

NEP 2023

Pattern

**Progressive Education Society's
Modern College of Arts, Science and Commerce(Autonomous),
Shivajinagar, Pune - 5
TYBCA (Science)
(2023 Course under NEP)**

Course Code : 23CsBcaU5101

Course Name : Programming in 'Java' (T+P)

Teaching Scheme: 2 Lectures/Week

Examination Scheme: CIA : 40 Marks

Credits: 4

End-Sem: 60 Marks

Prerequisite:

Basic knowledge of Object Oriented Programming language

Course Objectives:

- To understand the fundamentals of object-oriented programming in Java
- To understand the concept and importance of Exception Handling
- To understand basic screen design with Swing
- To understand User Interface Components with Swing
- To understand features of JavaFX

Course Outcomes:

On completion of the course, Students will be able to:

- Explore Object Oriented features
- Develop robust application using Core Java features
- Develop basic GUI based application
- Proficiency in Exception Handling
- Develop applications with File handling

CO No	Course Outcomes (COs)	Bloom's Cognitive Level
CO1	List and explain the fundamental concepts of Java, including OOP principles, data types, and control structures.	L1
CO2	Demonstrate the use of classes, objects, inheritance, polymorphism, and exception handling in Java programs.	L2
CO3	Apply Java constructs such as arrays, strings, packages, and interfaces to solve computational problems.	L3

CO4	Analyze the use of multithreading, file handling, and collections framework in application development.	L4
CO5	Evaluate different approaches for building efficient, reusable, and modular Java applications.	L5
CO6	Design and implement Java programs and mini-projects applying OOP and advanced Java features.	L6

Course Contents:

Unit No.	Title	Lectures
Unit 1	An Introduction to Java	4
	1.1 Overview of Java concepts 1.1.1 What can Java do? 1.1.2 Characteristics/buzzwords of Java 1.1.3 Advantages and disadvantages of Java 1.2 Comparison of Java and C++ 1.3 Java Environment, IDE 1.4 Java Tools – jdb, javap, javadoc 1.5 Data types, Variables 1.6 Operators 1.7 <u>Expressions, Statements, and Blocks</u> 1.8 Control Flow Statements 1.9 Wrapper classes 1.10 Simple java program	
Unit 2	Essential Classes and OOP's Concepts	2
	2.1 Introduction to OOP concepts (Class, Object, Inheritance, Interface, Package) 2.2 Basic I/O 2.3 Exceptions 2.4 Concurrency 2.5 The Platform Environment	
Unit 3	Objects and Classes	6
	3.1 Defining Your Own Classes 3.2 Access Specifiers (public, protected, private, default) 3.3 Array of Objects 3.4 Constructor, Overloading Constructors and use of 'this' Keyword 3.5 Usage of static block, static fields and static	

	methods 3.6 Predefined class – Object class and its methods getClass(), clone() 3.7 Usage of built-in string functions e.g. equals(), toString() etc... and mathematical functions e.g. sqrt(), pow(), round() etc... 3.8 Inner class, anonymous class 3.9 Creating .jar file and .manifest file 3.10 Garbage Collection (System.gc(), finalize() Method)	
Unit 4	Inheritance	4
	4.1 Inheritance Basics (extends Keyword) and Types of Inheritance 4.2 Superclass, Subclass and use of Super Keyword 4.3 Method Overriding and runtime polymorphism 4.4 Use of final keyword related to method and class 4.5 Use of abstract class and abstract methods 4.6 Interfaces 4.7 Runtime polymorphism using interface 4.8 Object Cloning	
Unit 5	Exception Handling	4
	5.1 Dealing with Errors and Exception 5.2 Exception class, Checked and Unchecked exception 5.3 Exception handling blocks: try, try with resources, catch, throw, throws, finally 5.4 Catching and handling exception 5.5 Creating user defined exception 5.6 Assertions	
Unit 6	Strings, Streams and Files	4
	6.1 String class and StringBuffer Class 6.2 Formatting string data using format() method 6.3 Stream classes, Byte Stream classes Character Stream Classes 6.4 Creation of files and usage of the File class 6.5 File operations: 6.5.1 Reading characters and bytes 6.5.2 Writing characters and bytes 6.6 Handling primitive data types 6.7 Random Access files	
Unit 7	User Interface Components with Swing, Introduction to JavaFX	6
	7.1 What is Swing?	

	7.2 The MVC(Model View Controller) Architecture and Swing 7.3 Usage of Layout Managers 7.4 Swing Components – JButton, JLabel, JText, JTextArea, JCheckBox, JRadioButton, JList, JComboBox, JMenu, JPopupMenu Class, JMenuItem, CheckBoxMenuItem, JRadioButtonMenuItem, JScrollBar 7.5 Dialogs (Message, confirmation, input), JFileChooser, JColorChooser 7.6 Event Handling: 7.6.1.Event sources (Mouse, Keyword) 7.6.2 Event Listeners 7.7 Adapters 7.8 JavaFX 7.8.1 What is JavaFX? 7.8.2 Key features of JavaFX	
	EXPERIENTIAL LEARNING (Case study: UI design)	

Reference books:

1. Java The Complete Reference - Eleventh Edition, Herbert Schildt, Tata Mc Graw Hill, ISBN-13 : 978-9390491629
2. Programming with Java | 6th Edition, E Balagurusamy, ISBN-13 : 978-9353162344
3. Core Java: Fundamentals, Volume I, 10th Edition, Cay S. Horstmann, Prentice Hall ISBN-13: 978-0134177304

Reference link:

<https://docs.oracle.com/javase/8/>

Lab work : Programming in Core JAVA

Teaching Scheme: 4 Hours/Week in the Lab

Course Objective:

To understand the process of designing and implementing applications with Core Java features.

Sr. No.	Assignment Name
1.	Java Tools and IDE, simple Java programs
2.	Essential Classes and OOP's Concepts
3.	Objects and Classes
4.	Inheritance
5.	Exception Handling
6.	Strings, Streams and Files
7.	User Interface Components with Swing

**Progressive Education Society's
Modern College of Arts, Science and Commerce, (Autonomous)
Shivajinagar, Pune – 5**

**TYBCA (Science)
(2023 Course under NEP)**

Course Code : 23CsBcaU5102

Course Name : Web Technologies-II (T + P)

Teaching Scheme: 2 Lectures/Week

Credits: 2

Examination Scheme: CIA : 20 Marks

End-Sem : 30 Marks

Desirable Prerequisites: One must have knowledge of PHP, HTML.

Course Objectives:

- Learn different technologies used at client-side Scripting Language

- Learn different technologies used at server-side Scripting Language
- Learn Java Script to program the behavior of web pages.
- Learn jQuery to program the behavior of web pages.
- Learn AJAX to make our application more dynamic

Course Outcomes:

CO No.	Course Outcome (CO)	Bloom's Level (BL)
CO1	Understand and apply PHP superglobals to handle form data.	2,3
CO2	Demonstrate file handling operations such as reading and writing.	3
CO3	Analyze XML structure and integrate XML with PHP for data exchange.	4
CO4	Implement dynamic web pages using JavaScript and manipulate DOM.	3
CO5	Use jQuery for efficient DOM manipulation and event handling.	3,5
CO6	Develop interactive web applications using AJAX and PHP for data retrieval.	6

Course Contents:

Unit No.	Title	Lectures
Unit 1	Web Techniques	8
	1.1 Super global Variables 1.2 Server information 1.3 Sticky forms 1.4 File Uploads 1.5 Setting response headers 1.6 Maintaining state 1.6.1. Session and Cookies	
Unit 2	Files and Directories	3
	2.1 Working with files and directories 2.2 Opening and Closing 2.3 Getting information about file	
Unit 3	XML	5
	3.1 What is XML? 3.2 XML document Structure 3.3 PHP and XML 3.4 XML parser	

Unit 4	JavaScript-DHTML	6
	4.1 Overview of JavaScript, DHTML 4.2 Basic Syntax (JS data types, JS variables) 4.3 Primitives, Operations and Expressions 4.4 JS Control statements 4.5 JavaScript Functions 4.6 JavaScript HTML DOM (onmouseup, onmousedown, onclick, onload, onmouseover, onmouseout)	
Unit 5	jQuery	4
	5.1 jQuery Introduction 5.2 Install and Use jQuery Library 5.3 First jQuery Example 5.4 jQuery Syntax 5.5 Basic Selectors (ID, CLASS) 5.6 jQuery programs	
Unit 6	Ajax	4
	6.1 Understanding java scripts for AJAX 6.2 Classical AJAX web application model (Using XML) 6.3 Connecting database using php and AJAX 6.4 Ajax jQuery programs	

Reference books:

1. Programming PHP By Rasmus Lerdorf and Kevin Tatroe O' Reilly publication ISBN: 9781449392772, 3rd Edition
2. Beginning PHP 5, Wrox publication ISBN-10: 0 764557831 ISBN-13: 978-0764557835
3. AJAX Black Book Kogent Solutions ISBN-13978-8177228380
4. Mastering PHP BPB Publication ISBN: 9789387284203
5. Programming the World Wide Web, Robert W Sebesta (4th Edition) ISBN-10: 8131764583 ISBN-13: 978-8131764589
6. jQuery pocket reference by David Flanagan ISBN-10 1449397220
7. Learning jQuery by Jonathan Chaffer ISBN-10: 1849516545 ISBN-13: 978-1849516549
8. JavaScript and jQuery by David Sawyer McFarland ISBN-10 : 1491947071 ISBN-13 : 978-1491947074
9. www.php.net.in
10. www.jquery.com
11. www.W3schools.com

Course Code : 23CsBcaU5102

Course Name : Lab on Web Technologies-II

Teaching Scheme: 4 Hours/Week

Credits: 2

Examination Scheme: CIA : 20 Marks

End-Sem : 30 Marks

Sr.No.	Title of the assignment
--------	-------------------------

1.	Super global Variable Sticky Form Session Cookies
2.	File and Directories
3.	XML
4.	JavaScript
5.	jQuery
6.	AJAX Ajax with database connectivity Ajax jQuery

Progressive Education Society's
Modern College of Arts, Science and Commerce (Autonomous)
 Shivajinagar, Pune - 5

TYBCA (Science)
(2023 Course under NEP)

Course Code :23CsBcaU5103

Teaching Scheme: TH: 2Hours/Week

Examination Scheme: CIA : 20 Marks

Course Name :Data Analytics

Credits : 02

End-Sem : 30 Marks

Prerequisites:

- Knowledge of probability theory, statistics and programming

Course Objectives:

- Able to apply fundamental algorithmic ideas to process data
- Learn to apply hypotheses and data into actionable Predictions
- To understand Data Analytics Life Cycle and Business Challenges

Course Outcomes:

After successful completion of this course students will able to :

CO No	Course Outcomes (COs)	Blooms Cognitive level
CO 1	understand Data science process	1
CO 2	Understand Basics of Data Analytics and Types of Analytics	2
CO 3	Apply the concepts of Data processing	3
CO 4	Deploying the Data Analytics Lifecycle in data analytics projects	4
CO 5	Selecting appropriate data visualizations to clearly communicate analytic insights to business sponsors and analytic audiences	5
CO 6	Apply Data Analytics techniques in a Case study and also use Visualization techniques	6

Course Contents:

Unit No.	Title	Number of Lectures
Unit 1	Introduction to Data Science	6
	1.1 Basics of Data What is Data Science? Data science process Stages in data science project 1.2 Basics of Data Analytics Types of Analytics – Descriptive, Predictive, Prescriptive 1.3 Data Preprocessing, Normalization and Transformation, Use of BeautifulSoup Tool 1.4. Statistical Inference Populations and samples, Statistical modeling, Probability, Distribution,	

	Correlation, Regression	
Unit 2	Introduction to Machine Learning	7
	2.1.Introduction 2.2. Basics of Machine Learning 2.3. Supervised Machine Learning 2.3.1.kNN 2.3.2.Naive Bayes 2.3.3.Decision Tree 2.3.4.Support vector machines 2.4. Unsupervised Learning 2.4.1.Cluster Analysis 2.4.2.K means 2.4.3.Association Rule Mining 2.4.4.AprioriAlgorithm 2.5.Regression Analysis 2.5.1.Linear Regression 2.5.2.Nonlinear Regression	
Unit 3	Data Optimization	6
	2.1 Hyper parameter tuning using GridsearchCV 2.2 RandomSearchCV 2.3 Stacking, boosting, Ensembling 2.4 Feature Engineering 2.5 Concept of Over fitting, Under fitting, Balance/Imbalanced data, Cross Validation, Normalization 2.6 Web scrapping in 'Data Analytics' add tool 'Beautiful SOAP'	
Unit 4	Data Visualization	10
	4.1 Basic Principles Ideas and tools for data visualization, Graph visualization, Data Summaries, Model Checking and Comparison Purpose of Visualization Multidimensional Visualization Tree Visualization Graph Visualization Visualization techniques Understanding analytics output and their usage 4.2. Scikit package 4.3. Matplotlib library Plotting, subplots, Images 4.4. Data Visualization tools: Tableau, PowerBI 4.5. Extracting or interpreting graphs	
Unit5	Experiential Learning	1
	Apply Data Analytics techniques in a Case study and also use Visualization techniques	

Reference Books:

- Developing Analytic Talent: Becoming a Data Scientist, Vincent Granville, wiley, 2014

ISBN-10: 1118810082, **ISBN-13:** 978-1118810088

2. Introduction to Data Science, Jeffrey Stanton & Robert De Graaf, Version 2.0, 2013.

Progressive Education Society's

Modern College of Arts, Science and Commerce,

Shivajinagar, Pune - 5

Computer Science

(2023 Course under NEP 2023)

Course Code : 23CsBcaU5201

Course Name : ActionScript

Teaching Scheme: TH: 4 Hours/Week

Credits: 04

Examination Scheme: CIA : 40 Marks

End-Sem : 60 Marks

Prerequisite Courses:

- Object oriented Concepts
- scripting Concepts

Course Objectives:

- To understand the basic concepts of ActionScript and its applications.
- To study the usage of functions
- To study how to use scripting language while animating
- To understand the basic concepts for making interactive events
- To study handling Events

CO No	Course Outcomes (COs)	Blooms Cognitive level
CO 1	Define the basic concepts of ActionScript 3.0 and its applications.	1
CO 2	Explain the usage of functions in ActionScript and their role in scripting for animation.	2
CO 3	Implement ActionScript 3.0 to create basic interactions in Animate.	3
CO 3	Examine different events that occur during interactions and determine their impact on animations.	4
CO 4	Assess the effectiveness of various event-handling techniques in ActionScript.	5
CO 5	Develop interactive animations by integrating ActionScript functions and event handling.	6

Course Contents

Unit 1	Introduction	2 lectures
--------	--------------	------------

	1.1 Introduction to ActionScript 3.0 1.2 Applications of ActionScript 3.0 1.3 Features of ActionScript 3.0	
Unit 2	ActionScript 3.0 fundamentals	4 lectures
	2.1 Getting Started with coding 2.2 ActionScript Basics 2.3 Declaring and using Variables 2.4 Data types in ActionScript 3.0 2.5 Operators and Expressions 2.6 Converting datatypes and operators	
Unit 3	Introduction to Animate	4 lectures
	3.1 Introduction to interface 3.2 Frames and keyframes 3.3 What are Symbols 3.4 How to Animate 3.5 Adding Actionsript to Frames 3.6 ActionScript Syntax 3.7 Comments	
Unit 4	Manipulating Symbols with ActionScript	5 lectures
	4.1 Introducing Symbols 4.2 Types of Symbols 4.3 Using MovieClip and Button's property 4.4 Working with MovieClip Methods 4.5 Working with the text fields 4.6 Using text field properties 4.7 Adding Symbols to stage 4.8 Loading External Images	
Unit 5	Functions in Javascript	3 lectures
	5.1 What is Functions 5.2 Built-in functions and user defined functions 5.3 Function declaration 5.4 Function calling 5.5 Function return	
Unit 6	Control Statements	3 lectures
	6.1 Conditional Statements - if statement - if else statement - Switch statements 6.2 Iterative Statements(Loops) - for loop	

	• while loop • do while loop	
Unit 7	ActionScript Events	4 lectures
	7.1 Concept of events 7.2 Event handlers 7.3 ActionScript Event Types 7.4 Using Mouse Events 7.5 play and stop using ActionScript 7.6 Start and Drag using ActionScript	
Unit 8	Log-in panel and Forms in ActionScript	5 lectures
	8.1 Dynamic Text box 8.2 Different Text fields-input and password 8.3 use of external .php file for creating form using Actionsript 3.0	

Reference books:

- Essential ActionScript 3.0" by Colin Moock, ISBN-10: 0596526946, ISBN-13: 978-0596526948, Adobe Developer Library publication
- "Learning ActionScript 3.0: A Beginner's Guide" by Rich Shupe and Zevan Rosser, ISBN-10: 059652787X, ISBN-13: 978-0596527877, O'Reilly Media, Incorporated publication
- "ActionScript 3.0 Game Programming University" by Gary Rosenzweig, ISBN-10: 078973702X, ISBN-13: 978-0789737021, Que Publishing

Progressive Education Society's
Modern College of Arts, Science and Commerce (Autonomous),
Shivajinagar, Pune – 5

TYBCA (Science)
(2023 Course under NEP)

Course Code: 23CsBcaU5202

Course Name: Data Mining and Data Warehousing

Teaching Scheme: TH: 2 Hours/Week

Credit: 04

Examination Scheme: CIA: 40 Marks

End-Sem: 60 Marks

Prerequisite Courses:

- Understand the concepts of Data Ware housing and Data Mining Concepts.
- Explain the methodologies used for analysis of data
- Describe various techniques which enhance the data modelling.
- Discuss and Compare various approaches with other techniques in data mining and data ware housing

Course Objectives:

- To understand data warehouse concepts, architecture, business analysis and tools
- To understand data pre-processing techniques
- To study algorithms for finding hidden and interesting patterns in data
- To understand and apply various classification and clustering techniques using tools.

Course Outcomes:

After successful completion of this course students will able to:

CO No	Course Outcomes (COs)	Blooms Cognitive level
CO 1	Define the functionality of the various data mining and data warehousing component	1
CO 2	Explain schema types of dimensional data modelling.	2
CO 3	Apply appropriate classification, clustering techniques for data analysis	3
CO 4	Discover interesting patterns from large amounts of data to analyze for predictions and classification.	4
CO 5	Compare different approaches of data ware housing and data mining with various technologies.	5
CO 6	Design a Data warehouse system and perform business analysis with OLAP tools.	6

Course Contents:

Unit 1	Introduction to Data Mining	10 lectures
	1.1 Definition Data mining 1.2 Data Mining issues 1.3 Stages of the Data Mining Process (KDD) 1.4 Data Mining Techniques/Tasks 1.5 Knowledge Representation Methods 1.6 Applications of Data mining 1.7 Data Preprocessing • Data Cleaning • Data Transformation • Data Reduction • Data Integration	
Unit 2	Data Warehousing	08 lectures
	2.2 Introduction to Data Warehouse 2.3 Data Warehouse Architecture and its components 2.4 Data Modeling with OLAP • Introduction • Difference between OLTP and OLAP • Data Mart • Fact Table, Dimension Table, OLAP cube • Different OLAP Operations 2.5 Schema Design • Introduction • Star and snow-Flake Schema 2.6 Introduction to Machine Learning 2.7 Introduction to Pattern Matching 2.8 small example as case study based on Schema Design	
Unit 3	Classification	12 lectures
	3.1 Introduction • Definition 3.2 Decision Tree • Induction • Construction Principle • Continuous classes Classification and Regression Trees (CART) • Attribute Selection Measures • Tree Pruning 3.3 Bayes Classification Methods • Bayes' Theorem • Naive Bayesian Classification	

	3.4 Bayesian Networks 3.5 Linear classifier 3.6 Perceptron 3.7 k-Nearest-Neighbor Classifiers 3.8 Introduction to Prediction	
Unit 4	Clustering	08 lectures
	4.1 Cluster Analysis • Introduction to Unsupervised Learning • Requirements for Cluster Analysis • Problems faced in clustering 4.2 Hierarchical Methods • Agglomerative Hierarchical Clustering • Divisive Hierarchical Clustering 4.3 Partitioning Methods • k-Means: A Centroid-Based Technique • k-Medoids: A Representative Object-Based Technique	
Unit 5	EDA and Data Visualization	10 lectures
	5.1 What is Exploratory Data Analysis? 5.2 Steps in EDA 5.3 Basic tools (plots, graphs and summary statistics) of EDA 5.4 Types of exploratory data analysis 5.5 Basic principles of data visualization 5.6 Benefits of Data Visualization 5.7 Data visualization techniques 5.8 Tools for data visualization	
Unit 6	Data Mining Techniques, Accuracy Measures	12 lectures
	6.1. Frequent Item-Sets 6.2 Market Basket Analysis 6.3 Apriori Algorithm 6.4 Association Rule Mining 6.5 Rule Basic Measures – Support and Confidence 6.6 Precision, Recall, F-measure, Confusion Matrix	

Reference Books:

1. Introduction to Data Mining - Pang-Ning-Tan | Vipin Kumar Michael Steinbach, paperback publication
2. Data Mining Concepts and Techniques - Jiawei Han and Micheline Kamber
3. Data Mining Introductory and Advanced Topics - Margaret H. Dunham S. Sridhar
4. S.C. Gupta -Fundamentals of Statistics, ISBN-13: 978-8183183390
5. D.N. Elhance -Fundamentals of Statistics, ISBN-13: 978-8122500332

6. Data Mining Concepts and Techniques - Jiawei Han | Micheline Kamber | Jian Pei
7. Data Mining - Pieter Adriaans , Dolf Zantinge
8. Data Warehousing in the Real World A Practical Guide for Building Decision Support Systems
- Sam Anahory , Dennis Murray
9. The Data Warehouse Toolkit - Ralph Kimball, Margy Ross Amir D Aczel, Jayavel
Sounderpandian -Complete Business statistics, ISBN-13: 978-0077108601

**Progressive Education Society's
Modern College of Arts, Science and Commerce,
Shivajinagar, Pune - 5
TYBCA (Science)
(2023 Course under NEP)**

Course Code: 23CsBCAU5301

**Course Name: Project Management- IV
(Software Project Management)**

Teaching Scheme: TH: 4 Hours/Week

Credit: 04

Examination Scheme: CIA : 40 Marks

End-Sem : 60 Marks

Prerequisite Courses:

- 1. Software Engineering**

Course Objectives:

1. To learn process of software project management
2. To understand details of cost estimation
3. To Learn use of project Management tools
4. To understand configuration management
5. To learn user roles and software teams
6. To be familiar with the different methods and techniques used for project management.

Course Outcomes:

1. Describe the principal tasks of software project managers, and basic concepts in software projects
2. Identify and describe the key phases of project management
3. Plan software projects, including risk and quality management
4. Explain basic concepts and principles of components of software

CO No	Course Outcome	Blooms cognitive Level
CO 1	Describe the principal tasks of software project managers, and basic concepts in software projects	1,4
CO 2	Identify and describe the key phases of project management	2,4
CO 3	Plan software projects, including risk and quality management	5,6,3
CO 4	Explain basic concepts and principles of components of software	1,2
CO	Be an active team member on an IT project.	3,6

5		
CO 6	Apply project management concepts and techniques to an IT project.	3,2

Course Contents

Unit No.	Title	Lectures
Unit 1	Introduction To Software Project Management	6
	1.1. Project Definition 1.2. Contract Management 1.3. Activities covered By Software Project Management 1.4. Overview of Project Planning 1.5. Stepwise Project Planning.	
Unit 2	Project Evaluation	9
	2.1. Work Break Down for Project Estimation & setting 2.2. Milestones 2.3. Different methods of estimation 2.3.1. COCOMO model 2.3.2. Delphi cost estimation 2.3.3. Function point analysis. 2.4. Project Management through Microsoft Project (MS-Project) 2.5. Introduction 2.5.1. Gantt Chart 2.5.2. PERT Chart 2.6. Usage of Microsoft Project for Estimation and Management 2.7. Software Project Metrics (Size Oriented, Software Measurement, Function Oriented, Object Oriented Metrics) 2.8. Project Scheduling, tracking & Progress reporting	
Unit 3	Activity Planning	9
	3.1. Objectives 3.2. Project Schedule 3.3. Sequencing and Scheduling Activities 3.4. Network Planning Models 3.4.1. Forward Pass 3.4.2. Backward Pass 3.5. Activity Float 3.6. Shortening Project Duration 3.7. Activity on Arrow Networks	
Unit 4	Risk Management	8
	4.1. Nature Of Risk 4.2. Types of Risk	

	4.3. Managing Risk 4.4. Hazard Identification 4.5. Hazard Analysis 4.6. Risk Planning and Control	
Unit 5	Software Quality Management & Control	7
	5.1. Quality Assurance & Standards 5.2. The SEI Capability Maturity Model CMM 5.3. Concept of Software Quality 5.3.1. Software Quality Attributes, 5.3.2. Software Quality Metrics and Indicators, 5.4. Quality assurance & Validation plan (SQA Activities, reviews, walkthroughs, inspection, testing) Automation to improve Quality in testing 5.5. Defect Management	
Unit 6	Configuration Management (CM)	7
	6.1. Configuration management & Maintenance plan 6.2. Change Management 6.3. Version and Release Management 6.4. Configuration Management Tools	
Unit 7	Managing People and Organizing Teams	10
	7.1. Introduction 7.2. Understanding Behaviour 7.3. Organizational Behaviour (Selecting The Right Person) 7.4. The Oldham Hackman Job Characteristics Model 7.5. Working In Groups 7.6. Becoming A Team 7.6.1. Decision Making 7.6.2. Leadership 7.6.3. Organizational Structures 7.7. Stress, Health and Safety 7.8. Case Studies	
Unit 8	Project Management Tools	3
	8.1. Project management tool like MS Project 8.2. Assignment based on the tool	
Unit 9	EXPERIENTIAL LEARNING	1
	Case study	

Reference books:

1. Software Project Management 5th Edition, McGraw. Hill. ISBN-10 : 0077122798, ISBN-13 : 978-0077122799
2. Effective Software Project Management 1st Edition Robert K. Wysocki ISBN-10 :

0764596365 , ISBN-13 : 978-0764596360

3. Information Technology Project Management by Kathy Schwalbe Thomson Publication.
ISBN-101285847091
4. Software project management in practice, Pearson, 1st Edition, Pankaj Jalote ISBN-13: 9780201737219
5. Software testing and quality assurance, Theory and practice, Wiley, 1st edition, Kshirsagar Naik ISBN-10 : 0471789119 ISBN-13 : 978-0471789116
6. Software project management, A Concise Study, S. A. Kelkar. ISBN-10 : 8120347021 ISBN-13 : 978-8120347021
7. Software Engineering-A Practitioner's Approach 7th or 8th edition, Roger Pressman, McGraw Hill Publication ISBN-10 : 0071184589 ISBN-13 : 978-0071184588
8. Reference website <http://www.pmi.org>

Progressive Education Society's
Modern College of Arts, Science and Commerce (Autonomous)
Shivajinagar, Pune – 5

TYBCA (Science)
(2023 Course under NEP)

Course Code: 23CsBcaU5501

Course Name: Lab Course on Python Programming

Teaching Scheme: PR : 4 Hours/Week

Credit : 02

Examination Scheme: CIA: 20 Marks

End-Sem : 30 Marks

Prerequisite Courses:

- An understanding of programming in an Imperative Language (e.g., C/C++)
- Knowledge of basic Discrete Mathematics (e.g., Sets, Relations, Functions)

Course Objectives:

- To introduce Python programming fundamentals and problem-solving skills.
- To cover essential Python concepts such as control structures, functions, and file handling.
- To introduce PostgreSQL database connectivity using Python.
- To implement real-world applications using Python and databases.

CO No	Course Outcomes (COs)	Bloom's Cognitive Level
CO1	List and recall fundamental Python programming concepts and syntax.	L1
CO2	Demonstrate the use of Python libraries, functions, and modules in solving problems.	L2
CO3	Apply object-oriented programming concepts (classes, inheritance, polymorphism) in Python programs.	L3

CO4	Analyze Python programs using exception handling, file handling, and regular expressions.	L4
CO5	Evaluate different Python approaches for data handling, performance, and modularity.	L5
CO6	Design and implement Python applications for real-world scenarios using advanced programming constructs.	L6

Course Contents:

Sr.No	List of practical
1	Basic Python Programming A. Writing and Executing Simple Python Programs B. Implementing Operators and Type Casting C. Working with input() and print() Functions D. Simple Arithmetic Operations and Expression Evaluation E. Debugging Simple Python Programs
2	Control Statements A. Implementing if-else and Nested Conditions B. Using Loops (for and while) for Pattern Printing C. Writing Programs Using Loop Control Statements D. Generating Fibonacci Series, Factorial, and Prime Numbers E. Implementing List Comprehension
3	Functions and Modules A. Writing and Calling User-Defined Functions B. Implementing Different Types of Function Arguments C. Using Built-in Functions (len(), sum(), max(), min())

	D. Recursion Programs (Factorial, Fibonacci) E. Importing and Using Built-in Modules (math, random)
4	Data Structures A. Working with Lists: Adding, Removing, Updating Elements B. Performing Operations on Tuples and Sets C. Using Dictionary Methods (get(), keys(), values(), items()) D. Implementing Nested Lists and Dictionaries E. Sorting and Searching Data in Python Collections
5	File Handling and Exception Handling A. Writing and Reading Text Files (.txt, .csv) B. Implementing File Operations (Open, Read, Write, Append) C. Working with Exception Handling (try-except) D. Handling Multiple Exceptions and Using finally E. Debugging Errors and Implementing assert Statements
6	Database Connectivity A. Creating a Database B. Connecting Python to database

**Progressive Education Society's
Modern College of Arts, Science and Commerce(Autonomous),
Shivajinagar, Pune - 5
TYBCA (Science)
(2023 Course under NEP)**

Course Code : 23CsBCAU6101

Course Name : Advance Programming in 'Java' (T+P)

Teaching Scheme: 4 Hours/Week

Credits: 04

Examination Scheme: CIA : 40 Marks

End-Sem: 60 Marks

Desirable Prerequisites: Knowledge of Core Java

Course Objectives:

- To learn database programming using Java

- To study web development concept using Servlet and JSP
- To learn socket programming for developing Client-Server applications

Course Outcomes:

On completion of the course, Students will be able to:

- Develop robust applications with Advanced Java features
- Develop applications with Java Database Connectivity
- Develop applications for Server side programming with Servlet and Java Server Pages

CO No	Course Outcomes (COs)	Bloom's Cognitive Level
CO1	List and explain advanced Java concepts including JDBC, networking, servlets, and multithreading.	L1
CO2	Demonstrate the use of advanced Java APIs for database connectivity, event handling, and GUI development.	L2
CO3	Apply Java features such as collections, generics, and exception handling in solving real-time problems.	L3
CO4	Analyze enterprise-level requirements and integrate Java technologies like JSP/Servlets for web solutions.	L4
CO5	Evaluate Java application designs for scalability, efficiency, and maintainability.	L5
CO6	Design and develop advanced Java-based applications incorporating database, GUI, and networking concepts.	L6

Course Contents

Unit No.	Title	Lectures
Unit 1	Collections	5
	1.1 Introduction to the Collection framework 1.2 List – ArrayList, LinkedList and Vector, Stack, Queue 1.3 Set - HashSet, TreeSet, and LinkedHashSet 1.4 Map – HashMap, LinkedHashMap, Hashtable and TreeMap	

	1.5 Interfaces such as Comparator, Iterator, ListIterator, Enumeration	
Unit 2	Database Programming	6
	2.1 Introduction to JDBC and Architecture 2.2 Types of JDBC drivers 2.3 <u>Processing SQL Statements with JDBC</u> , Usage of Resultset 2.4 Transactions – commit(), rollback(), SavePoint (Database : PostgreSQL)	
Unit 3	Servlet	7
	3.1 Introduction to Servlet 3.2 Servlet life cycle 3.3 Tomcat configuration (Note: Only for Lab Demonstration) 3.4 Handling GET and POST request (HTTP) 3.5 Handling data from HTML to servlet 3.6 Retrieving data from database to servlet 3.7 Session tracking 3.7.1 User Authorization 3.7.2 URL Rewriting 3.7.3 Hidden form fields 3.7.4 Cookies	
Unit 4	Java Server Pages (JSP)	6
	4.1 Introduction to JSP 4.2 JSP Lifecycle 4.3 Implicit Objects 4.4 Scripting elements – Declarations, Expressions, Scriptlets, Comments 4.10 JSP Directives 4.5.1 Page Directive 4.5.2 Include directive 4.6 Simple JSP Program 4.7 Mixing Scriptlets and HTML 4.8 Example of forwarding contents from database to servlet, servlet to JSP and displaying it using JSP Scriptlet tag	
Unit 5	Multithreading	4
	5.1 What are threads? 5.2 Thread Lifecycle 5.3 Starting and running thread (using Thread Class) 5.4 Thread Priorities 5.5 Running multiple threads	

	5.6 Usage of Runnable interface 5.7 Synchronization and inter-thread Communication	
Unit 6	Introduction to Frameworks	2
	7.1 Spring 7.1.1 Introduction of Spring framework, Bean 7.1.2 Spring Applications 7.1.3 Spring – MVC framework 7.2 Introduction to Components of Hibernate 7.3 Introduction to Struts and framework 7.4 Introduction to Maven framework, MOJO, POJO	
	EXPERIENTIAL LEARNING (Project Walkthrough)	

References Books:

1. Java The Complete Reference - Eleventh Edition, Herbert Schildt, Tata Mc Graw Hill, ISBN-13 : 978-9390491629
2. Programming with Java 6th Edition, E Balagurusamy, ISBN-13 : 978-9353162344
3. Core Java, Volume II—Advanced Features, Tenth Edition, Pearson publication, ISBN-13 : 978-0134177298
4. Getting started with Spring Framework: covers Spring 5 by J Sharma and Ashish Sarin, ISBN-13 : 978-1979962780
5. Spring 4 for Developing Enterprise Applications: An End-to-End Approach by Henry H.Liu, ISBN-13 : 978-0615639451

Reference link:

<https://docs.oracle.com/javase/8/>

Lab work:Programming in Advanced JAVA

Teaching Scheme: 4 Hours/Week in the Lab

Course Objective :

- To learn database programming using Java
- To study web development concept using Servlet and JSP
- To learn socket programming for developing Client-Server applications

Sr. No.	Assignment Name
1.	Collections
2.	Database Programming
3.	Servlets
4.	Java Server Pages
5.	Multithreading

Progressive Education Society's
Modern College of Arts, Science and Commerce (Autonomous),
Shivajinagar, Pune – 5

TYBCA (Science)
(2023 Course under NEP)

Course Code: 23CsBcaU6102

Course Name: Android App Development (T+P)

Total Credits : 4 (T+P)

Teaching Scheme: TH: 2 Hours/Week

Examination Scheme: CIA: 20 Marks

Credit: 02

End-Sem: 30 Marks

Prerequisite Courses:

- Basic knowledge of programming (preferably Java).
- Familiarity with object-oriented programming concepts.

Course Objectives:

- To introduce students to the fundamentals of Android app development.
- To build the skills necessary to design and develop Android applications.
- To familiarize students with Android tools, including Android Studio and essential libraries.

Course Outcomes:

After successful completion of this course students will able to:

CO No	Course Outcomes (COs)	Blooms Cognitive level
CO 1	Design and Apply various mobile applications using emulators.	1
CO 2	Utilize applications to hand-held devices	2
CO 3	Analyze Java programming concepts to Android application development.	3
CO 4	Install and configure Android application development tools	4
CO 5	Demonstrate their ability to debug programs running on mobile devices	5
CO 6	Build the database to store data locally	6

Course Contents:

Unit 1	Introduction to Android and Setup	5 lectures
	1.1 Overview of Android architecture and its components. 1.2 Introduction to Android Studio 1.3 Overview of Java basics for Android development.	
Unit 2	Android Studio Basics	4 lectures
	2.1 Exploring the Android Studio interface. 2.2 Creating a "Hello World" app. 2.3 Overview of the app structure: Manifest, resources, and code files	
Unit 3	User Interface (UI) Fundamentals	5 lectures
	3.1 Introduction to Views and Layouts (TextView, Button, EditText, etc.). 3.2 XML layout files and design basics. 3.3 Introduction to different layout types: LinearLayout, RelativeLayout, ConstraintLayout.	
Unit 4	Activity Lifecycle and Intents	6 lectures
	4.1 Understanding Activity lifecycle (onCreate, onStart, onPause, etc.). 4.2 Introduction to Intents: Implicit and Explicit Intents. 4.3 Navigating between activities using Intents.	
Unit 5	Event Handling in Android	5 lectures
	5.1 Setting up event listeners (Button click, text input). 5.2 Handling user interactions with UI elements. 5.3 Working with event listeners and callbacks in Android.	
Unit	Fragments in Android	5 lectures

6		
	6.1 Introduction to Fragments: Definition and lifecycle. 6.2 Managing Fragments within Activities. 6.3 Passing data between Activities and Fragments.	

Lab Course on Android

Teaching Scheme:PR : 4 Hours/Week
Examination Scheme: CIA: 20 Marks

Credit : 02
End-Sem : 30 Marks

Course Contents:

Sr.No	List of practical
1	Hello World App: Create a simple "Hello World" Android app with a button that displays a toast message when clicked.
2	UI Layout and Views: Build an app with the following UI elements: TextView, EditText, Button, and a Switch. When the button is clicked, it should display the entered text from EditText and toggle the Switch status.
3	Intent and Activity Navigation: Create a simple app with two screens. The first screen should have a Button that, when clicked, opens the second activity and displays a message.
4	Event Handling and User Interaction: Create an app with a Button and EditText. When the button is clicked, the app should display a greeting message that includes the text entered by the user in the EditText field.
5	Using SharedPreferences for Data Storage: Create an app with a Switch and a Button. When the button is clicked, save the Switch's status (on/off) in SharedPreferences, and load it when the app starts again.
6	User Input Validation: Create an EditText field for user input, Add a Button to validate the user input, If the user enters text, display a success message in a Toast. If the input is empty, show a message requesting the user to enter something.
7	Working with Different Layouts: Design three layouts: one using LinearLayout, another using RelativeLayout, and the third with ConstraintLayout., Add a Button in each layout that displays a Toast when clicked., Compare and understand the differences between these layout types.
8	SQLite Database CRUD Operations: Create a SQLite database to store tasks (Task name and status), Implement the CRUD operations (Create, Read, Update, Delete) for tasks, Display the tasks in a RecyclerView, Implement a Button to add new tasks and another Button to delete them.
9	Image Picker: Implement an image picker using Intent, Display the selected image in an ImageView.
10	To create an Android app that performs addition, factorial calculation, sum of digits, Armstrong number check, reverse number, and palindrome number check.

Reference Books:

1. "Android Programming: The Big Nerd Ranch Guide" by Bill Phillips, Chris Stewart, and Kristin Marsicano **ISBN-13:** 978-0134706054,
2. "Android Development for Beginners: Learn to Build Android Apps" by Google Developers **ISBN-13:** 978-0991391134
3. "Head First Android Development: A Brain-Friendly Guide" by Dawn Griffiths and David Griffiths **ISBN-13:** 978-1491974050
4. "Professional Android" by Reto Meier and Ian Lake **ISBN-13:** 978-1118779607
5. "Android Cookbook: Problems and Solutions for Android Developers" by Ian F. Darwin **ISBN-13:** 978-1449319510
6. "Android Application Development for Java Programmers" by James C. Sheusi **ISBN-13:** 978-0137057133
7. "Android Studio 3.0 Development Essentials" by Neil Smyth **ISBN-13:** 978-1942270679
8. "Android App Development for Dummies" by Michael Burton **ISBN-13:** 978-1118840492

Progressive Education Society's
Modern College of Arts, Science and Commerce,
Shivajinagar, Pune - 5
TYBCA (Science)
(2023 Course under NEP)

Course Code: 23CsBcaU6103

Course Name: Lab Course on DOT NET

Teaching Scheme: TH: 4 Hours/Week

Credit: 02

Examination Scheme: CIA: 20 Marks

End-Sem: 30 Marks

Prerequisites:

- Knowledge of object-oriented programming concepts such as data abstraction, encapsulation, inheritance, and polymorphism.
- Familiarity with programming language such as C++ and core Java.
- Knowledge of web development.

Objectives:

- To understand the DOTNET framework.
- C# language features.
- Web development using ASP.NET.

Course Outcome:

- Knowledge of object-oriented concepts. Design user experience and functional requirements C#.NET application.
- Code solutions and compile C# projects within the .NET framework.
- Design and develop professional console and window-based .NET application, Web application
- Data Binding concepts using ADO.NET in window-based application, Web Application.
- Pick up design patterns which is best practice for Web service interface documents.
- It helps in identifying the current problems in the Company and suggest solution(s) using .NET applications.

CO No	Course Outcomes (COs)	Bloom's Cognitive Level
-------	-----------------------	-------------------------

CO1	List and describe the basics of .NET framework, CLR, and IDE environment.	L1
CO2	Demonstrate the use of C# programming constructs (data types, classes, methods) in .NET applications.	L2
CO3	Apply object-oriented features of .NET (inheritance, polymorphism, interfaces) to solve problems.	L3
CO4	Analyze the use of ADO.NET for database connectivity and data manipulation.	L4
CO5	Evaluate different approaches for developing secure, scalable, and efficient .NET applications.	L5
CO6	Design and implement desktop/web applications using .NET technologies and GUI frameworks.	L6

Course Contents:

Sr.No	List of practicals
1	Basic concepts of Object-Oriented Programming Language using C#. A. Using Flow of Control Statement B. Using Class and Object C. Use of types of properties D. Use of Functions, Delegates E. Exception Handling
2	Windows Programming A. Use of controls of Form B. Validation of Form C. Use of ADO.NET I. Data Binding II. SQL Queries
3	Web Programming with ASP.NET A. ASP.NET Server Controls

	B. ASP.NET Web Controls C. Validation Controls D. Concept of Session and Cookies D. Use of ADO.NET I. Data Binding II. SQL Queries
--	---

Progressive Education Society's
Modern College of Arts, Science and Commerce,
Shivajinagar, Pune - 5
TYBCA (Science)
(2023 Course under NEP)

Course Code: 23CsBcaU6201

Teaching Scheme: TH: 4 Hours/Week

Examination Scheme: CIA : 40 Marks

Course Name: Internet of Things

Credit: 4(T+P)

End-Sem : 60 Marks

Prerequisite Courses:

Basic knowledge of Electronics and Computer Networks.

Course Objectives:

- To study fundamental concepts of IoT
- To learn different protocols used for IoT
- To understand roles of sensors, actuators in IoT
- To learn programming Arduino and Raspberry Pi

- To learn to implement IoT systems using open source IoT platforms.

Course Outcomes:

After successful completion of this course students will able to:

CO No	Course Outcomes (COs)	Blooms Cognitive level
CO 1	Identify and Describe fundamental concepts of IoT, terminologies, sensors, actuators, WSN	1
CO 2	Explain IoT systems architectures, IoT Enabling Technologies and protocols	2
CO3	Experiment with practical IoT systems, make use of programming concepts to work with Arduino and Raspberry Pi	3
CO 4	Illustrate and Compare protocols, analyze data flow	4
CO 5	Evaluate performance and security, propose improvements to IoT systems	5
CO 6	Design and Discuss new IoT systems or applications tailored to specific use cases, Implement IoT systems using open source IoT platforms.	6

Chapter No.	Title	Lectures
Chapter 1	Introduction to IoT and Fundamental Concepts of IoT	20
	1.1 Introduction • Definitions and characteristics of IoT • IoT architecture	
	1.2 Physical design of IoT • Things in IoT • IoT protocols • Introduction to IoT application layer protocols • HTTP,CoAP,MQTT,XMPP,DDS,AMQP	
	1.3 Logical design of IoT • IoT functional blocks • IoT communication models	
	1.4 IoT Enabling Technologies • Wireless Sensor Networks • Cloud computing	

	• Big data analytics • Communication protocols • Embedded systems	
	1.5 IoT levels and deployment templates	
	1.6 Wireless and wired communication technologies for iot	
	1.7 Embedded Computing basics • Microcontrollers • System-on-Chip • Choosing the right platform for your IoT device	
	1.8 IoT examples	
Chapter 2	Understanding Sensors, Actuators and WSN	7
	2.1 Sensors • Definition • Types of sensors • Examples of sensors	
	2.2 Actuators • What is actuator? • Types of actuators • Examples of actuators	
	2.3 Wireless Sensor Networks • Structure of a Wireless Sensor Network • WSN and IoT	
Chapter 3	Working with Arduino	10
	3.1 Basics • Introduction • Arduino Uno board anatomy • Arduino Software (IDE)	
	3.2 Programming • Language reference • Variables: understand how to define and use ◦ variables in a sketch? • Functions: learn how to define and use ▪ functions in a sketch? • Library: using and installing arduino libraries	
	3.3 Examples on interfacing sensors and actuators with Arduino	
Chapter 4	Working with Raspberry Pi	12
	4.1 What is Raspberry Pi?	
	4.2 Raspberry Pi hardware specifications	

	4.3 About Raspbian 4.4 Linux commands 4.5 Basic hardware needed to run your Raspberry Pi 4.6 Setting up your Raspberry Pi 4.7 Using Python to connect to the real world via GPIO 4.8 Simple program assignments using Raspberry Pi 4.9 Examples on interfacing sensors and actuators with Raspberry Pi 4.10 IoT cloud platforms, sending sensor data to cloud	
Chapter 5	IoT Applications	5
	5.1 Home Automation 5.2 Cities 5.3 Environment 5.4 Energy 5.5 Retail 5.6 Logistics 5.7 Industry 5.8 Agriculture 5.9 Health and Lifestyle	
Chapter 6	IoT Security and Interoperability	5
	6.1 Security requirements for IoT 6.2 IoT security risks and challenges 6.3 Modes of attacks 6.4 Tools for security and interoperability	
Chapter 7	Experiential Learning	1

References

1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things A Hands-On-Approach", Universities Press
2. Jan Holler ,Vlasios Tsiatsis, Catherine Mulligan ,Stamatis Karnouskos ,Stefan Avesand, David Boyle, "From Machine to Machine to the Internet of Things Introduction to a New Age of Intelligence", Elsevier Publication
3. Adrian McEwen,Hakim Cassimally,"Designing Internet of Things", Wiley Publication
4. <https://www.arduino.cc/en/Tutorial/HomePage>
5. <https://www.raspberrypi.org/documentation>
6. <https://docs.thinger.io/>
7. <https://nodered.org/>
8. <https://thingspeak.com/>

Assignments on Internet of Things(IoT)

1. Programming Arduino Development Board Using Simulation Software
2. Interfacing LEDs, sensors, motors with Arduino
3. Interfacing LEDs, analog and digital sensors with Raspberry Pi
4. Interfacing Servo Motors, DC motors with Raspberry Pi
5. Raspberry Pi Pulse Width Modulation(PWM)
6. Pi Camera Interface with Raspberry Pi
7. Sending Sensor Data to Cloud platform
8. IoT Device Controlling Using Cloud
9. Building Smart Home Cloud Service with Google
10. Interface Bluetooth with Arduino/Raspberry Pi to Turn LED ON/OFF when '1'/'0' is Received from Smart Phone Using Bluetooth
11. Controlling LED/Motor through Web Server
12. Mobile Application Connectivity for IoT
13. Uploading Data on Cloud using Wi-Fi ESP8266 Module
14. IBM Node-RED Tool
15. Using Google Firebase for IoT Device Configuration

Note: Assignments from 1 to 7 are Compulsory and 8 to 15 are Optional.

**Modern College of Arts, Science and Commerce,
Shivajinagar, Pune - 5
TYBCA (Science)
(2023 Course under NEP)**

Course Code: 23CsBcaU6202

Teaching Scheme: TH: 4 Hours/Week

Examination Scheme: CIA : 40 Marks

Course Name: Cloud Computing

Credit: 4

End-Sem : 60 Marks

Desirable Prerequisite: Basic knowledge of Computer Networks, Virtualization.

Course Objectives:

- To study fundamental concepts of Cloud Computing
- To understand virtualization in cloud computing
- To learn application and security in cloud computing

- To learn advanced concepts and future trends in cloud computing

Course Outcome:

After successful completion of this course students will able to:

CO No	Course Outcomes (COs)	Blooms Cognitive level
CO 1	Define Cloud Computing. List desired features and benefits of Cloud Computing, leading cloud platform features and services	1
CO 2	Demonstrate cloud deployment models, cloud service models, multicloud concepts	2
CO3	Discover the security and compliance challenges of cloud computing	3
CO 4	Compare operation and economic models of various trending cloud platforms prevailing in IT industry.	4
CO 5	Examine the virtualization foundations to cater to the needs of elasticity, portability, and resilience of cloud service providers	5
CO 6	Discuss architectural style, work flow of real-world applications ,and elaborate advanced concepts and future trends in cloud computing	6

Course Contents

Unit No.	Title	Lectures
Unit 1	Cloud Computing – A overview	12
	1.1 Cloud vs. Traditional IT 1.2 Defining Cloud Computing 1.3 Cloud Computing Architecture 1.4 Deployment models – Public, Private, Hybrid 1.5 Service models – Infrastructure as a Service (IaaS), Platform as a service (PaaS), Software as a Service (SaaS) 1.6 Examining the characteristics of Cloud Computing 1.7 Benefits of Cloud Computing 1.8 Disadvantages of Cloud Computing Features ,services of cloud platforms : Google Cloud Platform, Microsoft Azure, AWS, Salesforce 1.9 Multicloud Environment	
Unit 2	Abstraction and Virtualization	12
	2.1 Introduction to Virtualization Technologies 2.2 Load Balancing and Virtualization 2.3 Understanding Hypervisors – Virtual Machine types 2.4 Virtualization Structures/Tools and Mechanisms	

Unit 3	Understanding Cloud Security	12
	3.1 Cloud computing security fundamentals 3.2 Common Threats and Vulnerabilities 3.3 Cloud computing security architecture: Architectural Considerations- General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro-architectures. 3.4 Identity Management and Access control :Identity management, Access control, Autonomic Security 3.5 Cloud computing security challenges: Virtualization security management, virtual threats, VM Security Recommendations, VM-Specific Security techniques,	
Unit 4	Moving Application to cloud	8
	4.1 Cloud Migration strategies and process 4.2 Six R's of Cloud Migration 4.3 Applications in the Clouds • Functionality mapping • Application attributes • Cloud service attributes 4.4 Cloud bursting	
Unit 5	Advanced Cloud Concepts	8
	5.1 Serverless Computing (FaaS - AWS Lambda, Azure Functions) 5.2 Containerization and Orchestration (Docker, Kubernetes, AWS EKS, Azure AKS) 5.3 Big Data and Analytics (AWS EMR, Google BigQuery, Azure Synapse) 5.4 Machine Learning Integration (AWS SageMaker, Azure ML, Google AI Platform)	
Unit 6	Future Trends in Cloud Computing	8
	6.1 Edge Computing and Its Relation to Cloud 6.2 Cloud and Internet of Things (IoT) 6.3 Artificial Intelligence and Machine Learning in Cloud 6.4 Cloud Computing for High-Performance Computing (HPC) 6.5 The Future of Cloud Security and Privacy	
Unit 7	Experiential Learning	1
	Case Study based on Cloud Computing Concepts	

Reference books:

1. Cloud Computing Bible – Barrie Sosinsky. Willey India Edition. ISBN-13 : 978-9332535923
2. Cloud Computing Principles and Paradigms- Rajkumar Buya, James Broberg, Andrzej Goscinski. Willey publication. ISBN-13 : 978-8126541256
3. The Cloud Computing Book: The Future of Computing Explained, CRC Press, ISBN-13: 978-0367706845
4. Cloud Security: A Comprehensive Guide to Secure Cloud Computing-Ronald L. Krutz ,

Russell Dean Vines. ISBN-13: 978-0470589878

5. Distributed and Cloud Computing From Parallel Processing to the Internet of Things, Kai Hwang, Jack Dongarra, Geoffrey C. Fox. ISBN: 9780128002049

Ebook:

<https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.500-291r2.pdf>

MOOC courses link:

<https://nptel.ac.in/courses/106105167>

<https://www.digimat.in/nptel/courses/video/106104182/L01.html>

<https://www.digimat.in/nptel/courses/video/106104182/L02.html>

Progressive Education Society's
Modern College of Arts, Science and Commerce,
Shivajinagar, Pune - 5
TYBCA (Science)
(2023 Course under NEP)

Course Code : 23CsBCAU6301

Course Name : Project Management -IV
(Digital Marketing)

Teaching Scheme: TH: 2 Hours/Week

Credit : 04

Examination Scheme: CIA : 40 Marks

End-Sem : 60 Marks

Prerequisite Courses:

- Knowledge and Interest in Digital Platforms

Course Objectives:

- Develop a digital marketing plan that will address common marketing challenges
- Articulate the value of integrated marketing campaigns across SEO, Paid Search, Social, Mobile, Email, Display Media, and Marketing Analytics.
- Recognize key performance Indicators tied to any digital marketing plan
- Improve return on investment for any digital marketing plan

- Launch a new, or evolve an existing, career path in Digital Marketing

Course Outcomes:

On completion of the course, student will be able to–

- Self-Directed Learning: Develop the ability to work independently as well as effectively in the changing environment.
- Usage of Analytical Tools: Develop the ability to apply appropriate quantitative/qualitative techniques used in social science disciplines along with ICT, softwares etc.
- Life Skills: Articulate and apply ethics, values and ideals that demonstrate awareness of current societal challenges leading to better quality of life.

CO No	Course Outcomes (COs)	Blooms Cognitive level
CO1	Apply Digital Marketing Strategies: Develop and implement a structured digital marketing plan to address real-world business challenges.	3
CO2	Leverage Digital Tools & Analytics: Utilize SEO, Paid Search, Social Media, Email Marketing, and Web Analytics to enhance marketing performance.	4
CO3	Evaluate Marketing Performance: Identify key performance indicators (KPIs) and analyze campaign effectiveness to improve return on investment (ROI).	5
CO4	Adapt to Evolving Digital Trends: Stay updated with emerging digital marketing techniques and industry best practices to remain competitive.	2
CO5	Enhance Career Opportunities: Build a strong foundation for a career in Digital Marketing by applying learned skills to real-world scenarios.	6

Course Contents

Unit No.	Title	Lectures
Unit 1	Basics of digital marketing	4 lectures
	1.1 Introduction To Online Digital Marketing 1.2 Importance Of Digital Marketing 1.3 How did Internet Marketing work? 1.4 Traditional Vs. Digital Marketing 1.5 Types of Digital Marketing 1.6 Increasing Visibility 1.7 Visitors' Engagement 1.8 Bringing Targeted Traffic 1.9 Lead Generation	
Unit 2	Analysis and keyword research	4 lectures
	2.1 Market Research 2.2 Keyword Research And Analysis 2.3 Types Of Keywords 2.4 Tools Used For Keyword Research 2.5 Localized Keyword Research 2.6 Competitor Website Keyword Analysis 2.7 Choosing Right Keywords To The Project	
Unit 3	Search engine optimization (SEO)	4 lectures
	3.1 Introduction To Search Engine Optimization 3.2 How Did Search Engine work? 3.3 SEO Fundamentals & Concepts 3.4 Understanding the SERP 3.5 Google Processing 3.6 Indexing 3.7 Crawling	
Unit 4	On-page optimization	6 lectures
	4.1 Domain Selection 4.2 Hosting Selection 4.3 Meta Data Optimization 4.4 URL Optimization	

	4.5 Internal Linking 4.6 404 Error Pages 4.7 H1, H2, H3 Tags Optimization 4.8 Image Optimization	
Unit 5	Off-page optimization	10 lectures
	5.1 Link Building Tips & Techniques 5.2 Difference Between White Hat And Black Hat SEO 5.3 Social Bookmarking Submission 5.4 Search Engine Submission 5.5 Web 2.0 Submission 5.6 Article Submission 5.7 Image Submission 5.8 Video Submission 5.9 Forum Submission 5.10 PPT Submission 5.11 PDF Submission 5.12 Classified Submission 5.13 Business Listing 5.14 Blog Commenting	
Unit 6	SEO updates and analysis	6 lectures
	6.1 Google Panda, 6.2 Google Penguin, 6.3 Google Penalties 6.4 SEO Tools 6.5 Backlinks Tracking, Monitoring, And Reporting	
Unit 7	Local business & google mapping	4 lectures
	7.1 Creating Local Listing In Search Engine 7.2 Google Places Setup (Including Images, Videos, Map Etc) 7.3 Search Engine Visibility Reports 7.4 Verification Of Listing 7.5 Google Reviews	
Unit 8	Google adwords or pay per click marketing	8 lectures
	8.1 Google Adwords 8.2 Introduction To Online Advertising And Adwords	

	8.3 Adwords Account And Campaign Basics 8.4 Adwords Targeting And Placement 8.5 Adwords Bidding And Budgeting 8.6 Adwords Tools 8.7 Ads Type 8.8 Search Network 8.9 Display Network 8.10 Shopping Ads , Video Ads 8.11 Universal App Ads 8.12 Remarketing 8.13 Performance Monitoring 8.14 Reports	
Unit 9	Social media optimization (SMO)	8 lectures
	9.1 Social Media Optimization 9.2 Introduction To Social Media Networks 9.3 Types Of Social Media Websites 9.4 Social Media Optimization Concepts 9.5 Facebook, Google+, LinkedIn, YouTube, Pinterest 9.6 Hashtags 9.7 Image Optimization	
Unit 10	Google web analytics	6 lectures
	10.1 Getting Started With Google Analytics 10.2 Navigating Google Analytics 10.3 Audience 10.4 Acquisition 10.5 Traffic Sources 10.6 Behavior 10.7 Content 10.8 Visitors 10.9 Live Data	

Reference Books:

1. DIGITAL MARKETING STEP-BY-STEP by Ondrej Svoboda
2. Digital Marketing Growth Hacks: The World's Best Digital Marketers Share Insights on How They Grew Their Businesses with Digital