



**Bharati Vidyapeeth
(Deemed to be University)
College of Engineering, Pune**

**B.Tech.(Information Technology)
Programme Curriculum(2020Course)
Semester- V and Semester-VI**

CBCS2021Course

[illegible]

HUMAN COMPUTER INTERACTION					
Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture:	04	University Examination	60		
Practical:	-	Internal Assessment	40	Lecture	04
		Term Work	--	Practical	-
		Practical / Oral	--		
Total	04	Total	100	Total	04
Course Objective:					
To gain theoretical knowledge and practical experience in the fundamental aspects of designing and implementing user interfaces.					
Prerequisite:					
Basic computer knowledge					
Basic HTML knowledge					
Basic Software Engineering knowledge					
Course Outcomes: On completion of the course, students will have the ability to:					
1. To learn foundations of Human Computer Interaction.					
2. To understand Graphical User Interface.					
3. To identify Design Process.					
4. To learn Screen Designing.					
5. To understand Models and Theories of HCI.					
6. To learn Web Interface Designing.					
Unit I INTRODUCTION					08 Hours
What is HCI, History of HCI, Computer Devices, Difference between Humans and Computers, User Interface, Benefits of User Interface, Good Design, Benefits of Good Design					
Unit II THE GRAPHICAL USER INTERFACE					08 Hours
Popularity of Graphics, The concept of Direct Manipulation, Graphical System, Characteristics, Web User-Interface Popularity, Characteristics, Principles of User Interface. Design Thinking. Stages of Design Thinking.					
Unit III DESIGN PROCESS					08 Hours
Human Interaction with Computers, Models of Interaction: Frameworks, Ergonomics, Styles, Elements, Interactivity. Human Characteristics, Human Considerations. Design rules: principles, standards, guidelines, rules. Golden rules.					
Unit IV SCREEN DESIGNING					08 Hours
Design goals-Screen planning and purpose, organizing screen elements, Ordering of screen data and content-screen navigation and flow, Information retrieval on web-statistical graphics					
Unit V MODELS AND THEORIES					08 Hours

HCI Models, Cognitive models, Communication and collaboration models, Hypertext, Multimedia and World Wide Web.	
Unit VI WEB INTERFACE DESIGN	08 Hours
Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow – Case Studies, Game Designing, Application designing.	
Textbooks	
1. Ben Shneidermann, “Designing the user interface”, Third edition, Pearson Education Asia	
2. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, —Human Computer Interaction, 3rd Edition, Pearson Education, 2004	
Reference Books	
1. Wilbert O Galitz, ”The essential guide to user interface design”, , Wiley Drdeam Tech	
2. Alan Dix, janetFincay, GreGoryd, Abowd, Russell Bealg, “Human Computer Interaction”, Pearson Education	
List of Assignments	
1. Describe User interface with it’s benefits.	
2. Enlist and explain characteristics of Graphical User Interface.	
3. State design rules in Design process.	
4. How to design screen with proper planning? Explain.	
5. Explain HCI models.	
6. Describe and design web interface.	
Project Based Learning	
1. Design E-Shopping system	
2. Design E-government service system	
3. Design E-Hotel reservation system.	
4. Design E-Banking System	
5. Design Mechanism for an Augmented Reality Interface	
6. Design Mechanism for Virtual Reality Interface	
Syllabus for Unit Tests:	
Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit - VI

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING					
Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture	04	University Examination	60	Lecture	04
Practical:	02	Continuous Assessment	40		
		Termwork	25	Practical	01
		Oral	25		
Total	06	Total	150	Total	05
Course Overview					
The course provides an overview of the fundamentals of Machine Learning. The basic components needed to design a model to solve the problem, are covered.					
Prerequisite:					
Fundamental understanding of statistics.					
Introduction to Python.					
Course Outcomes: On completion of the course, students will have the ability to:					
1. Understand the fundamentals of probability and statistics.					
2. Implement the clustering using unsupervised learning.					
3. Apply the classification techniques.					
4. Apply the regression techniques.					
5. Apply the regularization for balancing the bias and variance.					
6. Apply the model for decision-making.					
Unit I					
Introduction to Artificial Intelligence & Machine Learning					08 Hours
Introduction to AI, ML, AI- Scope, Application, Environment, Probability Density Function, Normal Distribution, Standard Deviation, Regression Coefficient. Hypothesis Testing, Loss Functions. Introduction to supervised and unsupervised learning.					Pink with youtube
Unit II					08 Hours
Unsupervised Learning					
Clustering, Feature Extraction, Spurious Correlation, K-Means clustering, KNN, Dimensionality Reduction, Principal Component Analysis, Multidimensional Scaling.					
Unit III					08 Hours
Classification Algorithms					
Classification Algorithms- Naïve Bayes, Logistic Regression, Support Vector Machine, Decision Tree, Result validation of Classification – Precision, Recall, F-Measure, MAP, R-Curve.					
Unit IV					08 Hours
Regression algorithm					
Linear Regression, Lasso Regression, Ridge Regression, Random Forest Regression Loss Function – Mean Average Error, Mean Standard Error LogCosh, Huber, Quantile Loss					
Unit V					08 Hours
Regularization and Gradient Descent					

Cost functions, regularization, feature selection, hyper-parameters, and more complex statistical optimization algorithms like Gradient Descent and its.	
Unit VI	08 Hours
Bagging, Boosting, and stacking , Random forest	
Bagging Advanced supervised learning algorithms -Combining classification and regression algorithm, Trade-off between bias and variance, bootstrapping, and aggregating (also known as “Bagging”) to reduce variance. Random Forest algorithm, reduction in a correlation. Boosting and Stacking Advanced supervised learning algorithms –Boosting algorithm to reduce variance and bias. Design the case-specific model.	
Textbooks	
1 Introduction to Machine Learning with Python: A Guide for Data Scientists 1st Edition, Andreas Müller, Sarah Guido	
2 Data Science from Scratch: First Principles with Python 2nd Edition, Joel Grus	
3 Machine Learning in Action, Manning Publication, Peter Harrington	
4 Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, O’Reilly Media Publication, First Edition, AurelienGeron.	
5 Python Machine Learning, Packt Publication, Sebastian Raschka, Vahid Mirjalili.	
Reference Books	
1 Pattern Recognition and Machine Learning, Author: Christopher M. Bishop, Springer Publication.	
2 Machine Learning for Hackers: Case Studies and Algorithms to Get You Started Authors: Drew Conway & John Myles, O’Reilly Media Publication.	
List of Assignments	
1. Identify the association between dependent and independent variables.	
2. Apply the clustering techniques using unsupervised learning.	
3. Apply dimensionality reduction using PCA	
4. Apply Naïve Bayes classification algorithms.	
5. Apply the KNN algorithm for the classification.	
6. Implement Linear Regression Algorithm.	
7. Implement the SVM Algorithm for Regression.	
8. Apply regularization for avoiding overfitting.	
9. Calculate the Gradient descent for the given algorithm.	
10. Design a model for applying a combination of the algorithms.	
Project Based Learning	
1. Compare The effect of features over the output for the standard dataset (like Dataset at Kaggle).	
2. Calculate the distribution, normalization, and outliers to maximize the effect of the training.	
3. Compare the classification of the standard algorithm on the common dataset and check the consistency for the different datasets.	
4. Apply Bagging for combining the effect of the various algorithm.	
5. Implement the classification techniques for detecting spam content.	
6. Apply the pre-processing techniques to explore insights of the Dataset.	

7. Apply the regression approaches to predict the behaviour of a given stock.	
8. Implement all optimization algorithms for any classification or regression algorithm.	
9. Design a model to accurately classify the given video on YouTube based on the Metadata.	
10. Design the model resilient to the effect of the number of Epochs.	
A group of 3-4 students shall complete any one of the projects listed above.	
Syllabus for Unit Tests:	
Unit Test -1	Unit – I, Unit – II, Unit – III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

COMPUTER ORGANIZATION AND ARCHITECTURE					
Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture:	03	University Examination	60	Lecture	03
Tutorial:	01	Internal Assessment	40	Tutorial	01
		Term Work	--	Practical /Oral	--
		Practical/Oral	--		
Total	04	Total	100	Total	04
Course Objective:					
1. To learn the low-level design and working of computer/processor					
2. To learn parallel computing architectures and platforms					
Prerequisite:					
Digital Electronics, Microprocessor Architecture, Structured Programming					
Course Outcomes: On completion of the course, students will have the ability to:					
1. Understand the recent trends in Computer Architecture					
2. Understand various hardware design tools and platforms with case studies					
3. Understand the design techniques of control unit of a processor					
4. Understand the basic design of a processor and memory technologies					
5. Understand different multiprocessor architectures					
6. Understand different parallel processing architectures and concepts underlying.					
Unit I – Recent Advances					04 Hours
Technology trends in Computer Architecture, Performance Metrics, Improving performance, Moore's law, Cluster Computing, Cloud Computing, Quantum Computers, Hardware support for Operating Systems, Hardware Transactional Memory with OS support (HTMOS), GPU vs TPU					Done
Unit II – Digital Logic Design, Simulation and Debugging with HDLs					10 Hours
Case Study of Hardware Description Languages: A) VHDL B) Verilog C) SystemVerilog D) SystemC Case Studies of HDL Simulation and Debugging tools like ModelSim, Xilinx etc.					
Unit III – Control Unit Design					08 Hours
Hardwired Control Unit, Micro-programmed Control Unit design, Recent Trends					
Unit IV – Processor and Memory Design					08 Hours
Basic design of a Processor, Control path, Data path					

Cache memory: Working principle, Mapping functions, Replacement algorithms, Cache coherence, Examples, Atomic Memory, UFFO storage, UltraRAM, 3D NAND, Intel Optane memory, Recent Trends	Done
Unit V – Multiprocessor Architectures	06 Hours
Shared memory – Distributed Memory multiprocessor architectures, Message-Passing Multiprocessors, Dataflow machine architecture Supercomputer architecture, Recent Trends	
Unit VI – Parallel Computing and Programming	12 Hours
Pipelining, Data and Control Hazards, Stalls, RISC/Pentium-4 Pipeline, Complex Pipelines, Out-of-order Execution, Dynamic Scheduling, Tomasulo Algorithm, Register renaming, Register Scoreboarding, Basic compiler techniques for exposing instruction-level parallelism, Vector processors, Array processors, VLIW architecture, Multithreaded architecture, GPU Computing architecture, Nvidia Maxwell, CUDA, Writing a simple parallel algorithm, Parallel Programming languages, OpenMP, MPI, Pthreads, Amdahl's Law, Gustafson-Barsis's Law, Karp-Flatt Metric, isoefficiency, Recent Trends	
Textbooks	
1. Computer Organization and Architecture, William Stallings, Prentice Hall	
2. Computer Organization and Embedded Systems, Hamacher&Zaky, McGraw Hill	
3. Advanced Computer Architecture, Kai Hwang, Tata McGraw Hill	
4. Fundamentals of Logic Design, Charles Roth & Larry Kinney, Cengage Learning	
5. The Verilog: Hardware Description Language, Thomas & Moorby, Extra Materials	
6. Advanced Computer Architecture and Parallel Processing, Rewini& Barr, Wiley Publications	
Reference Books	
3. Computer Organization and Design: The Software/Hardware Interface, David Patterson, Elsevier	
4. Fundamentals and Standards in Hardware Description Languages, Jean Mermet, Springer Science	
5. Parallel Computers: Architecture and Programming, V.Rajaraman&C.Murthy, Prentice Hall India	
6. Introduction to Parallel Computing: From Algorithms to Programming, Roman Trobec, Springer	
Project Based Learning	
1. Case studies in recent trends in Computer Architecture	
2. Case studies in Hardware Description Languages and Simulators	
3. Recent Trends in Control Unit Design	
4. Case studies in recent Memory Technologies	
5. Case studies in recent trends in Multiprocessor Architectures	
6. Case studies in recent trends in Parallel Computing	
Syllabus for Unit Tests:	

Unit Test -1	Unit – I, Unit – II, Unit – III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

ADVANCED DATABASE SYSTEMS					
Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture	03	University Examination	60	Lecture	03
		Internal Assessment	40		
Practical	02	Term Work	25	Practical	01
		Practical	25		
Total	05	Total	150	Total	04
Course Objective:					
1. Exploring the working of large scale and emerging database management systems					
2. Study and analysis of query processing and query optimization in distributed and parallel databases					
Prerequisite:					
Student should be well aware of database management systems, analysis of data structure and algorithms with sufficient programming experience					
Course Outcomes: On completion of the course, students will have the ability to:					
1. Understand the working of distributed database management system					
2. Understand the processing and optimization of distributed queries					
3. Understand the architecture and query processing in parallel database management system					
4. Understand the concepts of advanced transaction management					
5. Understand the concepts of different information retrieval systems					
6. Understand the structure and significance of Big Data and NoSQL Databases					
Unit I - Distributed databases: Architecture and Design					06 Hours
Distributed data processing,What is a DDBS; Advantages and disadvantages of DDBS, Problem areas					
Distributed DBMS Architecture: Transparencies in a distributed DBMS,Distributed DBMS architecture, Global directory issues,					
Distributed Database Design: Alternative design methodologies and strategies, Distributed design issues, Types and role of Fragmentation, Types and role of replication, Data allocation					
Unit II - Distributed query processing and optimization					06 Hours
Distributed Query processing: Problem of query processing, Distributed query, Query decomposition, Distributed Query Processing Methodology, translation global queries to fragment queries					
Distributed Optimization: Objectives of query optimization, Factors governing query optimization, Ordering of fragment queries, optimization of join operation, Load balancing, Distributed query optimization algorithms					
Unit III - Parallel Database Management System					06 Hours
Introduction: Types of parallelism in database systems, Parallel Query Processing, multiprocessor architectures, parallel relational operators, parallelism in main-memory DBMS, parallel handling of integrity constraints, Integrated I/O parallelism					

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Orange

Parallel Query Processing and Optimization: Inter-query parallelism, intra-query parallelism, intra-operation parallelism, inter-operation parallelism, objectives of parallel query optimization, parallel query optimization, load balancing, parallelism in join queries, testing the quality of query optimization	
Unit IV – Advanced concepts in Transaction Management	06 Hours
Transaction Management: ACID properties, pessimistic locking, optimistic locking, flat transactions, nested transactions, deadlock detection and management and their algorithms, Recovery Methods Concurrency control and Reliability in Distributed Databases: Concurrency control in centralized database systems vs Concurrency control in DDBSs, Distributed concurrency control algorithms, Deadlock management, Reliability issues in DDBSs; Types of failures, Reliability techniques, Commit protocols, Recovery protocol	
Unit V –Advanced Querying and Information Retrieval	06 Hours
Decision Support Systems, Data Analysis and OLAP, Data Mining, Data Warehousing, Information Retrieval Systems Database Tuning and Performance: Benchmarking, TPC benchmarks, object oriented benchmarks, TP Monitors, TPC and Wisconsin benchmarks, performance measurement, and performance tuning	
Unit VI - Big Data and NoSQL Databases	06 Hours
What is NoSQL? Why NoSQL? History of NoSQL Databases, Features of NoSQL, Types of NoSQL Databases, Query Mechanism tools for NoSQL, CAP Theorem Big Data - Introduction, Types, Characteristics, Testing, Examples, Introduction to Hadoop, MongoDB- Introduction, Architecture, Features, Data Modelling in MongoDB	
Textbooks	
<ol style="list-style-type: none"> 1. Database System Concepts, Seventh Edition, AviSilberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill 2. Data Warehousing: Concepts, Techniques, Products and Applications, 3rd Edition, C.S.R. Prabhu, PHI Learning Pvt. Ltd. 3. Stefano Ceri and Giuseppe Pelagatti, “Distributed databases principles and systems”, Tata McGraw Hill 	
Reference Books	
<ol style="list-style-type: none"> 1. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Sadalage, P. & Fowler, Wiley Publications 2. M. Tamer Özsu and Patrick Valduriez, “Principles of Distributed Database Systems”, Springer Science & Business Media, 3rd edition 	
List of Assignments	
<ol style="list-style-type: none"> 1. Compare query processing in RDBMS with DDBMS 2. Analysis of parallel sort and parallel join operations 3. Analysis of Lucene web search engine 4. Comparison of different NoSQL databases types 	

5. Analyse comprehensive aspects of factors that drive the MongoDB vs SQL decision	
6. Study of Hadoop as a big data tool	
List of Laboratory Exercises	
1. Installation of MongoDB	
2. MongoDB Create Database with primary key	
3. MongoDB Query Document using find(), Sort(), Limit() method	
4. MongoDB Count(), Remove() , Update(), Document() Functions	
5. MongoDB administration functions	
6. Installation of Cassandra environment	
7. Cassandra - Shell Commands	
8. Cassandra Table Operations	
9. Cassandra Keyspace Operations	
10. Cassandra CURD Operations	
Project Based Learning	
1. MongoDB Security, Monitoring & Backup	
2. MongoDB Indexing	
3. Creating User & add Role in MongoDB	
4. Streaming Twitter Data	
5. MongoDB Replication	
6. Analysis of FB data	
Syllabus for Unit Tests:	
Unit Test -1	Unit – I, Unit – II, Unit – III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

MOBILE APPLICATION DEVELOPMENT					
Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture	04	University Examination	60	Lecture	04
Practical	02	Internal Assessment	40		
		Term Work	25	Practical	01
		Practical	25		
Total	06	Total	150	Total	05
Course Objective:					
The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experience-					
<ol style="list-style-type: none"> 1. To help students to gain a basic understanding of Android application development. 2. To create simple Android Applications. 3. To understand how to publish, deploy and monetize Mobile Applications. 					
Prerequisite:					
<ol style="list-style-type: none"> 1. Java or object-oriented programming experience. 2. Application Development with JavaScript. 3. Application Development with cross platform. 4. Knowledge about Impressive User Interface features. 					
Course Outcomes: On completion of the course, students will have the ability to:					
1. Understand the features and architectures of mobile applications.					
2. Apply essential Android Programming concepts.					
3. Design user interface development using Android Screen Elements and Layouts					
4. Develop Android applications related to mobile related server-less database like SQLite.					
5. Create ISO Mobile application using Swfit and Xcode.					
6. Deploy and maintain the Android Applications.					
Unit I					08 Hours
Introduction to Mobile Application Development: Introduction to Mobile Applications and Device Platforms, The Mobile Application Development Life Cycle, Mobile application developing frameworks and Tools, The Mobile Application Front-End, The Mobile Application Back-End. Key Mobile Application Services, Mobile OS Architectures-Kernel Structure-Comparing and Contrasting architectures of Android, iOS and Windows. Android and ios arch and compare 5-6 points					
Unit II					08 Hours
Android Development Framework: Android OS design and Features, Android development framework, Android SDK features, best practices in Android programming, Types Android tools, Installing and running applications on Android Studio. Android application components: Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc., Android Application Lifecycle: Activities, Activity lifecycle, activity states, monitoring state changes, Services, Intents, Receiving and Broadcasting Intents, Permissions.					

Unit III	08 Hours
Android User Interface Components and Layouts: Android SDK, Android virtual Devices (AVDs), Emulators, Dalvik Virtual Machines, Difference between JVM and DVM, Android installation and configuration steps. Creating Adaptive and responsive user interfaces, Introduction to Android views and layouts, Editable and non-editable Text Views, Retrieving data from users, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers, View versus View Groups. Layouts – Build in Layout Classes such as Linear, Relative, Grid and Table Layouts, Fragments Fragment Life Cycle, Testing the user interface.	
Unit IV	08 Hours
Activity and Multimedia with Databases: Creating Private and Shared Preferences, Adding, Deleting and Updating Preferences, Working with Files and Directories, Creating SQLite Database, Storing, Updating and Deleting Database Records. Closing and Deleting SQLite Database. Study Android's Content Providers, Modify Content Providing Data Improving Applications using Content writing.	
Unit V	08 Hours
iOS Fundamental: Introduction to iOS, iOS Architecture, Frameworks, Application Life cycle, Features. Concepts of Swift, Features of Xcode, Navigator, Editor Utility, Tools. iOS Application start up: Application Templates, Concept of Storyboard, Hello World Application, Features and working approaches, Debugging Database, Preference, SQLite webservice and RESTful Web Services.	
Unit VI	08 Hours
Publishing Android Application: Performance Improvement of Android Application: Performance Parameters, Profiling Tools, Rendering and Layout, Garbage Collection and Memory Leaks, Best Practices, Testing Android applications. Preparing for Publishing: Signing, Versioning and Publishing the Android Application to the Android Market.	
Textbooks	
1. Android programming for Beginners, Horan, John, Packet Publication, 2015, ISBN: 978-1-78588-326-2	
2. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012	
3. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013	
4. J. F. DiMarzio, "Android: A Programmer's Guide", McGraw Hill Education (India) Private Limited. 1st Edition, 2008.	
5. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed. (2011)	
6. Unlocking Android Developer's Guide By Frank Ableson and Charlie Collins and Robi Sen, Manning Publication Co.	

Reference Books	
1.	Valentino Lee, Heather Schneider, Robbie Schell, Mobile Applications: Architecture, Design, and Development, Prentice Hall, April 2004, ISBN-13: 978-0131172630
2.	Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013
3.	Beginning Android, Mark L Murphy, Wiley India Pvt Ltd, Dreamtech Press 2009.
4.	Android Application Development All-in-One For Dummies, Barry Burd, For Dummies, 2015.
5.	Android Programming: The Big Nerd Ranch Guide), by Bill Phillips, Chris Stewart, Kristin Marsicano, Big Nerd Ranch Guides Publishing, 2017.
6.	Head First Android Development 2e: A Brain-Friendly Guide, Dawn Griffiths , David Griffiths., O'Reilly Publishing ,2017.
7.	Professional Android, by Reto Meier, Ian Lake, Wrox Publishing, 2018.
8.	Beginner's Guide to IOS 11 App Development Using Swift 4: Xcode, Swift and App Design Fundamentals, by SerhanYamacli, Createspace Independent Publication , 2018.
9.	Android Wireless Application Development By Lauren Darcey and Shane Conder, Pearson Education, 2nd Edition.
List of Assignments	
1.	Explain the basic terms related to Android system.
2.	Identify the tools and software required for developing an Android application.
3.	Describe the steps to configure the given Android Development environment.
4.	Describe the user interface for given Android application.
5.	Write the query to perform given operation.
6.	Describe Application life cycle in detail with an example.
List of Laboratory Exercises	
1.	Create “First Android Application” that will display “ BVDUCOEP-PUNE ” in the middle of the screen in the green color with White background.
2.	Develop an application that uses GUI components, Font and Colours.
3.	Create login application where you will have to validate EmailID (UserName). Till the username and password is not validated, login button should remain disabled.
4.	Developing of an application for data persistence.
5.	Create an application that will change color of the screen, based on selected options from the menu.
6.	Create an application that will display toast (Message) on specific interval of Time.
7.	Create a background application that will open activity on specific Time.
8.	Write an Android application for calculator.
9.	Implement an application that creates an alert upon receiving a message.
10.	Create simple app for Iso OS phone.
Project Based Learning	
1.	Create sample application with Check username and password only. On successful login, go to the next screen and on failing login, alert user using Toast. Also pass username to next screen.
2.	Write an Android application to convert into different currencies for example, Rupees to dollar.
3.	Create and Login application as above. On successful login, open browser with any URL.

4. Developing of simple game.	
5. Write an application to mark the daily route of travel in map.	
6. Write an android application to count library overdue.	
7. Create the MP3 player like application with service.	
8. Develop one Application, Which Contains Specific User Interface and design Interface.	
Syllabus for Unit Tests:	
Unit Test -1	Unit – I, Unit – II, Unit – III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

INFORMATION TECHNOLOGY LABORATORY-III					
Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Practical	02	Term Work	25 Marks	Practical	01
Tutorial	01	Practical	25 Marks	Tutorial	01
Total	03	Total	50 Marks	Total	02
Course Objective:					
To acquire programming skills in core Python to develop various applications.					
Prerequisite:					
Understanding of basic programming knowledge and oops concepts.					
Course Outcomes: On completion of the course, students will have the ability to:					
1. To acquire programming skills in core Python.					
2. To acquire Object Oriented Skills in Python					
3. To develop the skill of designing Graphical user Interfaces in Python					
4. To develop the ability to write database applications in Python					
Unit I : Introduction to Python					06 Hours
Install Python and Environment Setup • First Python Program • Python Identifiers, Keywords and Indentation • Comments and document interlude in Python • Command line arguments • Getting User Input • Python Data Types • What are variables? • Python Core objects and Functions • Number and Maths					
Unit II : List, Ranges & Tuples in Python					06 Hours
Introduction • Lists in Python • More about Lists • Understanding Iterators • Generators, Comprehensions and Lambda Expressions: - Introduction, Generators and Yield, Next and Ranges • Understanding and using Ranges • More About Ranges • Ordered Sets with tuples					
Unit III :Python Dictionaries and Sets					06 Hours
Introduction to the section • Python Dictionaries • More on Dictionaries • Sets • Python Sets Examples					
Unit IV :Input and Output in Python					06 Hours
• Reading and writing text files • writing Text Files • Appending to Files and Challenge • Writing Binary Files Manually • Using Pickle to Write Binary Files					
Unit V : Exceptions					06 Hours

<ul style="list-style-type: none"> • Errors in Python • Compile-Time Errors • Runtime Errors • Logical Errors • What is Exception? • Handling an exception • try....except...else • try-finally clause • Argument of an Exception • Python Standard Exceptions • Raising an exceptions • User-Defined Exceptions 	
Unit VI : Python Regular Expressions	06 Hours
What are regular expressions? • The match Function • The search Function • Matching vs searching • Search and Replace • Extended Regular Expressions • Wildcard	
Textbooks	
Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978-1111822705.	
Reference Books	
1. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016	
2. Mark Lutz, Programming Python, O`Reilly, 4th Edition, 2010	
List of Laboratory Exercises	
1. Write a program to implement Arithmetic Operations	
2. Write a program to implement Built-in Functions	
3. Write a program to implement Loops	
4. Write a program to implement Data Types	
5. Write a program to implement Strings	
6. Write a program to implement Classes and Objects	
7. Write a program to implement Built-in Modules	
8. Write a program to implement Constructors and Inheritance	
9. Write a program to implement File Operators	

Project Based Learning <ol style="list-style-type: none"> 1. Guess the Number Game 2. Rock, paper, scissors 3. Hangman 4. Countdown Timer 5. Password Generator 6. QR code encoder / decoder 7. Tic-Tac-Toe 8. Binary Search 9. Minesweeper 10. Sudoku Solver 11. Photo manipulation in Python 12. Markov Chain Text Composer 13. Pong 14. Snake 15. Online Multiplayer Game 16. Web Scraping Program 17. Weather Program 18. Code a Discord Bot with Python - Host for Free in the Cloud 19. Space invaders game 	
Syllabus for Unit Tests:	
NA	

CBCS 2021 Course[illegible]

CLOUD COMPUTING					
Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture	04	University Examination	60	Lecture	04
		Internal Assessment	40		
Practical	02	Term Work	25	Practical	01
		Oral	25		
Total	06	Total	150	Total	05
Course Objective:					
This course aims at giving students a knowledge of Cloud computing along with its applications in terms of the following					
<ul style="list-style-type: none"> • Understanding the systems, protocols, and mechanisms to support cloud computing. • Understanding the architecture of cloud computing • Discuss Cloud Platforms in Industry • Understanding cloud computing applications. • Discuss Cloud Security and various challenges 					
Prerequisite:					
<ul style="list-style-type: none"> • Computer Networks • Operating System-I • Information Security 					
Course Outcomes: On completion of the course, students will have the ability to:					
1. Understand the Concept of Cloud Computing					
2. Understand the Virtualization Techniques and its need.					
3. Analyse various types of clouds and its Architecture.					
4. Illustrate the fundamental concepts of cloud computing and understand their use in different scientific applications.					
5. Analyse and understanding of advanced concepts in Cloud Computing.					
6. Understanding of cloud security techniques.					
Unit I					
					08 Hours
Introduction:					
Definition, Historical Developments, Computing Platforms and Technologies. Building cloud computing environments, Principles of Parallel and Distributed Computing: Parallel versus Distributed Computing, Elements of Parallel Computing, Elements of Distributed Computing, and Technologies for Distributed Computing.					
Unit II					
					08 Hours
Virtualization:					
Characteristics, Virtualization Techniques, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples.					
Unit III					
					08 Hours
Cloud Computing Architecture:					

Cloud Reference Model, Types of Clouds, Economics of Clouds, Open Challenges, Cloud Platforms in Industry: Amazon Web Services, Google AppEngine, And Microsoft Azure.	
Unit IV	08 Hours
Cloud Applications: Scientific Applications in – Healthcare, Biology, Geo-Science; Business Applications in– CRM and ERP, Productivity, Social Networking, Media Applications, Multiplayer Online Gaming.	
Unit V	08 Hours
Advanced Topics in Cloud Computing: Energy Efficiency in Clouds, Market Based Management of Clouds, Federated Clouds / InterCloud, Third Party Cloud Services.	
Unit VI	08 Hours
Understanding Cloud Security: Securing the Cloud, The security boundary, Security service boundary, Security mapping, Securing Data, Brokered cloud storage access, Storage location and tenancy, Encryption, Auditing and compliance, Establishing Identity and Presence, Identity protocol standards	
Textbooks	
1. Mastering Cloud Computing, Buyya R, Vecchiola C, Selvi S T, McGraw Hill Education (India), 2013. 2. Cloud Computing Bible, Barrie Sosinsky ,Wiley Publishing Inc. 2011 3. Cloud Computing from Beginning to End by Ray J Rafiels 4. Cloud Computing for Dummies by Judith S. Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper	
Reference Books	
1. Buyya R, Broberg J, Goscinski A, “Cloud Computing - Principles and Paradigms”, Wiley, 2011 2. Cloud Computing: Concepts, Technology & Architecture by Zaigham Mahmood, Ricardo Puttini, Thomas Erl	
List of Assignments	
<ul style="list-style-type: none"> It consist of 10-12 tutorials based on above topics& case study on cloud service providers like AMAZON EC2, salesforce.com etc. 	
Project Based Learning	
Developing application on Google AppEngine	
Syllabus for Unit Tests:	
Unit Test -1	Unit – I, Unit – II, Unit – III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

SOFTWARE TESTING AND QUALITY ASSURANCE					
Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture	04	University Examination	60		
		Internal Assessment	40	Lecture	04
Practical	02	Term Work	25	Practical	01
		Practical	50		
Total	06	Total	175	Total	05
Course Objective:					
Study fundamental concepts of software testing and its application in various scenarios with the help different testing strategies, methods and tools.					
Prerequisite:					
Knowledge of Software Engineering, Software Project Management					
Course Outcomes: On completion of the course, students will have the ability to:					
1. Provide knowledge about fundamentals of software testing					
2. Design specific and measurable test cases to ensure coverage					
3. Apply black box testing techniques					
4. Know various levels of testing					
5. Apply automation tools for testing process					
6. Understand notion of quality through software quality models					
Unit I Software Testing – Concepts					08 Hours
Quality revolution, software quality, testing as a process, purpose of testing, principles of testing, error, fault, defect and failure, defect life cycle, notion of software reliability, verification and validation, white box and black box testing, static testing and dynamic testing. Test plan, test management, test execution and reporting, test team organization and management.					
Unit II White Box Testing Techniques					08 Hours
Need of white box testing, static white testing techniques: peer review, inspections, code walkthrough, formal technical reviews, test adequacy criteria Structural testing – code coverage testing, code complexity testing, mutation testing, debugging, design of test cases, instrumentation and tool support.					
Unit III Black Box Testing Techniques					08 Hours
Need of black box testing, static black box testing, requirement analysis, test case design criteria, requirement based testing, positive and negative testing, boundary value analysis, decision tables, equivalence partitioning, state based or graph based testing, cause effect graph based, error guessing, documentation testing, domain testing, design of test cases, instrumentation and tool support.					
Unit IV Testing Techniques					08 Hours
Levels of testing: unit testing, integration testing, system testing, acceptance testing, usability and accessibility testing, configuration testing, compatibility					

testing, GUI testing, regression testing, web-based system testing, non-functional testing techniques.	
Unit V Software Test Automation	08 Hours
Manual testing, test automation, terms used in automation, Process Model for Automation, automated testing tools and case studies, factors for choosing a particular tool, an overview for the major functional testing tools, overview of test management and bug tracking tools.	
Unit VI Software Quality Assurance	08 Hours
Software quality, quality attribute, quality assurance, quality control and assurance, methods of quality management, cost of quality, quality management and project management, software quality metrics-TQM, Six Sigma, ISO, SQA Model.	
Textbooks	
1. Srinivasan Desikan and Gopalaswamy Ramesh, Software Testing – Principles and Practices, Pearson Education, 2011.	
Reference Books	
1. Ron Patton, Software Testing, Second Edition, Sams Publishing, Pearson Education, 2007. AU Library.com	
2. Dorothy Graham, Rex Black, Erik Van Veenendaal, “Foundations of Software Testing, Fourth Edition, Cenage publication	
3. Kshirasagara Naik, Priyadarshi Tripathy: Software Testing and Quality Assurance, Wiley India 2012	
4. M.G. Limaye: Software Testing-Principles, Techniques and Tools – McGraw Hill, 2009	
List of Laboratory Exercises	
1. To Prepare Test Plan for the implemented system under test. The Test Plan shall be based on System Requirement Specification. The Test plan consists of following issues. a. Purpose of the test. /Location and schedule of the test. b. Test descriptions. /Pass and Fail Criteria.	
2. Take any system (e.g. ATM system) and study its system specifications and write test cases	
3. To perform Unit testing especially indicating the traced Independent data paths, Control paths and Error handling paths. Prepare control flow graphs for the unit under test. Compute the Cyclomatic complexity of the unit.	
4. To perform Data Flow testing for the Program Segments by identifying the Definition-Use chain and type of data flow anomaly.	
5. Design test cases for testing of any E-commerce web site.	
6. To perform Black-Box Testing for all the units contained in the architectural segments using Equivalence Partitioning, Boundary Value Analysis and Orthogonal Array testing methods.	
7. Creating a test report using BugZilla tool.	

8. To perform Web Based Testing for Web Application incorporating Selenium testing tool.	
Project Based Learning Students shall construct a test plan for their mini projects and write test cases for testing of the same. Student shall test their project functionality using any appropriate automation testing tool.	
Syllabus for Unit Tests:	
Unit Test -1	Unit – I, Unit – II, Unit - III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

DATA WAREHOUSING AND DATA MINING					
Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture	03	University Examination	60	Lecture	03
Tutorial	01	Internal Assessment	40	Tutorial	01
		Total	100	Total	04
Course Objective:					
<ul style="list-style-type: none"> To understand data warehouse concepts, architecture, business analysis and tools To understand data pre-processing and data visualization techniques 					
Prerequisite:					
Basic concepts of DBMS					
Course Outcomes: On completion of the course, students will have the ability to:					
1. Design a Data warehouse system and perform business analysis with OLAP tools.					
2. Apply suitable pre-processing and visualization techniques for data analysis					
3. Apply frequent pattern and association rule mining techniques for data analysis					
4. Apply appropriate classification techniques for data analysis					
5. Apply appropriate clustering techniques for data analysis					
6. Understand WEKA tool.					
Unit I Data Warehousing, Business Analysis And On-Line Analytical Processing (OLAP)					
					08 Hours
Basic Concepts - Data Warehousing Components – Building a Data Warehouse – Database Architectures for Parallel Processing – Parallel DBMS Vendors - Multidimensional Data Model – Data Warehouse Schemas for Decision Support, Concept Hierarchies -Characteristics of OLAP Systems – Typical OLAP Operations, OLAP and OLTP.					
Unit II Data Mining – Introduction					08 Hours
Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques – Issues – applications- Data Objects and attribute types, Statistical description of data, Data Preprocessing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.					
Unit III Data Mining - Frequent Pattern Analysis					08 Hours
Mining Frequent Patterns, Associations and Correlations – Mining Methods- Pattern Evaluation Method – Pattern Mining in Multilevel, Multi Dimensional Space – Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns					
Unit IV CLASSIFICATION					08 Hours
Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines — Lazy Learners – Model Evaluation and Selection-Techniques to improve Classification Accuracy.					

Unit V CLUSTERING		08 Hours
Clustering Techniques – Cluster analysis-Partitioning Methods - Hierarchical Methods – Density Based Methods - Grid Based Methods – Evaluation of clustering – Clustering high dimensional data- Clustering with constraints, Outlier analysis-outlier detection methods.		
Unit VI WEKA TOOL		08 Hours
Datasets – Introduction, Iris plants database, Auto imports database - Introduction to WEKA, The Explorer – Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association–rule learners.		
Textbooks		
Jiawei Han and Micheline Kamber, —Data Mining Concepts and TechniquesII, Third Edition, Elsevier, 2012		
Reference Books		
<ol style="list-style-type: none"> 1. Alex Berson and Stephen J.Smith, —Data Warehousing, Data Mining & OLAPII, Tata McGraw – Hill Edition, 35th Reprint 2016 2. K.P. Soman, Shyam Diwakar and V. Ajay, —Insight into Data Mining Theory and Practicell, Eastern Economy Edition, Prentice Hall of India, 2006. 3. Ian H.Witten and Eibe Frank, —Data Mining: Practical Machine Learning Tools and TechniquesII, Elsevier, Second Edition. 		
Project Based Learning		
<ol style="list-style-type: none"> 1. Data Warehouse Design for E-commerce Environments. 2. Data Warehouse Project for Music Data Analysis. 3. Data Warehouse Project for B2B Trading Company. 		
Syllabus for Unit Tests:		
Unit Test -1	Unit – I, Unit – II, Unit – III	
Unit Test -2	Unit – IV, Unit – V, Unit – VI	

QUANTITATIVE TECHNIQUES, COMMUNICATION AND VALUES					
Teaching Scheme		Examination Scheme		Credits	
	Hours/Week		Marks		Credits
Lecture	04	University Examination	60	Theory	04
Practical	--	Internal Assessment	40	Practical	--
Total	04	Total	100	Total	04
Course Pre-requisites: The students should have knowledge of					
1	Basic mathematics, reasoning and comprehensive ability				
2	Communication process, soft skills				
3	Leadership qualities, ethics, etiquettes and values				
Course Objective:					
	The Quantitative Techniques, Communication and Values aims to augment students to face the campus recruitment test and train them on applying short techniques/ tricks to solve questions of Maths, reasoning and English in very less amount of time. The communication and values section focuses on the aspects of communication and soft skills such as grooming personality for leading team, presentation, business communication which would enable graduates to project themselves as a professionals in the corporate sector and/or otherwise.				
Course Outcomes: The student will be able to					
1	Solve the aptitude test in the recruitment and competitive exam by applying short techniques and solve the question in less amount of time				
2	Apply the short mnemonics and techniques to solve the questions of logical reasoning in the placement and competitive exam in lesser time.				
3	Develop the verbal ability to communicate effectively using suitable vocabulary and proper sentence pattern				
4	Understand the concept of soft skills and its implication at workplace				
5	Build up the ability to study employment business correspondences and its proper implications				
6	Understand business ethics, etiquettes and values and apply them in the professional ventures.				
Course Content:					
Unit-I	QUANTITATIVE APTITUDE: Number system, Percentage, profit and loss, Simple Interest and Compound Interest, Ratio, Proportion and Average, Mixture and Allegation, Time, Speed & Distance, Time & Work , Permutation & Combination, Probability, Pipes and Cisterns				08 Hrs
Unit-II	NON-VERBAL REASONING: Coding, Decoding, Number series, Blood relation Directions, cubes & dices , Data Interpretation, Data Sufficiency, Set Theory & Syllogisms, Matching, Selection & Arrangement, Clocks & Calendars, Visual Reasoning, Input, Output & Flow Chart.				08 Hrs
Unit-III	VERBAL REASONING: Sentence Patterns, Sentence correction and spotting errors, Vocabulary, antonyms and synonyms and analogy, Phrasal Verbs, idiomatic expressions, reading comprehension, closest, sentence rearrangement and theme detection				08 Hrs
Unit-IV	SELF AWARENESS AND SOFT SKILLS DEVELOPMENT:				08 Hrs

	Concept of SWOT, Importance of SWOT, Individual & Organizational SWOT Analysis, Soft skills, meaning, need and importance, difference between soft skills and hard skills, life skills and personal skills, Leadership skills,-Importance ,Types, Attributes of good leader Motivational theories and leadership ,Emotional intelligence in personal and professional lives its importance need and application, Team Building and conflict resolution Skills ,Problem solving skills, Time Management and Stress Management Skills Pareto Principle(80/20) Rule in time management, Time management matrix, creativity and result orientation, working under pressure, stress management	
Unit-V	COMMUNICATION AND HONING EMPLOYMENT SKILLS: Communication process, Non-verbal codes in communication, importance of LSRW in communication, Barriers to communication, Principles of effective Technical writing, Email writing and Netiquettes, Letter writing – formal letters, job application letter, cover letter, structure of technical report writing, Building Resume and CV, Tips to build an effective Resume Group discussion, Skills required for Group Discussion Interview skills, Ways of handling telephonic interviews, Importance of body language, grooming & etiquettes for getting right impression in PI&GD , Extempore, Introduction to PowerPoint presentation, Structure & flow of presentation,	08 Hrs
Unit-VI	BUSINESS ETHICS, ETIQUETTES AND VALUES: The Importance of Ethics and Values in Business World, Respect for Individuality and diversity at workplace values of a good manager Key features of corporate etiquette, Corporate grooming & dressing, etiquettes in social & office Setting-Understand the importance of professional behaviour at the work place, Corporate social responsibility (CSR) its importance and need.	08 Hrs
Internal Assessment:		
	Unit Test – I	UNIT – I, II, III
	Unit Test – II	UNIT – IV, V, VI
Reference Books:		
1	Quantitative Aptitude by R. S. Agarwal published by S. Chand	
2	The Book of Numbers by Shakuntala Devi	
3	A Modern Approach To Logical Reasoning by R. S. Agarwal published by S. Chand	
4	A New Approach to Reasoning Verbal & Non-Verbal by InduSijwali	
5	Business Communication by Meenakshi Raman, Prakash Singh published by Oxford University press, second edition	
6	Communication Skills by Sanjay Kumar, Pushp Lata, published by Oxford University press, second edition	
7	Technical Communication by Meenakshi Raman, Sangeeta Sharma published by Oxford University press	
8	Developing Communication Skills by Krishna Mohan, Meera Banerji published by Macmillan India Pvt Ltd	
9	Soft Skills by Meenakshi Raman, published by Cengage publishers	
10	Soft Skills by Dr. K Alex published by Oxford University press	
11	Soft skills for Managers by Dr. T. KalyanaChakravarthi and Dr. T. LathaChakravarthi published by biztantra	
Project Based Learning Topics:		

1	Form a model for spoken and written communication skills which avoid grammar mistakes and common errors.
2	Develop various activity models for enriching and developing vocabulary.
3	Preparing strategies by using SWOT and TWOS analysis.
4	Analysing differences between Soft Skills, Hard skills, and Personal skills.
5	Develop Bruce Tuchman's Team Building Models with classmates/Teammates.
6	To study different personalities of Leaders from various sectors and find out their attributes and success stories.
7	Preparing a model for Time Management Skills and Stress Management and conduct activities for effective implementation of it.
8	Form a model to develop LSRW and communication Skills.
9	Conduction of mock interview and practice GD activities to build competencies for actual selection process.
10	Prepare a model for evaluating Values and Ethics of Good Managers.
11	Prepare a model of dress codes and attire for different professional situations Corporate etiquettes and its implications.
12	Develop some good activities to understand the importance and need of Corporate social responsibility (CSR).

AGILE METHODOLOGIES					
Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Lecture	04	University Examination	60	Lecture	04
		Internal Assessment	40		
		Total	100	Total	04
Course Objective:					
To prepare students for software development using agile methodology					
Prerequisite: Software Engineering					
Course Outcomes: On completion of the course, students will have the ability to:					
1. Differentiate traditional project development methodology and Agile methodology.					
2. Identify the roles and responsibilities of agile practitioners in agile projects					
3. Apply requirement engineering practices behind several specific agile methodologies.					
4. Define the core practices behind Scrum framework.					
5. Understand the role of design principles in agile software design.					
6. Define the core practices behind Extreme Programming framework.					
7. Describe implications of functional testing, unit testing, and continuous integration.					
Unit I				08 Hours	
Introduction: Agile Software Development, Traditional Model vs. Agile Model, Agile Manifesto and Principles, Agile Project Management, Agile Team Interactions, Ethics in Agile Teams, Agile Documentations: Agile Drivers, Overview of Feature driven development, Lean Software Development					
Unit II				08 Hours	
Agility and Requirements Engineering (RE): Impact of Agile Processes in RE–Current Agile Practices, Overview of RE Using Agile , Managing Unstable Requirements, Requirements Elicitation, Agile Requirements Abstraction Model, Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modelling and Generation, Concurrency in Agile Requirements Generation.					
Unit III				08 Hours	
Agile Scrum Framework: Scrum Artifacts, Meetings, Activities and Roles, Scrum Team Simulation, Scrum Planning Principles, Product and Release Planning, Sprinting: Planning, Execution, Review and Retrospective; User story definition and Characteristics, Acceptance tests and Verifying stories, Burn down chart, Daily scrum, Scrum Case Study, Kabana case study					
Unit IV				08 Hours	
Agile Software Design and Development: Agile design practices, Role of design Principles, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control; Agility and Quality Assurance: Agile Interaction Design, Agile approach to					

Quality Assurance, Test Driven Development, Pair programming: Issues and Challenges.	
Unit V	08 Hours
Extreme Programming (XP): XP Lifecycle, The XP Team, XP Concepts: Refactoring, Technical Debt, Timeboxing, Stories, Velocity; Adopting XP: Pre-requisites, Challenges; Applying XP: Thinking- Pair Programming, Collaborating, Release, Planning, Development; XP Case Study	
Unit VI	08 Hours
Agile and Testing: The Agile lifecycle and its impact on testing, Test driven development– Acceptance tests and verifying stories, writing a user acceptance test, Developing effective test suites, Continuous integration, Code refactoring. Risk based testing, Regression tests, Test automation.	
Textbooks	
1. Robert C. Martin, “Agile Software Development, Principles, Patterns and Practices”, First International Edition, Prentice Hall.	
2. Ken Schawber, Mike Beedle, “Agile Software Development with Scrum”, International Edition, Pearson.	
Reference Books	
1. David J. Anderson and Eli Schragenheim, “Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results” , Prentice Hall, 2003	
2. Hazza and Dubinsky, “Agile Software Engineering, Series: Undergraduate Topics in Computer Science”, Springer, 2009.	
3. James Shore and Shane Warden, “The Art of Agile Development”, O’Reilly Media, 2007	
4. Cohn, Mike, “User Stories Applied: For Agile Software Development”, Addison Wesley, 2004.	
Project Based Learning: Students are encouraged to decide one project in the group (of min 2 to max) and applications of agile methodologies shall be demonstrated by team :	
1. For example “solve the traveling salesman problem (TSP) using a algorithm in the context of an XP project”.	
2. Develop sprint backlog for for project under consideration.	
3. Develop a Kabana board for complete project per week.	
4. Write a report and demonstrate the project using Extremes practices in software development	
5. Write a report and demonstrate the project using Scrum practices in software development	
6. Student database management projects in which the stories, sprints and action items can be created or updated weekly.	
7. Library management project in which the stories, sprints and action items can be created or updated weekly.	
8. Online appointment booking project in which the stories, sprints and action items can be created or updated weekly.	

Syllabus for Unit Tests:	
Unit Test -1	Unit – I, Unit – II, Unit – III
Unit Test -2	Unit – IV, Unit – V, Unit – VI

INFORMATION TECHNOLOGY LABORATORY - IV					
Teaching Scheme		Examination Scheme		Credit Scheme	
	Hours/Week		Marks		Credits
Practical	02	Term Work	25	Practical	01
Tutorial	01	Practical	50	Tutorial	01
Total	03	Total	75	Total	02
Course Objective:					
To acquire programming skills in core Python to develop applications in various domain.					
Prerequisite:					
Understanding of basic python programming and OOPs concepts					
Course Outcomes: On completion of the course, students will have the ability to:					
1. To acquire programming skills in Python Multithreaded Programming.					
2. To acquire database management with python					
3. To develop the skill of data science using python					
4. To develop the ability of Data Visualization using Python					
5. To develop the ability to implement Graphical User Interface					
6. To develop the ability to implement Django Web Framework in Python					
Unit I :Python Multithreaded Programming					06 Hours
What is multithreading? • Difference between a Process and Thread • Concurrent Programming and GIL • Uses of Thread • Starting a New Thread • The Threading Module • Thread Synchronization :- Locks , Semaphore • Deadlock of Threads • Avoiding Deadlocks • Daemon Threads					
Unit II : Using Databases in Python					06 Hours
Python MySQL Database Access • Install the MySQLdb and other Packages • Create Database Connection • CREATE, INSERT, READ Operation • DML and DDL Oepration with Databases					
Unit III : Data Science Using Python					06 Hours
•Numpy: Introduction to numpy , Creating arrays , Indexing Arrays , Array Transposition , Universal Array Function , Array Processing , Array Input and Output					
Unit IV Pandas					06 Hours
What are pandas? • Where it is used? • Series in pandas • Index objects • Reindex • Drop Entry • Selecting Entries • Data Alignment • Rank and Sort • Summary Statics • Index Hierarchy • Matplotlib: Data Visualization • Python for Data Visualization • Welcome to the Data Visualization Section • Introduction to Matplotlib					
Unit V :Graphical User Interface					06 Hours

• GUI in Python • Button Widget • Label Widget • Text Widget	
Unit VI :Django Web Framework in Python	06 Hours
• Introduction to MVC and MVT architecture in Web development • Django folder structure and flow of control	
Textbooks	
1. Fluent Python: Clear, Concise, and Effective Programming , by Luciano Ramalho	
2. Introduction to Machine Learning with Python: A Guide for Data Scientists, by Sarah Guido and Andreas C. Muller	
Reference Books	
1. Python Cookbook: Recipes for Mastering Python 3, by David Beazley and Brian K. Jones	
List of Laboratory Exercises	
1. Write a program to implement threads (Multithreaded Programming).	
2. Write a program to implement Databases (MySQL, MongoDB)	
3. Write a program to implement Handle and store Two-dimensional data	
4. Write a program to manipulate structured data.	
5. Write a program to implement GUI application	
6. Implement web applications using Django Web Framework	
Project Based Learning	
1. Automating boring Stuff Using Python (ex. Automate LinkedIn connections using Python)	
2. Python Text to Speech and Vice-Versa (ex. Convert Speech to text and text to Speech, Build a Virtual Assistant Using Python)	
3. Crawl Wikipedia pages with python	
4. E-commerce website project	
5. Build a blockchain using python	
6. Python Django Projects (ex. Weather app ,Voting system)	
7. Twitter Sentiment Analysis using Python	
8. Website Blocker using Python	
9. Python Language Translator	
10. Desktop Notifier Python App	
11. Creating Notepad using Python	
Syllabus for Unit Tests:	
NA	