Progressive Education Society's

Modern College Of Arts, Science and Commerce, Ganeshkhind, Pune - 411 016

(Autonomous)

Syllabus for

T. Y. B.B.A(CA)

As per Savitribai Phule Pune University

Introduction:

The degree shall be titled as Bachelor of Business Administration (B.B.A.)(Computer Application) under the Faculty of Commerce and Management. Third Year B.B.A.(CA) Based on Credit System is implemented w.e.f. the academic year 2019-2020, Second Year B.B.A.(CA) is implemented w.e.f. 2023-2024 , Third Year B.B.A.(CA) will be w.e.f. 2024-2025.

Programme Objectives:

BBA (CA) Graduate's will be able to

Po1: The BBA (CA) Programme provides sound academic base to develop an advanced career in Computer Application with various Management and Business skills.

Po2: This course focus on conceptual grounding of computer usage as well as its practical Business Application.

Po3: BBA (CA) inculcates basic programming ability amongst students which can help them to become a good programmer.

Po4: This course nurtures good Soft Skills and Managerial Skill in the students which create noble IT Professionals.

Po5: Students get excellent exposure to learn the process of Software development in the Vth and VIth semester by developing their own projects which helps them in campus placement.

Suggested internal assessment tools for courses:

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1. Library notes
2. Students Seminar
3. Short Quizzes / MCQ Test
4. Home Assignments
5. Tutorials/ Practical
6. Oral test
7. Research Project
8. Group Discussion
9. Open Book Test
10. Written Test
11. PPT presentation
12. Industrial Visit
13. Viva
14.

Teaching Methodology:

1. Classroom Teaching
2. Guest Lectures
3. Group Discussions
4. Surveys
5. Power Point Presentations
6. Visit to Industries
7. Research Papers & Projects
8. E-content

Subject List

TYBBA(CA) Sem V

Course Type	Sr. No.	Course(Subject) Title+	Course (Subject) code	Credits	Weightage for Internal Marks	Weightage For External Marks	Weightage for practical	Total Marks
CC		Cyber Security	CA-501	3	30	70		100
CC		OOSE	CA-502	3	30	70		100
CC		Core Java	CA-503	3	30	70		100
EC		Python	CA-504	3	30	70		100
PJ		Project	CA-505	4			100	100
PR		Computer Laboratory Based on 503 and 504(2 credits each)	CA-506	4			100	100
		Add on Course- IOT(30 Hours)	5	2	50			50

TYBBA(CA) Sem VI								
Course Type	**Sr. No.**	**Course(Subject) Title**	**Course(Subject) code**	**Credits**	**Weightage for Internal Marks**	**Weightage for External Marks**	**Weightage for practical**	**Total Marks**
CCT	1	Recent Trends in Information Technology(Tutorial/Assignment)	CA-601	3+1	30	70		100
CC	2	Software Testing	CA-602	3	30	70		100
CC	3	Advanced Java	CA-603	3	30	70		100
EC	4	Android Programming	CA-604	3	30	70		100
PJ	5	Project	CA-605	4			100	100
PR	6	Computer Laboratory Based on 603 and 604(2 credits each)	CA-606	4			100	100
	7	Add on Course-Soft Skills Training	6	2	50			50

Credit Allocation: - CC-Core Course, EC-Elective Course, PR-Practical, PJ-Project, AECC-Ability Enhancement Compulsory Courses, SEC-Skill Enhancement Courses.**Total - 132 Credits for Three years Programme.**

T.Y.B.B.A (C.A.) Semester –V
Course Code: CA-501
Subject Name: Cyber Security

Total Hours : 48 lectures **Total Credits: 03**

Prerequisites: -

- A course on Computer Networks.

Course Objectives:

- To understand the fundamentals of cyber security.
- To understand various categories of Cybercrime, Cyber-attacks on mobile, tools and techniques used in Cybercrime and case studies.
- To have an overview of the Cyber laws and concepts of Cyber forensics.

Course Outcome:-

- Have a good understanding of Cyber Security and the Tools.
- Identify the different types of Cyber Crimes.
- Have a good understanding of Cyber laws
- To develop Cyber forensics awareness.
- Identify attacks, security policies and credit card frauds in mobile and Wireless Computing Era.

Unit	Topic	No of lectures
1	**Chapter 1:- Introduction to Cyber Crime and Cyber Security** 1.1 Introduction 1.2 Cybercrime: Definition and Origin of the Word 1.3 Cybercrime and Information Security 1.4 Who are Cybercriminals? 1.5 Classifications of Cybercrimes: E-Mail Spoofing, Spamming, Cyber defamation, Internet Time Theft, Salami Attack/Salami Technique, Data Diddling,Forgery, Web Jacking, Newsgroup, Spam/Crimes Emanating from Usenet Newsgroup, Industrial Spying/Industrial Espionage, Hacking,OnlineFrauds,Computer Sabotage, Email Bombing/Mail Bombs, Computer Network Intrusions, Password Sniffing, Credit Card Frauds, Identity Theft 1.6 Definition of Cyber Security 1.7 Vulnerability, Threats and Harmful acts 1.8 CIA Triad 1.9 Cyber Security Policy and Domains of Cyber Security Policy	07
2	**Chapter 2 :- Cyber offenses and Cyberstalking** 2.1 Criminals Plan: Categories of Cybercrime Cyber Attacks: Reconnaissance, Passive Attack, Active Attacks, Scanning/Scrutinizing gathered Information, Attack (Gaining and Maintaining the System Access), Social Engineering, and Classification of Social Engineering. 2.2 Cyberstalking: Types of Stalkers, Cases Reported on Cyberstalking, Working of Stalking 2.3 Real-Life Incident of Cyber stalking 2.4 Cybercafe and Cybercrimes	10

	2.5 Botnets: The Fuel for Cybercrime, Botnet, Attack Vector 2.6 Cybercrime: Mobile and Wireless Devices – Proliferation - Trends in Mobility 2.7 Credit Card Frauds in Mobile and Wireless Computing Era 2.8 Security Challenges Posed by Mobile Devices 2.9 Authentication Service Security 2.10 Attacks on Mobile/Cell Phones	
3	**Chapter 3:- Tools and Methods Used in Cybercrime** 3.1 Introduction 3.2 Proxy Servers and Anonymizers 3.3 Phishing 3.4 Password Cracking 3.5 Keyloggers and Spywares 3.6 Virus and Worms 3.7 Trojan Horses and Backdoors 3.8 Steganography 3.9 DoS and DDoS Attacks 3.10 SQL Injection	05
4	**Chapter 4 :- Cybercrimes and Cyber security: The Legal Perspectives** 4.1 Introduction 4.2 Cybercrime and the Legal Landscape around the World 4.3 Why Do We Need Cyberlaws: The Indian Context 4.4 The Indian IT Act 4.5 Challenges to Indian Law and Cybercrime Scenario in India 4.6 Consequences of not Addressing the Weakness in Information Technology Act 4.7 Digital Signatures and the Indian IT Act 4.8 Amendments to the Indian IT Act 4.9 Cybercrime and Punishment 4.10 Cyberlaw, Technology and Students: Indian Scenario	07
5	**Chapter 5:- Cyber Forensics** 5.1 Introduction 5.2 Historical background of Cyber forensics 5.3 Digital Forensics Science 5.4 The Need for Computer Forensics 5.5 Cyber Forensics and Digital evidence 5.6 Forensics Analysis of Email 5.7 Digital Forensics Lifecycle 5.8 Challenges in Computer Forensics	06
6	**Chapter 6:- Cybersecurity: Organizational Implications** 6.1 Organizational Implications: Cost of cybercrimes and IPR issues 6.2 Web threats for organizations 6.3 Security and Privacy Implications from Cloud Computing 6.4 Social media marketing 6.5 Social computing and the associated challenges for organizations, Protecting people's privacy in the organization 6.6 Organizational guidelines for Internet usage and safe computing guidelines and computer usage policy 6.7 Incident handling	07

	6.8 Intellectual property in the cyberspace of cyber security.	
7	**Chapter 7:- Cybercrime: Illustrations, Examples and Mini-Cases** 7.1 Real-Life Examples 7.2 Mini-Cases 7.3 Illustrations of Financial Frauds in Cyber Domain 7.4 Digital Signature-Related Crime Scenarios 7.5 Digital Forensics Case Illustrations 7.6 Online Scams	06

References Books:

1. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives – Nina Godbole, SunitBelapure, Wiley: April 2011 India Publications Released.
2. Principles of Information Security,-Michael E Whitman, Herbert J Mattord, 3rd Edition, 2011.
3. Computer Security: Principles and Practice -William Stallings and Lawrie Brown, 3rd edition, Pearson, 2015.
4. Cyber Security Essentials- James Graham Richard Howard Ryan Olson

T.Y.B.B.A.(C.A.) Semester –V
Course Code: CA-502
Subject: Object Oriented Software Engineering

Total Hours: 48 **Total Credits: 03**

Pre Requisite: Students shall have the Basic Knowledge of Software Engineering

OBJECTIVES:

1. To understand the fundamentals of object modeling
2. To understand and differentiate Unified Process from other approaches.
3. To design with static UML diagrams.
4. To design with the UML dynamic and implementation diagrams.
5. To improve the software design with design patterns.
6. To test the software against its requirements specification.

Outcomes:

1. Students will be able to give Design Specifications for Project.
2. Students will acquire Knowledge in Basic Modeling.
3. Students will acquire Project Management Skills.

Chapter	Course Content	No of lectures
1	**Introduction and basics of Software Modelling** 1.1 Software Life Cycle Models (Revision of SE) 1.2 System Concepts 1.3 Project Organization 1.4 Communication in Project Management 1.5 Risk management in Project Management	4
2	**SRS Documentation** 2.1 SRS Specification 2.2 Requirement Elicitation **2.3** Business Engineering	4
3	**Introduction to UML** 3.1 Concept of UML 3.2 Advantages of UML	2
4	**Object Oriented Concepts and Principles** 4.1 What is Object Orientation? - Introduction , Object , Classes and Instance , Polymorphism, Inheritance 4.2 Object Oriented System Development- Introduction, Function/Data Methods (With Visibility), Object Oriented Analysis, Object Oriented Construction 4.3 Identifying the Elements of an Object Model 4.4 Identifying Classes and Objects 4.5 Specifying the Attributes (With Visibility)	4

	4.6 Defining Operations 4.7 Finalizing the Object Definition	
5	**Structural Modeling** 5.1 Classes 5.2 Relationship 5.3 Common Mechanism 5.4 Class Diagram (Minimum three examples should be covered) 5.5 Advanced Classes 5.6 Advanced Relationship 5.7 Interface 5.8 Types and Roles 5.9 Packages 5.10 Object Diagram (Minimum three examples should be covered)	**10**
6	**Basic Behavioural Modeling** 6.1 Interactions 6.2 Use Cases and Use Case Diagram with stereo types (Minimum three examples should be covered) 6.3 Interaction Diagram (Minimum two examples should be covered) 6.4 Sequence Diagram (Minimum two examples should be covered) 6.5 Activity Diagram (Minimum two examples should be covered) 6.6 State Chart Diagram (Minimum two examples should be covered)	**10**
7	**Architectural Modelling** 7.1 Component 7.2 Components Diagram (Minimum two examples should be covered) 7.3 Deployment Diagram (Minimum two examples should be covered) 7.4 Collaboration Diagram (Minimum two examples should be covered)	**6**
8	**Object Oriented Analysis** 8.1 Iterative Development and the Rational Unified Process 8.2 Inception 8.3 Understanding Requirements 8.4 Use Case Model From Inception to Elaboration 8.5 Elaboration	**4**
9	**Object Oriented Design** 9.1 The Booch Method, The Coad and Yourdon Method and Jacobson Method and Raumbaugh Method 9.2 The Generic Components of the OO Design Model	**4**

	9.3 The System Design Process - Partitioning the Analysis Model, Concurrency and Sub System Allocation, Task Management Component, The Data Management Component, The Resource Management Component, Inter Sub System Communication	
	Total	**48**

Reference Books:

Sr. No.	Title of the Book	Author's Name	Publication
1	The Unified Modeling Language User/Reference Guide,	**Grady Booch, James Rambaugh**	Pearson Education Inc
2	The Unified software development Process	**Ivar Jacobson, Grady Booch, James Rambaugh**	**Pearson Education**
3	**Agile Software development**	**Alistair Cockbair**	**Pearson Education**

T.Y.B.B.A.(C.A.) Semester –V
Course Code: CA-503
Subject: Core Java

Total Hours : 48 **Total Credits: 03**

Prerequisite:

- Student should know basics of object oriented programming.

Course Objectives:

- To introduce the object oriented programming concepts.
- To understand object oriented programming concepts, and apply them in solving problems.
- To introduce the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes
- To introduce the implementation of packages and interfaces
- To introduce the concepts of exception handling and multithreading.
- To introduce the design of Graphical User Interface using applets and swing controls.

Course Outcomes:

- Able to solve real world problems using OOP techniques.
- Able to understand the use of abstract classes.
- Able to solve problems using java collection framework and I/o classes.
- Able to develop multithreaded applications with synchronization.
- Able to develop applets for web applications.
- Able to design GUI based applications

Unit No.	Topic	No. of Lectures	Reference Books
1	**Java Fundamentals** 1.1 Introduction to Java. 1.1 Features of Java 1.2 Basics of Java: - Data types, variable, expression, operators, constant. 1.3 Structure of Java Program. 1.4 Execution Process of java Program. 1.5 JDK Tools. 1.6 Command Line Arguments. 1.7 Array and String: 1.7.1 Single Array & Multidimensional Array 1.7.2 String, String Buffer 1.8 Built In Packages and Classes : 1.8.1 java.util:- Scanner, Date, Math etc. 1.8.2 java.lang	8	1,2
2	**Classes, Objects and Methods** 2.1 Class and Object 2.2 Object reference 2.3 Constructor: Constructor Overloading 2.4 Method: Method Overloading, Recursion, Passing and Returning object form Method 2.5 new operator, this and static keyword, finalize() method 2.6 Nested class, Inner class, and Anonymous inner class	8	1,2

3	**Inheritance, Package and Collection** 3.1 Overview of Inheritance 3.2 inheritance in constructor 3.3 Inheriting Data members and Methods, 3.4 Multilevel Inheritance – method overriding Handle multilevel constructors 3.5 Use of super and final keyword 3.6 Interface: 3.7 Creation and Implementation of an interface, Interface reference 3.8 Interface inheritance 3.9 Dynamic method dispatch 3.10 Abstract class 3.11 Comparison between Abstract Class and interface **3.12** Access control **3.13 Packages** 3.13.1 Packages Concept 3.13.2 Creating user defined packages 3.13.3 Java Built inpackages 3.13.4 Import statement, Static import 3.14 **Collection** 3.14.1 CollectionFramework. 3.14.2 Interfaces: Collection, List, Set 3.14.3 Navigation: Enumeration, Iterator, ListIterator 3.14.4 Classes: LinkedList, ArrayList, Vector, HashSet	10	
4	**File and Exception Handling** **Exception** 4.1 Exception and Error 4.2 Use of try, catch, throw, throws and finally 4.3 Built in Exception 4.4 Custom exception 4.5 Throwable Class. **File Handling** 4.6 Overview of Different Stream (Byte Stream, Character stream) 4.7 Readers and Writers class 4.8 File Class 4.9 File Input Stream , File Output Stream 4.10 Input Stream Reader and Output Stream Writer class 4.11 FileReader and FileWriter class 4.12 Buffered Reader class.	8	1,2,3
5	**Applet, AWT, Event and Swing Programming** **Applet** 5.1 Introduction 5.2 Typesapplet 5.3 Applet Lifecycle 5.3.1 Creatingapplet 5.3.2 Applet tag	14	1,2,3,4

	5.4 AppletClasses 5.4.1 Color 5.4.2 Graphics 5.4.3 Font **AWT** 5.5 Components and container used inAWT 5.6 Layoutmanagers 5.7 Listeners and Adapterclasses 5.8 Event Delegationmodel **Swing** 5.9 Introduction to Swing Componentand Container Classes 5.10 Exploring Swing Controls- JLabel and Image Icon, JText Field, The Swing Buttons JButton, JToggle Button, JCheck Box, JRadio Button, JTabbed Pane, JScroll Pane, JList, JTable, JComboBox, Swing Menus, Dialogs,JFileOpen,JColorChooser.		
	Total Lectures	**48**	

Reference Books:

1. Programming with JAVA - EBalgurusamy
2. The Complete Reference – JAVA HerbertSchildt
3. Programming in Java, S. Malhotra, S. Chudhary, 2nd edition, Oxford Univ. Press.
4. Java Programming and Object-oriented Application Development, R. A. Johnson, Ceng

T.Y.B.B.A.(C.A.) Sem-V

Subject Code: 504
Subject: Python

Total Hours :- 48 **Total Credits: 03**

Prerequisites:

1. Experience with a high level language (C/C++, Java, MATLAB) is suggested.
2. Prior knowledge of a scriptinglanguage (Perl, UNIX/Linux shells) and Object-Oriented concepts is helpful but not mandatory.

Course Objectives:

1. To learn and understand Python programming basics and paradigm.
2. To learn and understand python looping, control statements and string manipulations.
3. Students should be made familiar with the concepts of GUI controls and designing GUI applications.
4. To learn and know the concepts of file handling, exception handling.

Course Outcomes: On completion of the course, student will be able

1. Define and demonstrate the use of built-in data structures "lists" and "dictionary".
2. Design and implement a program to solve a real world problem.
3. Design and implement GUI application and how to handle exceptions and files.

Unit	Details	Lectures
I	**Unit 1: Introduction to Python** 1.1 History, feature of Python, setting up path, working with python Interpreter, basic syntax, variable and data types, operators 1.2 **Conditional statements**-If, If-Else, nested if-else, Examples. 1.3 **Looping**-For,While,Nested loops, Examples 1.4 **Control Statements**-Break, Continue, Pass. 1.5 **String Manipulation**-Accessing String, Basic Operations, String Slices, Function and Methods, Examples. 1.6 **Lists**-Introduction, accessing list, operations, working with lists, function & methods. 1.7 **Tuple**-Introduction, Accessing tuples, operations working, function & methods, Examples. 1.8 **Dictionaries**-Introduction, Accessing values in dictionaries, working with dictionaries, properties, function, Examples. 1.9 **Functions**-Defining a function, calling a function, types of function, function arguments, anonymous function, global & local variable, Examples.	**16**
II	**Unit 2: Modules and Packages** **2.1 Built in Modules** 2.1.1 Importing modules in python program 2.1.2 Working with Random Modules. 2.1.3 E.g. - built-ins, time, date time, calendar, sys, etc **2.2 User Defined functions** 2.2.1 Structure of Python Modules **2.3 Packages** 2.3.1 Predefined Packages 2.3.2 User defined Packages	**6**

III	**Unit 3: Classes ,Objects and Inheritance** **3.1 Classes and Objects** 3.1.1 Classes as User Defined Data Type 3.1.2 Objects as Instances of Classes 3.1.3 Creating Class and Objects 3.1.4 Creating Objects By Passing Values 3.1.5 Variables & Methods in a Class **3.2 Inheritance** 3.2.1 Single Inheritance 3.2.2 Multilevel Inheritance	**8**
	3.2.3 Multiple Inheritance 3.2.4 Hybrid Inheritance 3.2.5 Hierarchical Inheritance 3.2.6 IS-A Relationship and HAS-A Relationship	
IV	**Unit 4: Exception Handling** 4.1 Python Exception 4.2 Common Exception 4.3 Exception handling in Python (try-except-else) 4.4 The except statement with no exception 4.5 Multiple Exception 4.6 The try-finally clause 4.7 Custom Exception and assert statement	**4**
V	**Unit 5: GUI Programming** 5.1 Introduction 5.2 Tkinter programming 5.4 Tkinter widgets 5.5 Frame 5.6 Button 5.7 Label 5.8 Entry	**10**
VI	**Unit 6: Python Libraries** 6.1 Statistical Analysis- NumPy, SciPy, Pandas, StatsModels 6.2 Data Visualization- Matplotlib, Seaborn, Plotly 6.3 Data Modelling and Machine Learning- Scikit-learn, XGBoost, Eli5 6.4 Deep Learning- TensorFlow, Pytorch, Keras 6.5 Natural Language Processing (NLP)- NLTK, SpaCy, Gensim	**4**

Reference Books:

1. Mark Lutz, Programming Python, O`Reilly, 4th Edition, 2010
2. Dive into Python, Mike
3. Learning Python, 4th Edition by Mark Lutz
4. Programming Python, 4th Edition by Mark Lutz
5. Python Programming:An introduction to computer,John Zelle,3rd Edition.

T.Y.B.B.A.(C.A.) Sem-V (CBCS 2019 Pattern)
Subject Code: CA-507
Subject: Internet of Things (IOT)

Total Hours: 30 **Total Credits: 02**

Prerequisite:

Basic knowledge of Internet, Networking, and Electronics.

Course Objectives:

1. To understand Technical aspects of Internet of things.
2. To describe smart objects and IoT Architecture.
3. To study and compare different Application protocols ofIoT.
4. To understand IoT platform using Arduino Uno.

Course Outcomes: Students will be able

1. To explain key technologies, smart objects, IoT Architecture and security in Internet of Things.
2. To illustrate the role of IoT protocols for efficient network communication.
3. To understand IoT platform such as Arduino Uno.

Unit No.	Contents Theory	No. of Lectures
1	**Fundamentals of IoT** 1.1 Basic Concepts of IoT 1.2 Major components of IoT devices 1.3 IOT Architecture 1.4 Pros & Cons of IOT	03
2	**Communication Technologies** 2.1 Wireless Communication: Bluetooth, ZigBee, WiFi, RF Links 2.2 Wired Communication: Ethernet 2.3 IOT Protocol: MQTT, CoAP, XMPP, OSGi	05
3	**Microcontroller Fundamental and Arduino uno** 3.1 System on Chip & Microcontroller 3.2 Arduino UNO: Introduction to Arduino, Arduino UNO, Arduino Board, The Anatomy of an Arduino Board 3.3 The Development Environment of Arduino Board 3.4 Writing Arduino Software, The Arduino Sketch 3.5 Fundamentals of Arduino Programming 3.6 Trying the code on an Arduino Emulator 3.7 Arduino Libraries 25 Programming & Interfacing 3.8 Application of IoT 3.9 Case studies: Home Automation, Smart Parking, etc.	07
Total		**15**
Practical Please Refer Lab Book		**15**

Reference Books:

1. Learning internet of things by Waher, Peter -Packt Publishing Ltd, 2015
2. "Fundamentals of Wireless Sensor Networks: Theory and Practice" by WaltenegusDargie Christian Poellabauer
3. Internet of Things (A Hands-on-Approach) by Vijay Madisetti , ArshdeepBahga
4. Designing the Internet of Things by Adrian McEwen, Hakim Cassimally
5. Internet of Things with Arduino Cookbook by Schwartz, M. - Packt Publishing Ltd.
6. "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, 1st Edition, Pearson Education (Cisco Press Indian Reprint)
7. "Internet of Things" by Srinivasa K G, CENGAGE Leaning India, 2017
8. Computer Networks by Tanenbaum, Andrew S - Pearson Education Pte. Ltd., Delhi, 4th Edition
9. Data and Computer Communications; By: Stallings, William - Pearson Education Pte. Ltd., Delhi, 6th Edition

TYBBA (CA) Sem VI Syllabus

T.Y.B.B.A.(C.A.) Sem-VI (CBCS 2019 Pattern)

Subject Code: CA-601

Subject: Recent Trends in IT

Total Hours: 48 **Total Credits: 3+1=4**

Prerequisites:

1. Basic knowledge of related programming and database concepts.
2. Fundamentals of Mathematical logic & Data structures.

Course Objectives

1. To introduce upcoming trends in Information technology.
2. To study Eco friendly software development concepts.
3. To provide a strong foundation of fundamental concepts in Artificial Intelligence.
4. To evaluate the performance of various data mining task.
5. To understand Data analytics using Spark Programming.

Course Outcomes: On completion of the course, student will be able

1. To discuss the basic concepts AI.
2. To apply basic, intermediate and advanced techniques to mine the data.
3. To provide an overview of the concept of Spark programming.

Unit No.	Contents	No. of Lectures
1	**Introduction to recent trends** 1.1 Artificial Intelligence 1.2 Data Warehouse 1.3 Data Mining 1.4 Spark	02
2	**Artificial Intelligence** 2.1 Introduction& Concept of AI 2.2 Applications of AI 2.3 Artificial Intelligence, Intelligent Systems, Knowledge –based Systems, AI Techniques 2.4 Early work in AI & related fields. 2.5 Defining AI problems as a State Space Search 2.6 Search and Control Strategies 2.7 Problem Characteristics 2.8 AI Problem: Water Jug Problem, Tower of Hanoi, Missionaries & Cannibal Problem	08

3	**AI Search Techniques** 3.1 Blind Search Techniques: BFS, DFS, DLS, Iterative deepening Search, Bidirectional Search, and Uniform cost Search 3.2 Heuristic search techniques: Generate and test, Hill Climbing, Best First search, Constraint Satisfaction, Mean-End Analysis, A*, AO*	**08**
4	**Data Warehousing** 4.1 Introduction to Data warehouse 4.2 Structure of Data Warehouse 4.3 Advantages & uses of Data Warehouse 4.4 Architecture of Data Warehouse 4.5 Multidimensional data model 4.6 OLAP Vs. OLTP 4.7 OLAP Operations 4.8 Types of OLAP Servers: ROLAP versus MOLAP versus HOLAP	**08**
5	**Data Mining** 5.1 Introduction to Data Mining 5.2 Data mining Task 5.3 Data mining issues 5.4 Data Mining versus Knowledge Discovery in Databases 5.5 Data Mining Verification vs. Discovery 5.6 Data Pre-processing – Need, Data Cleaning, Data Integration & Transformation, Data Reduction 5.7 Accuracy Measures: Precision, recall, F-measure, confusion matrix, cross-validation, bootstrap 5.8 Data Mining Techniques 5.9 Frequent item-sets and Association rule 5.10 Graph Mining: Frequent sub-graph mining 5.11 Software for data mining : R, Weka, Sample applications of data mining 5.12 Introduction to Text Mining, Web Mining, Spatial Mining, Temporal Mining	**12**
6	**Spark** 6.1 Introduction to Apache Spark 6.2 Spark Installation 6.3 Apache Spark Architecture 6.4 Components of Spark 6.5 Spark RDDs 6.6 RDD Operations: Transformation & Actions 6.7 Spark SQL and Data Frames 6.8 Introduction to Kafka for Spark Streaming	**10**

Total	**48**

Reference Books:

1. Artificial Intelligence by Elaine Rich, Kevin Knight - Tata McGraw Hill, 2nd Edition
2. Artificial Intelligence: A new Synthesis, Nilsson, Elsevier,ISBN 9788181471901
3. Data Mining Concepts and Techniques, by Jiawei Micheline Kamber, Morgan Kauf Mann Publishers.
4. Advanced Analytics with Spark by Sandy RyzaPublicatio O'REILLY
5. Apache Spark for Data Science Cookbook by Padma Priya Chittur

T.Y.B.B.A(C.A) Sem-VI (CBCS 2019 Pattern)

Subject Code: CA-602

Subject: Software Testing

Total Hours: 48 **Total Credits: 3**

Prerequisite:

1. Students shall have basic Knowledge of Software Engineering.
2. Students shall have basic Knowledge of OOSE

Objectives:

1. To provide learner with knowledge in Software Testing techniques.
2. To understand how testing methods can be used as an effective tool in providing quality assurance for software.
3. To provide skills to design test case plan for testing software.

Outcomes:

1. Students will be introduced to testing tools.
2. Students will acquire Knowledge of Basic SQA.
3. Students will be able to design basic Test Cases.

Chapter	Course Content	No of lectures
1	**Introduction** 1.1 Introduction, Nature of errors, 1.2 Testing Objectives 1.3 Testing principles 1.4 Testing fundamentals, 1.5 Software reviews, Formal Technical reviews, 1.6 Inspection and walkthrough 1.7 Testing Life Cycle	**10**
2	**Approaches to Testing –Testing Methods** 2.1 White Box Testing and types of white box testing 2.2 Test Case Design 2.3 Black Box Testing and types of black box testing 2.4 Gray Box Testing	**5**
3	**Software Testing Strategies &Software metrics** 3.1 Software Testing Process 3.2 Unit Testing 3.3 Integration- Top-down ,Bottom up 3.4 System Testing 3.5 Acceptance Testing (alpha, Beta testing) 3.6 Validation and Verification 3.7 Big Bang Approach 3.8 Sandwich approach 3.9 Performance Testing 3.10 Regression Testing 3.11 Smoke Testing 3.13 Load Testing	**10**

4	**Software metrics** 4.1 Introduction 4.2 Basic Metrics –size-oriented metric, Function – oriented metric 4.3 Cyclometic Complexity Metrics Examples on Cyclometic Complexity	**10**
5	**Testing for Specialized Environments** 5.1 Testing GUI's 5.2 Testing of Client/Server Architectures 5.3 Testing Documentation and Help Facilities 5.4 Testing for Real-Time Systems	**5**
6	**Testing Tools& Software Quality Assurance (Introduction)** 6.1 JUnit, Apache JMeter, Win runner 6.2 Load runner, Rational Robot 6.3 Quality Concepts, Quality Movement, Background Issues, SQA activities 6.4 Formal approaches to SQA 6.5 Statistical Quality Assurance 6.6 Software Reliability 6.7 The ISO 9000 Quality Standards 6.8 SQA Plan 6.9 Six sigma Informal Reviews	
TOTAL		48

Reference Books:

Sr. No.	Title of the Book	Author's Name	Publication
1.	**Software Engineering – A Practitioner's approach**	**Roger S Pressman**	**7th Edition Tata McGraw-Hill**
2.	Effective Methods of Software Testing.	**William E Perry**	Wiley Publishing Inc
3.	**Software Testing Principles and Practices**	**Srinivasan Desikan, Gopalswamy Ramesh**	**Pearson Publication**
4.	**Total Quality Management**	**DaleH. Besterfield,**	**Prentice Hall, 2003**

T.Y.B.B.A.(C.A.) Sem-VI (CBCS 2019 Pattern)
Subject Code: CA-603
Subject: Advanced Java

Total Hours: 48 **Total Credits: 3**

Prerequisite: Students should know basic programming concepts.

Objectives

- 1. To know the concept of Java Programming.
  2. To understand how to use programming in day to day applications.
  3. To develop programming logic.

Outcomes

1. Students will know the concepts of JDBC Programming.
2. Students will know the concepts of Multithreading and Socket Programming.
3. Students will know the concepts of Spring and Hibernate.
4. Students will develop the project by using JSP and JDBC.
5. Students will develop applications in Spring and hibernate.

Sr. No	Topic	Number Of Lectures
1.	**JDBC** 1.1 Introduction 1.2 JDBC Architecture. 1.3 JDBC Process 1.4 **Working with ResultSet Interface.**	**8**
2	**Multithreading:** 2.1 Introduction to Multithreading. 2.2 Thread creation: Thread Class, Runnable Interface. 2.3 Life cycle of Thread. 2.4 Thread Priority. 2.5 Execution of Thread Application. 2.6 Synchronization and Interthread communication.	**12**
3	**Networking:** 3.1 Overview of Networking. 3.2 Networking Basics: Port Number, Protocols and classes. 3.3 Sockets, Reading from and Writing to a Socket.	**5**
4	**Servlet and JSP** 4.1 Introduction to Servlet 4.2 Types of Servlet: Generic Servlet and Http Servlet 4.3 Life cycle of servlet 4.4 Session Tracking. 4.5 Servlet with database. **JSP** 4.6 Introduction to JSP. 4.7 JSP Life Cycle. 4.8 Components of JSP. 4.9 JSP with Database.	**12**
5	**Spring & Hibernate** **Spring:** 5.1 Introduction 5.2 Applications and Benefits of spring 5.3 Architecture and Environment Setup 5.4 Hello World Example 5.5 Core Spring- IoC Containers, Spring Bean Definition, Scope, Lifecycle **Hibernate** 5.6 Architecture and Environment 5.7 Configuration, Sessions, Persistent Class 5.8 Mapping Files, Mapping Types 5.9 Examples	**11**

Reference Books:

1. The Complete Reference – JAVA Herbert Schildt
2. Professional Hibernate, by Eric Pugh, Joseph D. Gradecki by Wiley Publishing, Inc., ISBN: 0- 7645-7677-1
3. Spring In Action, Craig Walls, Ryan Breidenbach, Manning Publishing Co., ISBN: 1-932394- 35-4
4. Head First Servlets and JSP: Passing the Sun Certified Web Component Developer Exam -2nd Edition-Bryan Basham, Kathy Sierra, Bert Bates- O'REILLY.

T.Y.B.B.A.(C.A.) Sem-VI (CBCS 2019 Pattern)
Subject Code: CA-604
Subject: Android Programming

Total Hours: 48 **Total Credits: 3**

Pre-requisite:

1. Concepts of OOP's.
2. Basic Knowledge About JAVA Programming

Objective:

1. To understand the Android Operating System and develop applications using Google's Android open-source platform.
2. To understand the issues relating to Wireless applications.

Outcome:

1. Student will be able to write simple GUI applications, use built-in widgets and components, work with the database to store data locally, and much more.
2. Demonstrate their understanding of the fundamentals of Android operating systems
   Demonstrate their skills of using Android software development tools

Unit	Topic	No. of lectures
1	**INTRODUCTION TO Android Programming** 1.1 What is Android? 1.2 History and Versions 1.3 Android Architecture 1.4 Basic Building Blocks 1.5 Android API Levels 1.6 Application Structure 1.7 First Hello World Program	**04**
2	**ACTIVITY, INTENT AND LAYOUT** 2.1 Introduction to Activity 2.2 Activity life cycle 2.3 Introduction to Intent 2.4 Types of Intent(Implicit and Explicit Intent) 2.5 Layout Manager 2.5.1 View and View Group 2.5.2 Linear Layout 2.5.3 Relative Layout 2.5.4 Table Layout 2.5.5 Grid Layout 2.5.6 Constraint Layout 2.5.7 Frame Layout 2.5.8 Scroll Layout	**07**

3	**BASIC UI DESIGN** 3.1 Button(Push Button, Check Box, Radio Button, Toggle Button, Image Button) 3.2 Text Fields 3.3 Spinner 3.4 List View 3.5 Toast 3.6 Scroll View 3.6 ProgressBar View 3.7 Auto Complete Text View 3.8 Dialog Box 3.8.1 Alert Dialog. 3.8.2 DatePicker Dialog. 3.8.3 TimePicker Dialog. 3.8.4 Custom Dialog.	**10**
4	**ADAPTER AND MENU** 4.1 Base Adapter 4.2 Array Adapter 4.3 ListView using Adapter 4.4 GridView using Adapter 4.5 Photo Gallery using Adapter	**05**
	4.6 Using Menu with Views 4.6.1 Option Menu 4.5.2 Context Menu 4.5.3 Popup Menu	
5	**THREADS AND NOTIFICATION** 5.1 Worker thread 5.2 Handlers & Runnable 5.3 AsynTask (in detail) 5.4 Broadcast Receiver 5.5 Services 5.5.1 Service life Cycle 5.5.2 Bounded Service 5.5.2 Unbounded Service 5.6 Notification 5.7 Alarm 5.8 Accessing Phone services(Call,SMS)	**06**
6	**CONTENT PROVIDER** 6.1 Content Providers 6.2 SQLite Programming 6.3 SQLiteOpenHelper 6.4 SQLiteDatabse 6.5 Cursor 6.6 Searching for content 6.7 Adding, changing, and removing content 6.8 Building and executing queries 6.9 Android JSON	**08**

7	**LOCATION BASED SERVICES AND GOOGLE MAP** **7.1** Display Google Maps 7.1.1 Creating the project 7.1.2 Obtaining the Maps API Key 7.1.3 Displaying the Map 7.1.4 Displaying the Zoom Control 7.1.5 Changing Views 7.1.6 Navigating to a specific location 7.1.7 Adding Markers 7.1.8 Getting the location that was touched 7.1.9 Geocoding and Reverse Geocoding 7.2. Getting Location Data 7.3. Monitoring a Location	**08**
	Total Lectures	**48**

Reference Books:

1. Beginning Android4 Application Development, By Wei-Meng Lee WILEY India Edition WROX Publication
2. Professional Android 4 Application Development, By Reto Meier WROX Publication
3. The official site for Android developers - https://developer.android.com

T.Y.B.B.A.(C.A.) Semester-VI
Subject: Soft Skill
Course Code : CA – 607

Total Hours: 30 **Credit:02**

Prerequisite:

1. Basic Writing Skills in English including grammar.
2. Basic knowledge in communication and a good understanding of English.
3. Ready to adhere the new techniques.

Objectives:

1. It helps participants to communicate effectively and to carry themselves confidently.
2. They also learn how to identify and overcome the barriers in interpersonal relationships.
3. To improve oral and written communication, teamwork, leadership, problem-solving and decision-making skills, to gain best results.
4. This course is useful for landing a great job, building a career and also finding employment as soft skills trainers.

Outcomes:

1. Understand the significance and essence of a wide range of soft skills
2. Learn how to apply soft skills in a wide range of routine social and professional settings.
3. Learn how to employ soft skills to improve interpersonal relationships.
4. Learn how to employ soft skills to enhance employability and ensure workplace and career success.

Unit	Topics	No. of Lectures
1	**Introduction to Soft Skills** 1.1 An Introduction to Soft skill - 1.1.1 Definition and Significance of Soft Skills 1.1.2 Soft skill Process 1.1.3 Uses of Soft Skill Development.	02
2	**Communication Skills** 2.1 Introduction - Components of communication process, Communication process , Effective communication process. 2.2 Types of communication – 2.2.1 Verbal Communication – • Punctuation • Meaning & opposites , vocabulary • Real Life conversations 2.2.2 Non – Verbal Communication - • Facial Expression , Posture , Gesture , Eye contact • appearance (dress code), Body Language, listening skills • essential formal writing skills	04
3	**Skills Development** 3.1 Interview Skills – Interviewer and Interviewee – in-depth perspectives. Before, During and After the Interview. Tips for Success.	05

	3.2 Presentation Skills - Types, Content, Audience Analysis, Essential Tips Before, During and After, Overcoming Nervousness. 3.3 Etiquette and Manners - Social and Business 3.4 Time Management - Concept, Essentials, Tips 3.5 Personality Development - Meaning, Nature, Features, Stages, Models, Learning Skills, Adaptability Skills.	
4	**Skill Implementation** 4.1 Resume writing – 4.1.1 How to write your resume. • Contact details. • Opening statement. • List of key skills. • List of technical/software skills. • Personal attributes/career overview. • Educational qualifications. • Employment history /volunteering/work placements. • References/referees. 4.1.2 Types of resume 4.2 Group Discussion - Importance, Planning, Elements, and Skills assessed, Effectively disagreeing, Initiating, Summarizing and Attaining the Objective. 4.3 Teamwork and Leadership Skills - Concept of Teams, Building effective teams, Concept of Leadership and honing Leadership skills , A Good Leader, Leaders and Managers , Types of Leaders , Leadership Behaviour.	04
Total		15

Reference Books :

1. Managing Soft Skills for Personality Development – edited by B.N.Ghosh, McGraw Hill India, 2012.
2. English and Soft Skills – S.P.Dhanavel, Orient Blackswan India, 2010.
3. Soft skills Training – A workbook to develop skills for employment by Fredrick H. Wentz .
4. Personality Development and Soft skills, Oxford University Press by Barun K. Mitra

The Time Trap : the Classic book on Time Management by R. Alec Ma