simple image processing techniques. 3) To be familiar with image compression and segmentation techniques 4) To represent image in form of features		
Course Outcomes: 1) Understand basic concepts image processing, image storage and types of transformations that can be applied to images. 2) Compare the domains and methods of image processing. 3) Analyse the correctness of algorithms using inductive proofs and loop Invariants. 4) Apply Image Restoration & Enhancement techniques, colour image processing. 5) Implement proper use of image processing tools.		
Module	Title and Contents	Hrs.
Module -1:	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 1.4 Image Sampling and Quantization 1.5 Relationships between pixels Color model.	10
Module -2:	Module -2: Image Enhancement 2.1 Spatial Domain: Gray level transformations, Histogram processing, Basics of Spatial Filtering, Smoothing and Sharpening Spatial Filtering 2.2 Frequency Domain: Introduction to Fourier Transform, Smoothing and Sharpening frequency domain filters, Ideal, Butterworth and Gaussian filters	8
Module -3:	Module -3: IMAGE RESTORATION AND SEGMENTATION 3.1 Noise models, Order Statistics 3.2 Types of Filters, 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:	Module -4: WAVELETS AND IMAGE COMPRESSION 4.1 Wavelets, Sub band coding, Multi-resolution expansions 4.2 Compression: Fundamentals, Image Compression models, Error Free Compression 4.3 Variable Length Coding, Bit-Plane Coding .	6

Reference Books:-	
1) Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, “Digital Image Processing Using MATLAB”, Third Edition Tata Mc Graw Hill Pvt. Ltd., 2011. 2) Anil Jain K. “Fundamentals of Digital Image Processing”, PHI Learning Pvt. Ltd., 2011. 3) Willlliam K Pratt, “Digital Image Processing”, John Willey, 2002. 4) Malay K. Pakhira, “Digital Image Processing and Pattern Recognition”, First Edition, PHI Learning Pvt. Ltd., 2011. 5) Bradski, Gary, Kaehler, Adrian. “Learning OpenCV: Computer Vision with the OpenCV Library.” Latest Edition: 2016 (2nd Edition).	
Evaluation Pattern:	
Total Marks: 50	
Internal Continuous Evaluation (20 Marks): • CCE - I : 10 Marks: Objective • CCE - II: 10 Marks: Objective • Mid Semester Exam: 20 Marks: Subjective Note: Conversion of 40 marks of internal evaluation to 20 Marks	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 Computer Application		
	Programme: B.Sc.	Semester -VI	
	Type: Elective Practical	Marks: 50	
	Credits:1	From: A. Y. 2025-26	
Name of the Course: BCAP 369 Lab Course Based on BCAT 365			
Course Objectives: 1) To learn digital image fundamentals. 2) To be exposed to simple image processing techniques. 3) To be familiar with image compression and segmentation techniques. 4) To represent image in form of features.			
Course Outcomes: 1) Load and display an image using an image processing library. 2) How to modify the brightness and contrast of an image and visually compare the differences. 3) Apply spatial filters like Gaussian for smoothing and Sobel for edge detection. 4) How to enhance the contrast of an image using histogram equalization. 5) Practice applying morphological operations like dilation and erosion on a binary image.			
Module	Title and Contents		Module
Section I:	List of Practical 1) Load and display an image in an image processing library.. 2) Perform the basic steps on a given image. 3) Modify the brightness and contrast of an image. Display the changes visually and analyze the differences. 4) Capture an image using a webcam and display it on the screen. Save the captured image for further processing. 5) Apply a transformation that flips the image horizontally. 6) Apply a Gaussian filter to smooth an image and a Sobel filter to sharpen it. 7) Histogram Equalization. 8) Apply inverse filtering to a blurred image to restore it. 9) Implement and test a basic image compression technique such as Run-Length Encoding (RLE) on a simple image. 10) Perform morphological operations like dilation and erosion on a binary image.		30
Reference Books :- 1) Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, “Digital Image Processing Using MATLAB”, Third Edition Tata Mc Graw Hill Pvt. Ltd., 2011. 2) Anil Jain K. “Fundamentals of Digital Image Processing”, PHI Learning Pvt. Ltd., 2011. 3) Willlliam K Pratt, “Digital Image Processing”, John Willey, 2002. 4) Malay K. Pakhira, “Digital Image Processing and Pattern Recognition”, First Edition, PHI Learning Pvt. Ltd., 2011.			

5) Bradski, Gary, Kaehler, Adrian. "Learning OpenCV: Computer Vision with the OpenCV Library." Latest Edition: 2016 (2nd Edition).

Evaluation Pattern:

Total Marks: 50

Journal, Students' Performance Viva, Project (10 Marks):

- Journal: 5 Marks
- Students' Performance: 05 Marks

Practical Exam Paper (15 Marks):

- Section I: Attempt any three questions
(Five questions of 5 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 Application		
	Programme: B.Sc.	Semester - VI	
	Type: Elective	Marks: 50	
	Credits: 2	From: A. Y. 2025-26	
Name of the Course: BCAT 369 Data Communication & Network Technologies			
Course Objectives: 1) Understand Networking Fundamentals. 2) Explore Transmission Media and Multiplexing Techniques. 3) Learn Network Models and Protocols. 4) Analyze Network Performance and Routing. 5) Identify and Mitigate Network Vulnerabilities.			
Course Outcomes: 1) Demonstrate linear data structures linked list, stack and queue 2) Implement tree, graph, hash table and heap data structures 3) Apply brute force and backtracking techniques 4) Demonstrate greedy and divide-conquer approaches 5) Implement dynamic programming technique			
Module	Title and Contents	Hrs.	
Module -1:	Module -1: Introduction to Networking 1.1 Introduction to Networking and Data communication, Need of Networking 1.2 Components of Data communication: sender, receiver, message, transmission media 1.3 Network Architecture-Client-Server and Peer to peer, Categories of Networks, Network topologies 1.4 Transmission Media: Guided Media - Twisted-Pair Cable, Coaxial Cable, Fiber-Optic Cable 1.5 Unguided Media: Radio Waves, Microwaves, Infrared, and satellite communication 1.6 Multiplexing: Frequency-Division Multiplexing, Wavelength-Division Multiplexing, Time Division Multiplexing 1.7 Switching: Circuit switching, Packet Switching, Message Switching.	10	
Module -2:	Module -2: Network Models and Services 2.1 Network Models and Services OSI reference model, TCP/IP reference model, Comparison of OSI and TCP/IP reference model, Protocol Standards 2.2 Introduction to Application Layer: Domain name system (DNS), Hypertext Transfer Protocol (HTTP), Simple Mail Transfer Protocol (SMTP), Telnet, File Transfer Protocol (FTP) 2.3 Introduction to Presentation Layer, Services of Presentation Layer: Data encoding, Data encryption and data compression 2.4 Introduction to Session Layer, Services of session layer: Data Flow control, simplex, half-duplex, or full-duplex, Token Management, Synchronization.	8	

Module -3:	Module -3: Network Performance 3.1 Transport layer - Transport Layer Primitives: listen, connect, send, receive, disconnect, Protocols: TCP, UDP 3.2 Network layer- IP Protocol and IP addressing, Connection oriented and connectionless services 3.3 Routing algorithm: Shortest path, Flooding, distance vector, Congestion control 3.4 Data link Layer- Data Link Layer protocols: Stop and Wait protocol, Sliding window protocol 3.5 Services of Data Link Layer: Framing, Error detection and correction, Flow control	8
Module -4:	Module -4: Network Vulnerabilities 4.1 Introduction to Vulnerabilities and Threats, Threats in transit, Protocol flaws, Impersonation 4.2 Active/Passive and Passive attacks: Virus, Worm. Malware, Hacking, Cracking, Sniffing, Spoofing, Dos, DDos, Masquerade, Trojan Horse. Ransomware, Logic bombs, Botnets, Keyloggers, Rootkits 4.3 Identification of Network vulnerabilities. Network security controls: Authentication, Access Controls, Basic Cryptography terminologies.	6
Reference Books:- 1) Andrew S. Tanenbaum: Computer Networks, 4th Edition, PHI. 2) Computer Networks – Protocols, Standards, and Interfaces, 2nd Edition by Uyless Black. 3) Computer Networking - A Top-Down Approach Featuring the Internet, 5th Edition, J.F. Kurose and K. W. Ross, Pearson Education, 2009. 4) Computer Networks: An Open-Source Approach, 1st Edition, R2. Y. D Lin, R. H Hwang, and F. Baker, McGraw Hill, 2011. 5) Bernard Menezes, ‘Network Security and Cryptography’, Cengage Learning, ISBN: 978- 81-315-1349-1.		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): - CCE - I : 10 Marks: Objective - CCE - II: 10 Marks: Objective - Mid Semester Exam: 20 Marks: Subjective Note: Conversion of 40 marks of internal evaluation to 20 Marks		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 Computer Application		
	Programme: B.Sc.	Semester - VI	
	Type: Elective Practical	Marks: 50	
	Credits:1	From: A. Y. 2025-26	
Name of the Course: BCAP 369 Lab Course Based on BCAT 366			
Course Objectives: 1) Understand Basic Networking Concepts. 2) Learn Transmission Media and Switching Techniques. 3) Understand Network Models and Protocol Operations. 4) Enhance Practical Network Performance Skills. 5) Identify and Mitigate Network Vulnerabilities.			
Course Outcomes: 1) Apply Networking Concepts in Real-world Scenarios. 2) Demonstrate Proficiency in Transmission Media and Multiplexing. 3) Implement and Analyze Network Protocols. 4) Evaluate Network Performance and Troubleshooting. 5) Implement dynamic programming technique.			
Module	Title and Contents	Hrs.	
Section I:	List of Practical 1) Demonstrate the setup of a simple Client-Server network using two devices and verify connectivity using a ping command.. 2) Identify and describe the physical components of a data communication setup. 3) Configure and compare the performance of different network topologies: Bus, Ring, and Star using a network simulation tool. 4) Set up a Local Area Network (LAN) and share files between devices using a Peer-to-Peer network architecture 5) Experiment with different transmission media (e.g., Twisted Pair vs. Coaxial Cable) and measure signal strength using available tools 6) Simulate data transfer using guided media (Fiber Optic) and unguided media (Radio Waves) in a network simulation tool. 7) Implement and observe the working of Frequency-Division Multiplexing (FDM) using a simulation tool 8) Compare data transmission delays in Time Division Multiplexing (TDM) versus Wavelength Division Multiplexing (WDM). 9) Simulate and analyze the working of circuit switching and packet switching using network simulation software. 10) Configure message switching in a network simulator and observe the routing of messages between devices 11) Implement and analyze the layers of the OSI model using a tool that displays protocol operations.	30	

	12) Configure a Domain Name System (DNS) server and resolve domain names to IP addresses in a LAN environment. 13) Set up an HTTP server and simulate a request-response cycle using a web browser or a curl command 14) Write a program or script to implement and test the Stop-and-Wait protocol for reliable data transfer between two systems. 15) Compare the performance of TCP and UDP by transferring a large file using both protocols and measuring transfer speed and reliability.	
Reference Books:- 1) Andrew S. Tanenbaum: Computer Networks, 4th Edition, PHI. 2) Computer Networks – Protocols, Standards, and Interfaces, 2nd Edition by Uyless Black. 3) Computer Networking - A Top-Down Approach Featuring the Internet, 5th Edition, J.F. Kurose and K. W. Ross, Pearson Education, 2009. 4) Computer Networks: An Open-Source Approach, 1st Edition, R2. Y. D Lin, R. H Hwang, and F. Baker, McGraw Hill, 2011. 5) Bernard Menezes, ‘Network Security and Cryptography’, Cengage Learning, ISBN: 978- 81-315-1349-1.		
Evaluation Pattern:		
Total Marks: 50		
Journal, Students' Performance Viva, Project (20 Marks): • Journal: 10 Marks • Students' Performance: 05 Marks • Viva: 05 Marks	Practical Exam Paper (30 Marks): • Section I: Attempt any three questions (Five questions of 10 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 Application		
	Programme: B.Sc.	Semester - VI	
	Type: VSC	Marks: 50	
	Credits:2	From: A. Y. 2025-26	
Name of the Course: BCAPVSC 3, Android Programming			
Course Objectives: 1) Understand Mobile Computing and frameworks. Work with Android Development Tools (IDE, SDK). 2) Understand emulators, virtual devices and development platforms. 3) Understand XML Fundamentals. 4) Interact with apps and network/cloud operations.			
Course Outcomes: 1) Install and Configure Android IDE. 2) Create, Compile and run Programs. 3) Write a short introductory program 4) Use the emulator to test the app 5) Create layout, use audio, photos and video.			
Module	Title and Contents	Hrs.	
Section I:	List of Practical 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 new activity using explicit intent and implicit intent . 14) 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”. 15) Develop a program: a) Send SMS b) Receive SMS	60	
Reference Books:- 1) Android Programming for Beginners: John Horton ,2019			

- 2) Android App Development Michael Burton ,2015
- 3) Kothari, Gajendra. “Android Programming.” Latest Edition: 2022.
- 4) Tiwari, Yogesh. “Android Application Development.” Latest Edition: 2021.
- 5) Wallace, James Talbot. “Learning Android Development with Kotlin.” Latest Edition: 2021.

Evaluation Pattern:

Total Marks: 50

Journal, Students' Performance Viva, Project (20 Marks):

- Project Part I : 10 Marks
- Students' Performance: 05 Marks
- Viva: 05 Marks

Practical Exam Paper (30 Marks):

- Section I: Attempt any three questions
(Five questions of 10 Marks)