Anekant Education Society's

Tuljaram Chaturchand College, Baramati

(Empowered Autonomous)

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION

Nelson Mandela Marg, Vasant Kunj, New Delhi 110070

www.aicte-india.org

Four Year Degree Program in BBA (Computer Application)

(Faculty of Commerce & Management) CBCS Syllabus

TYBBA (C.A.) Semester V

For Department of BBA (Computer Application)

Tuljaram Chaturchand College, Baramati

Choice Based Credit System Syllabus (2024 Pattern)

To be implemented from Academic Year 2026-2027

Title of the Programme: T.Y.BBA (Computer Application)

Preamble

AES's Tuljaram Chaturchand College has made the decision to change the syllabus of across various faculties from June, 2024 by incorporating the guidelines and provisions outlined in the National Education Policy (NEP), 2020. The NEP envisions making education more holistic and effective and to lay emphasis on the integration of general (academic) education, vocational education and experiential learning. The NEP introduces holistic and multidisciplinary education that would help to develop intellectual, scientific, social, physical, emotional, ethical and moral capacities of the students. The NEP 2020 envisages flexible curricular structures and learning based outcome approach for the development of the students. By establishing a nationally accepted and internationally comparable credit structure and courses framework, the NEP 2020 aims to promote educational excellence, facilitate seamless academic mobility, and enhance the global competitiveness of Indian students. It fosters a system where educational achievements can be recognized and valued not only within the country but also in the international arena, expanding opportunities and opening doors for students to pursue their aspirations on a global scale.

In response to the rapid advancements in science and technology and the evolving approaches in various domains of BBA (Computer Application) and related subjects, the Board of Studies in BBA (Computer Application) at Tuljaram Chaturchand College, Baramati - Pune, has developed the curriculum for the fifth semester of T.Y. BBA (Computer Application), which goes beyond traditional academic boundaries. The syllabus is aligned with the NEP 2020 guidelines to ensure that students receive an education that prepares them for the challenges and opportunities of the 21st century. This syllabus has been designedunder the framework of the Choice Based Credit System (CBCS), taking into consideration the guidelines set forth by the National Education Policy (NEP) 2020, LOCF (UGC), NCrF, NHEQF, Prof. R.D. Kulkarni's Report, Government of Maharashtra's General Resolution dated 20th April and 16th May 2023, and the Circular issued by SPPU, Pune on 31st May 2023.

BBA (Computer Application) is Undergraduate Degree Program with Computer Applications and Management Subjects. This program provides sound knowledge of theory and practical's. The different subjects helps the students to design, develop and implement software Applications, to learn emerging computer technologies and produce skilled human resource to face the professional challenges.

Overall, revising the BBA (Computer Application) syllabus in accordance with the NEP 2020 ensures that students receive an education that is relevant, comprehensive, and prepares them to navigate the dynamic and interconnected world of today. It equips them withthe knowledge, skills, and competencies needed to contribute meaningfully to society and pursue their academic and professional goals in a rapidly changing global landscape.

Programme Outcome for NEP 2020 (With Effect from June 2026-27)

Commerce and Management (Under Graduate Programme)

PO1: Broad Knowledge and Integrated Learning

Learners will develop wide-ranging knowledge across multiple disciplines and understand how these areas connect with professional fields such as Banking, Accounting, Management, Logistics, Marketing, Human Resource Management, and Computer Science.

PO2: Procedural Understanding for Skill Building

Learners will gain structured and systematic procedural understanding of each subject, enabling mastery of concepts and continuous improvement of practical and academic skills.

PO3: Logical Thinking and Problem-Solving Capability

Learners will be equipped to identify, analyze, and resolve problems in both predictable and unfamiliar situations by applying learned concepts to real-life scenarios. They will also be able to investigate complex problems through experimentation, data evaluation, and interpretation to derive meaningful conclusions.

PO4: Professional and Technical Communication Skills

Learners will enhance verbal and written communication abilities through the effective use of multiple languages. They will be able to express ideas clearly, present reasoned arguments using discipline-specific terminology, participate in constructive discussions, and demonstrate effective communication skills relevant to business and banking environments.

PO5: Analytical Judgment and Decision-Making Skills

Learners will develop the ability to critically examine situations, determine their accuracy and relevance, and make informed decisions. They will analyze business operations and assess the benefits and limitations of trade-related activities using analytical reasoning.

PO6: Creativity, Employability, and Entrepreneurial Mindset

Learners will be capable of recognizing opportunities and converting them into productive outcomes that contribute to personal success and societal advancement. They will be prepared for professional employment, entrepreneurial initiatives, and ethical leadership roles.

PO7: Interdisciplinary Awareness and Competence

Learners will acquire an understanding of principles and values from diverse disciplines and view knowledge as holistic, interconnected, and environmentally responsible, promoting empathy, collaboration, and interdisciplinary problem-solving.

PO8: Ethical Values through Social Participation

Learners will apply their knowledge and attitudes to uphold constitutional, moral, and humanistic values. They will actively engage in community-oriented activities aimed at social development and public well-being.

PO9: Integration of Indigenous Knowledge with Contemporary Practice

Learners will understand traditional knowledge systems and effectively adapt and apply them within modern professional and technological contexts.

PO10: System Planning and Solution Development

Learners will be able to conceptualize, design, and implement solutions for complex real-world computing problems. They will develop systems and processes that address specific needs while considering safety, cultural, social, and environmental responsibilities.

PO11: Ethical Awareness and Social Accountability

Learners will demonstrate an understanding of ethical principles and apply them responsibly in professional and societal contexts. They will exhibit integrity, accountability, respect for societal norms, and adherence to professional ethical standards.

PO12: Research Competence and Methodological Skills

Learners will acquire knowledge of fundamental research methods, processes, and ethical practices necessary for conducting academic, personal, and social research across disciplines.

PO13: Collaborative and Team-Based Skills

Learners will be able to function efficiently and respectfully within team environments, contributing constructively toward shared objectives.

PO14: Specialized Knowledge Application

Learners will demonstrate the ability to apply subject-specific concepts, theories, and models in areas such as Accounting, Taxation, Marketing, Finance, Human Resource Management, and Computer Applications through in-depth subject understanding.

PO15: Environmental Responsibility and Risk Management

Learners will be able to identify environmental risks associated with organizational activities and implement appropriate measures to monitor, control, and minimize impacts on air, water, and soil quality

Programme Specific Outcomes (PSOs)

PSO1. **Knowledge:** To understand and apply the fundamental principles, concepts, and methods in diverse areas of computer science, computer applications, management, mathematics, statistics, etc.

PSO2. **Problem Analysis:** Identify, analyze and formulate complex real-life computing problems. Attain substantiated conclusions to solve the problems using fundamental principles of computer science and application domains by using various tools and emerging technologies.

PSO3. **Design and Development:** Design and develop efficient solutions for complex real-world computing problems and design system components or processes that meet thespecified needs with appropriate consideration for public health and safety and the cultural, societal, and environmental considerations.

PSO4.**Conduct investigations of complex problems:** Ability to research, analyze and Investigate complex computing problems through the design of experiments, analysis, and interpretation of data, and synthesis of the information to arrive at valid conclusions.

PSO5. **Modern Tool Usage:** Create, identify and apply appropriate techniques, skills, andmodern computing tools to computing activities.

PSO6.**Ethics and Social Responsibility:** Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices.

PSO7.**Individual and Team Work:** Ability to work effectively as an individual, and as a member or leader as per need in, multidisciplinary teams.

PSO8.**Life-Long Learning:** Recognize the need and have the ability to engage in Independent continuous reflective learning in the context of technological advancement.

PSO9. **Project Management:** Understand and apply computing, management principles tomanage projects.

***PSO10.*Communication:** Able to use interpersonal skills and communicate effectively with the professionals and with society to convey technical information effectively and accurately and able to comprehend and write effective reports, design documentation, and make effective presentations.

***PSO11.*Innovation, employability, and Entrepreneurial skills:** Identify opportunities, and pursue those opportunities to create value and wealth for the betterment of the individual and society at large.

Anekant Education Society's

Tuljaram Chaturchand College, Baramati

(Empowered Autonomous)

Board of Studies (BOS) in BBA (Computer Application)

From 2025-26 to 2027-28

Sr. No.	Name of Member	Designation
1	Mrs. Salma Shaikh	Chairperson
2	Dr. Poonam Ponde	Expert from SPPU Pune
3	Dr. Sagar Jambhorkar	Expert from other University
4	Dr. Kamlesh Meshram	Expert from other University
5	Mr. Akshay Jaisinghani	Industry Expert
6	Mrs.Pooja Shinde	Meritorious Alumni
7	Mrs. Ashwini Bhosale	Member
8	Mr. Dattatray Aarde	Member
9	Ms. Trupti Bhosale	Member
10	Mr. Vishal Shah	Member
12	Mrs. Smita Kachare	Invitee Member
13	Ms. Harshada Pingle	Student Representative
14	Mr. Swapnil Kale	Student Representative

Anekant Education Society's

Tuljaram Chaturchand College

of Arts, Science and Commerce, Baramati (Empowered Autonomous)

Department of BBA (Computer Application)

Credit distribution Structure of B.B.A.(C.A.) (2024 Pattern)

Level	Sem.	Core Courses				Minor	GE/OE	AEC	IKS Gen.	VEC	SEC	CC	Total
4.5/100	I	6(T)+6(P)				-	2 (T)	2(T)	2(T)	2(T)	2(P)	-	22
	II	6(T)+6(P)				-	2 (P)	2(T)	-	2(T)	2(P)	2	22
Exit Option : Award of **UG Certificate** in Major With **Total Credits 44** **Continue option:** Student will select Computer as major and one as Minor.													
Level	**Sem.**	**Credit Related to Major**				**Minor**	**GE/OE**	**AEC**	**IKS Gen.**	**VEC**	**SEC**	**CC**	**Total**
		Major Core	**Major Elective**	**VSC**	**FP/OJT/ CEP**								
5.0/200	III	4(T) + 2(P)	-	2 (T/P)	2(FP)	2(T)+2(P)	2(T)	2(T)	2(T)	-	-	2(T)	22
	IV	4(T) + 2(P)	-	2 (T/P)	2(CEP)	2(T)+2(P)	2(P)	2(T)	-	-	2(T/P)	2(T)	22
Exit Option: Award of **UG Diploma** in Major and Minor With **Total Credits 88** OR Continue with Major and Minor.													
5.5/300	V	8(T) + 4(P)	2(T) + 2(P)	-	4(OJT)	2(T)	-	-	-	-	-	-	22
	VI	8(T) + 4(P)	2(T) + 2(P)	4 (T/P)	2 (FP)	-	-	-	-	-	-	-	22
Total 3 Years		86				10	08	08	04	04	06	06	132
Exit Option: Award of **UG Degree** in Major and Minor With **Total Credits 132** OR Continue with Major and Minor.													
6.0/400	VII	6(T) + 4(P)	2(T) +2(T/P)	-	4(RP)	4(RM)(T)	-	-	-	-	-	-	22
	VIII	6(T) + 4(P)	2(T) +2(T/P)	-	8(RP)	-	-	-	-	-	-	-	22
Total 4 Years		126				14	08	08	04	04	06	06	176
Four Year **UG Honours with Research Degree** in Major and Minor with **Total credits 176**													
6.0/400	VII	10(T) + 4(P)	2(T) +2(T/P)	-	-	4(RM)(T)	-	-	-	-	-	-	22
	VIII	10(T) + 4(P)	2(T) +2(T/P)	-	4(OJT)	-	-	-	-	-	-	-	22
Total 4 Years		126				14	08	08	04	04	06	06	176
Four Year **UG Honours Degree** in Major and Minor with **Total credits 176**													

T = Theory, **P** = Practical, **DSC** = Discipline Specific Course, **OE** = Open Elective, **SEC** = Skill Enhancement Course, **IKS** = Indian Knowledge System, **AEC** = Ability Enhancement Course, **VEC** = Value Education

TYBBA(C.A.) – Semester –V				
Course Type	**Course Code**	**Course Title**	**Theory/ Practical**	**Credits**
Major Mandatory	BBACA-301-MRM	Data Science and Analytics	Theory	02
	BBACA-302-MRM	Web Development Using React	Theory	02
	BBACA-303-MRM	Internet of Things	Theory	02
	BBACA-304-MRM	Cyber Security	Theory	02
Major Mandatory	BBACA-305-MRM	Practical Lab on BBACA-301-MRM	Practical	02
	BBACA-306-MRM	Practical Lab on BBACA-302-MRM	Practical	02
Major Elective (MJE)	BBACA-307-MJE(A)	Software Testing & Quality Assurance	Theory (Any One)	02
	BBACA-307-MJE(B)	Cloud Computing		
	BBACA-308-MJE(A)	Practical Lab on Tableau / Power BI	Practical (Any One)	02
	BBACA-308-MJE(B)	Practical Lab on BBACA-307-MJE(B)		
On Job Training (OJT)	BBACA-309-OJT	On Job Training	Practical	04
Minor	BBACA-310-MN	Programming using GO	Theory	02
			Total Credits of Semester - V	**22**

TYBBA(C.A.) – Semester –VI				
Course Type	**Course Code**	**Course Title**	**Theory/ Practical**	**Credits**
Major Mandatory	BBACA-351-MRM	Android Programming	Theory	02
	BBACA-352-MRM	Data Mining	Theory	02
	BBACA-353-MRM	AI for Everyone	Theory	02
	BBACA-354-MRM	NoSQL	Theory	02
Major Mandatory	BBACA-355-MRM	Practical Lab on BBACA-351- MRM	Practical	02
	BBACA-356-MRM	Practical Lab on BBACA-354-MRM	Practical	02
Major Elective (MJE)	BBACA-357-MJE(A)	Operating System	Theory (Any One)	02
	BBACA-357-MJE(B)	.Net Framework		
	BBACA-358-MJE(A)	Practical Lab on BBACA-357-MJE(A)	Practical (Any One)	02
	BBACA-358-MJE(B)	Practical Lab on BBACA-357-MJE(B)		
Vocational Skill Course (VSC)	BBACA-359-VSC	Recent Trends In IT	Theory	02
	BBACA-360-VSC	Practical Lab on Networking	Practical	02
Field Project(FP)	BBACA-361-FP	Field Project	Practical	02
			Total Credits of Semester - VI	**22**
			Total Credits of Semester – V+VI	**44**

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Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati (Empowered Autonomous)

CBCS Syllabus as per NEP 2020 for T.Y. BBA (Computer Application) (2024 Pattern)

Name of the Programme : BBA (Computer Application)
Programme Code : BBACA
Class : TY BBA (C.A.)
Semester : V
Course Type : Major Mandatory
Course Code : BBACA-301-MRM
Course Title : Data Science & Analytics
No. of Credits : 02
No. of Teaching Hours : 30

Course Objectives:

1. Understand the meaning, importance, and real-life applications of Data Science.
2. Explain the key steps in a Data Science project.
3. Apply basic statistical concepts like probability, sampling, and inference.
4. Use NumPy and Pandas for array operations and data handling with Series and DataFrames.
5. Clean and organize data through merging, reshaping, transforming, and grouping.
6. Explore and summarize data using statistics and visualization techniques.
7. Create meaningful visualizations using Matplotlib to present insights.

Course Outcomes:

After successfully completing this course, students will be able to:

CO1: Understand basic concepts of Data Science, types of data analysis, and the role of statistical models in decision-making.

CO2: Use NumPy arrays and Pandas tools to perform data operations and manage datasets.

CO3: Create, read, update, and filter DataFrames to analyze structured data efficiently.

CO4: Clean and transform data by handling missing values, merging datasets, and applying group operations.

CO5: Summarize grouped data using aggregation and cross-tabulation techniques.

CO6: Perform Exploratory Data Analysis to identify patterns, trends, and outliers.

CO7: Create clear and meaningful visualizations using Matplotlib, including multiple and tree-style plots.

Topics and Learning Points			Teaching Hour
Unit I		**Introduction to Data Science**	**(05 Lecture)**
	1.1	Basics and Definition of Data Science and Data Analytics	
	1.2	Data Science Process and Project Stages	
	1.3	Applications of Data Science in Various Fields	
	1.4	Types of Analytics – Descriptive, Predictive, Prescriptive	
	1.5	Statistical Inference, Populations and Samples, Probability	
Unit II		**Numpy And Pandas Packages**	**(10 Lecture)**
	2.1	Introduction to Arrays	
	2.2	Types of Arrays	
	2.3	Array Creation Methods	
	2.4	Introduction to Series in Pandas	
	2.5	Introduction to DataFrame in Pandas	
	2.6	Creating DataFrames	
	2.7	Accessing Rows and Columns in a DataFrame	
	2.8	Dropping Entries from Series and DataFrames	
	2.9	Indexing, Selection, and Filtering in DataFrame	
	2.10	Arithmetic Operations between DataFrames and Series	
UNIT III		**Data Wrangling, Aggregation, Group Operations and EDA**	**(10 Lecture)**
	3.1	Combining and Merging Data Sets	
	3.2	Reshaping and Pivoting	
	3.3	Data Transformation	
	3.4	Group By Mechanics	
	3.5	Data Aggregation	
	3.6	GroupWise Operations, Cross Tabulations	
	3.7	Exploratory Data Analysis	
	3.8	Steps in EDA	
	3.9	Basic tools (plots, graphs and summary statistics) of EDA	
	3.10	Types of exploratory data analysis	
UNIT IV		**Data Visualization**	**(05 Lecture)**
	4.1	Introduction to Data Visualizations using Matplotlib,	
	4.2	Various Tools for Data Visualization	
	4.3	Types of Visualization Methods in matplotlib	
	4.4	Tree Visualization	
	4.5	Subplots & Subplot2Grid Method	

References:

1) Data Mining concepts and Techniques by Jiawei Han and Micheline Kamber, ELSEVIER, Third Edition,
2) R and Data Mining, By Yanchang Zhao, Elsevier Inc., ISBN-10: 0123969638 Data Science from Scratch: First Principles with Python By O‟Reilly Media, 20153.
3) Wes McKinney ,*Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Jupyter*, Third Edition
4) Febio Nilli, Python data Analytics with Pandas, Numpy and Matplotlib, Third Edition

Choice Based Credit System Syllabus (2024 Pattern) (As Per NEP 2020)

Mapping of Program Outcomes with Course Outcomes

Class: TYBBA (C.A.) (SEM V) **Subject:** BBA (C.A.)

Course: Data Science & Analytics **Course Code:** BBACA-301-MRM

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	3	–	–	–	–	–	–	–	–	–	–	–	3	–
CO2	–	3	3	–	–	–	–	–	–	3	–	–	–	3	–
CO3	–	3	3	–	–	–	–	–	–	3	–	–	–	3	–
CO4	–	3	3	–	–	–	–	–	–	3	–	–	–	3	–
CO5	–	3	3	–	–	–	–	–	–	3	–	–	–	3	–
CO6	–	–	3	–	–	–	–	–	–	3	–	–	–	3	–
CO7	–	–	3	–	–	3	–	–	–	3	–	–	3	3	–

PO1 – Fundamental Knowledge:

CO1 provides a strong theoretical foundation in Data Science concepts, types of analysis, and statistical models used for decision-making.

PO2 – Technical and Practical Skills:

CO1 to CO5 develop hands-on skills in handling datasets using NumPy and Pandas, including data manipulation, transformation, and management.

PO3 – Analytical and Problem-Solving Ability:

CO2 to CO7 strengthen analytical thinking through data cleaning, aggregation, exploratory analysis, and interpretation of patterns and trends.

PO6 – Employability and Innovation:

CO7 enhances professional skills by enabling students to create meaningful visualizations useful in industry reporting and analytics.

PO10 – Systematic Analysis and Solution Development:

CO2 to CO7 contribute to structured data analysis processes that support informed decision-making and solution development.

PO13 – Communication and Presentation Skills:

CO7 improves the ability to present analytical findings clearly through graphical and visual representation.

PO14 – Specialized Domain Knowledge:

CO1 to CO7 ensure application of core Data Science tools and techniques in practical and real-world scenarios.

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Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati
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CBCS Syllabus as per NEP 2020 for T.Y. BBA (Computer Application) (2024 Pattern)

Name of the Programme : BBA (Computer Application)
Programme Code : BBACA
Class : TY BBA (C.A.)
Semester : V
Course Type : Major Mandatory
Course Code : BBACA-302-MRM
Course Title : Web Development Using React
No. of Credits : 02
No. of Teaching Hours : 30

Course Objectives:

1. To understand the basics of ReactJS and set up the development environment.
2. To learn how to create React applications using components and JSX.
3. To understand props, state, and component lifecycle in ReactJS.
4. To apply React Hooks for managing state and side effects in applications.
5. To develop skills in handling events and user interactions in ReactJS.
6. To design and validate forms using controlled components in ReactJS.
7. To implement styling techniques in React applications using CSS and modern approaches.

Course Outcomes:

After successfully completing this course, students will be able to:

CO1: Understand and set up the ReactJS development environment.
CO2: Create React applications using components and JSX.
CO3: Use props and state to manage data in React components.
CO4: Apply React Hooks in functional component development.
CO5: Implement event handling and user interactions in ReactJS.
CO6: Design and validate forms using controlled components.
CO7: Apply styling techniques to develop responsive React user interfaces.

Topics and Learning Points			Teaching Hour
Unit I		**ReactJS Fundamentals and Development Setup**	**(05 Lecture)**
	1.1	Introduction to ReactJS & Environment Setup	
	1.2	Create ReactJS App & Project Structure	
	1.3	Hello World Program in ReactJS	
	1.4	Functional Components	
	1.5	JSX Basics	
Unit II		**ReactJS Components, Props, State, and Hooks**	**(10 Lecture)**
	2.1	Functional vs Class Components	
	2.2	Component Rendering and Structure	
	3.3	Introduction to Props	
	2.4	Passing Data using Props	
	2.5	Component Reusability and Composition	
	2.6	Introduction to State in React	
	2.7	State Management and Updates	
	2.8	Lifecycle Methods in Class Components	
	2.9	Hooks – useState and useEffect	
	2.10	Hooks – useContext and Practical Examples	
Unit III		**Event Handling and Forms in ReactJS**	**(10 Lecture)**
	3.1	Introduction to Event Handling in ReactJS	
	3.2	Handling Events with Functions	
	3.3	Event Binding Techniques	
	3.4	Passing Arguments in Events	
	3.5	Introduction to Forms in ReactJS	
	3.6	Controlled Components	
	3.7	Handling Form Inputs (text, checkbox, radio, select)	
	3.8	Form Submission Methods	
	3.9	Form Validation Techniques	
	3.10	Examples on Forms and Events	

Unit IV **Styling and Design in ReactJS** **(05 Lecture)**

4.1 Introduction to Styling in React and CSS Basics

4.2 Applying CSS in React Components

4.3 CSS Modules

4.4 CSS-in-JS Concepts

4.5 Examples on React Styling

References:

1) Learning React: Modern Patterns for Developing React Apps, Alex Banks & Eve Porcello, O'Reilly Media, 2020

2) The Road to React: Your Journey to Master React.js, Robin Wieruch, CreateSpace Independent Publishing Platform, 2018

3) React in Action, Mark Tielens Thomas, Manning Publications, 2018

4) Fullstack React: The Complete Guide to ReactJS and Friends, Anthony Accomazzo, Nathan Murray, Ari Lerner, Clay Allsopp, David Guttman, Fullstack.io, 2017

Choice Based Credit System Syllabus (2024 Pattern) (As Per NEP 2020)

Mapping of Program Outcomes with Course Outcomes

Class: TYBBA (C.A.) (Sem V) **Subject:** BBA (C.A.)

Course: Web Development Using React **Course Code:** BBACA-302-MRM

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

CO–PO Mapping Table

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	3	–	–	–	–	–	–	–	–	–	–	–	3	–
CO2	–	3	3	–	–	–	–	–	–	3	–	–	–	3	–
CO3	–	3	3	–	–	–	–	–	–	3	–	–	–	3	–
CO4	–	3	3	–	–	–	–	–	–	3	–	–	–	3	–
CO5	–	3	3	–	–	–	–	–	–	3	–	–	–	3	–
CO6	–	3	3	–	–	–	–	–	–	3	–	–	–	3	–
CO7	–	3	3	–	–	3	–	–	–	3	–	–	3	3	–

PO1 – Broad Knowledge and Integrated Learning

CO1 builds a strong foundation in ReactJS fundamentals, including development environment setup and core architectural concepts. It introduces component-based design and modern front-end development principles.

PO2 – Procedural Understanding and Skill Development

CO1–CO7 develop structured and systematic programming skills in ReactJS. Students learn component creation, JSX, props, state management, hooks, and form handling. The course emphasizes step-by-step application development practices.

PO3 – Logical Thinking and Problem-Solving Capability

CO2–CO7 enhance analytical and logical reasoning through dynamic UI development. Students manage application state, handle events, and implement conditional rendering. Problem-solving skills are strengthened through debugging and interaction handling.

PO6 – Creativity, Employability, and Entrepreneurial Mindset

CO7 supports the creation of responsive and user-friendly interfaces aligned with industry standards. Students develop practical skills demanded in modern web development roles. It enhances innovation through creative UI design and styling techniques.

PO10 – System Planning and Solution Development

CO2–CO7 contribute to systematic front-end system design using reusable components. Learners apply modular architecture and structured coding practices. Applications are developed considering scalability and maintainability.

PO13 – Collaborative and Team-Based Skills

CO7 encourages participation in project-based development activities. Students learn collaborative coding practices followed in industry environments. It promotes coordination and shared responsibility in UI development tasks.

PO14 – Specialized Knowledge Application

CO1–CO7 ensure in-depth application of ReactJS concepts in real-world scenarios. Students apply domain-specific tools and modern front-end techniques. The course strengthens practical implementation capability.

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Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati

(Empowered Autonomous)

CBCS Syllabus as per NEP 2020 for T.Y. BBA (Computer Application) (2024 Pattern)

Name of the Programme : BBA (Computer Application)

Programme Code : BBACA

Class : TY BBA (C.A.)

Semester : V

Course Type : Major Mandatory

Course Code : BBACA-303-MRM

Course Title : Internet of Things

No. of Credits : 02

No. of Teaching Hours : 30

Course Objectives:

1. To introduce embedded systems and real-time systems concepts.
2. To understand processors, microcontrollers, and SoC technologies.
3. To explain IoT architecture, devices, and enabling technologies.
4. To study IoT networking and communication models.
5. To understand IoT protocols and cloud platforms.
6. To analyze IoT security challenges and requirements.
7. To develop basic IoT system design skills.

Course Outcomes:

After successfully completing this course, students will be able to:

CO1: Explain embedded and real-time system concepts.

CO2: Describe processors, microcontrollers, and SoC technologies.

CO3: Illustrate IoT architecture, devices, and technologies.

CO4: Analyze IoT networking and communication models.

CO5: Compare IoT protocols and cloud platforms.

CO6: Identify IoT security threats and protection mechanisms.

CO7: Design a basic secure IoT application.

Topics and Learning Points			Teaching Hour
Unit I		**Embedded Systems Fundamentals**	**(05 Lecture)**
	1.1	Embedded System Concepts	
	1.2	Real-Time Systems	
	1.3	Processors and Microcontrollers	
	1.4	System-on-Chip (SoC)	
	1.5	Embedded System Architecture	
Unit II		**IoT Concepts and Design**	**(10 Lecture)**
	2.1	IoT Overview and Characteristics	
	2.2	IoT Devices and Architecture	
	2.3	Sensors and Actuators	
	2.4	IoT Design Methodology	
	2.5	IoT Networking Basics	
	2.6	IoT Communication Models	
	2.7	IoT Functional Blocks	
	2.8	IoT Enabling Technologies	
	2.9	IoT Applications	
	2.10	IoT Core Technologies (M2M, SCADA, WSN, RFID)	
Unit III		**IoT Protocols and Cloud**	**(10 Lecture)**
	3.1	IoT Protocol Standards	
	3.2	M2M Protocols	
	3.3	WSN Protocols	
	3.4	RFID Protocol	
	3.5	Modbus Protocol	
	3.6	Zigbee Architecture	
	3.7	IP-Based Protocols (MQTT, 6LoWPAN, LoRa)	
	3.8	Cloud Models for IoT	
	3.9	AWS and IoT Cloud Platforms	
	3.10	Web Services (REST, gRPC, SOAP)	
Unit IV		**IoT Security**	**(05 Lecture)**
	4.1	IoT Security Fundamentals	
	4.2	IoT Vulnerabilities and Threats	
	4.3	Security Requirements and Challenges	
	4.4	Identity and Access Control	
	4.5	Data and Communication Security	

Reference Books:

1. Embedded Systems: Architecture, Programming and Design Author: Raj Kamal , Publisher: McGraw-Hill Education , Relevance: Covers embedded system fundamentals, processors, microcontrollers, SoC, and system architecture.
2. The Internet of Things: A Hands-On Approach Authors: Arshdeep Bahga, Vijay Madisetti Publisher: Universities Press Relevance: Excellent coverage of IoT architecture, design methodology, protocols, and real-world applications.
3. Internet of Things: Principles and Paradigms Editors: Rajkumar Buyya, Amir Vahid Dastjerdi Publisher: Morgan Kaufmann Relevance: Focuses on IoT concepts, cloud integration, enabling technologies, and IoT applications.
4. Designing the Internet of Things Authors: Adrian McEwen, Hakim Cassimally Publisher: Wiley Relevance: Practical guide to IoT design, sensors, actuators, communication models, and system implementation.
5. IoT Security: Advances in Authentication, Authors: Feiqi Deng, Houbing Song Publisher: Wiley Relevance: Covers IoT security fundamentals, vulnerabilities, identity management, and data security.

Choice Based Credit System Syllabus (2024 Pattern) (As Per NEP 2020)

Mapping of Program Outcomes with Course Outcomes

Class: T.Y. BBA (C.A.) **Subject:** BBA (C.A.)

Course: Internet of Things **Course Code:** BBACA-303-MRM

Weightage: 1=weak or low relation, 2=Moderate or partial relation, 3=Strong or direct relation

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CO2	–	3	–	–	–	–	–	–	–	–	–	–	–	3	–
CO3	–	–	3	–	–	–	–	–	–	–	–	–	–	3	–
CO4	–	–	3	–	–	–	–	–	–	3	–	–	–	–	–
CO5	–	–	3	–	3	–	–	–	–	3	–	–	–	–	–
CO6	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–
CO7	–	–	3	–	3	–	–	–	–	3	3	–	–	–	–

PO1: Broad Knowledge and Integrated Learning

CO1 strongly contributes by building foundational knowledge of embedded and real-time systems.

PO2: Procedural Understanding for Skill Building

CO2 strongly supports procedural understanding through study of processors, microcontrollers, and SoC technologies.

PO3: Logical Thinking and Problem-Solving Capability

CO3, CO4, CO5, and CO7 strongly develop analytical and problem-solving skills through IoT architecture analysis, networking evaluation, protocol comparison, and system design.

PO5: Analytical Judgment and Decision-Making Skills

CO5 and CO7 strongly support analytical evaluation of IoT protocols, cloud platforms, and secure system decisions.

PO10: System Planning and Solution Development

CO4, CO5, and CO7 strongly contribute to system design, planning, and implementation of IoT-based solutions.

PO11: Ethical Awareness and Social Accountability

CO6 and CO7 strongly support secure system development and ethical application of IoT technologies.

PO14: Specialized Knowledge Application

CO2 and CO3 strongly apply embedded and IoT concepts in specialized technical domains.

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CBCS Syllabus as per NEP 2020 for T.Y. BBA (Computer Application) (2024 Pattern)

Name of the Programme : BBA (Computer Application)

Programme Code : BBACA

Class : TY BBA (C.A.)

Semester : V

Course Type : Major Mandatory

Course Code : BBACA-304-MRM

Course Title : Cyber Security

No. of Credits : 02

No. of Teaching Hours : 30

Course Objectives:

1. To introduce basic concepts of cyberspace, cybercrime, and cyber security.
2. To provide knowledge of types of cybercrimes and cyber offenders.
3. To understand cybercrime tools and techniques such as phishing, malware, and hacking.
4. To explain vulnerabilities, threats, and risks in digital systems.
5. To familiarize students with information security principles and CIA triad.
6. To introduce computer forensics and digital evidence concepts.
7. To understand cyber laws and the Indian IT Act and related penalties.

Course Outcomes:

After successfully completing this course, students will be able to:

CO1. Describe concepts of cybercrime and cyber security and their societal impact.

CO2. Identify types of cybercriminals and cybercrimes.

CO3. Explain cybercrime tools and attack techniques.

CO4. Assess security vulnerabilities and suggest basic protection measures.

CO5. Apply information security principles such as confidentiality, integrity, and availability.

CO6. Demonstrate understanding of computer forensics and digital evidence.

CO7. Explain cyber laws and legal consequences of cyber offences in India.

Topics and Learning Points			Teaching Hour
Unit I		**Introduction to Cyber Crime and Cyber Security**	**(05 Lectures)**
	1.1	Introduction to Cyber Security and Cybercrime	
	1.2	Information Security	
	1.3	Vulnerability, Threats and Harmful Acts	
	1.4	CIA Triad and Goals of Security	
	1.5	Zero Trust Security Model in Cyber Security	
Unit II		**Types of Cybercrimes and Cyber Offenders**	**(10 Lectures)**
	2.1	Cybercriminals, motives and Category	
	2.2	Hackers and Types of Hackers	
	2.3	E-Mail Related Crimes	
	2.4	Data and Financial Crimes	
	2.5	Content and Reputation Crimes	
	2.6	Network and System Crimes	
	2.7	Industrial and Organized Crimes	
	2.8	Online Frauds and Newsgroup Espionage	
	2.9	Cyber Terrorism	
	2.10	Impact of Cybercrime on National Security	
Unit III		**Cybercrime Tools, Techniques and Security Threats**	**(10 Lectures)**
	3.1	Proxy Servers and Anonymizers	
	3.2	Phishing- Types and Prevention Techniques	
	3.3	Password Security	
	3.4	Malicious Software-Virus, Worms and Trojan Horses	
	3.5	DoS and DDoS Attacks	
	3.6	SQL Injection	
	3.7	Security Threats	
	3.8	Steganography	
	3.9	Computer Forensics- Definition and Role in Investigation	
	3.10	Digital Evidence	
UNIT IV		**Cyber Laws and Legal Framework**	**(05 Lectures)**
	4.1	Introduction to Cyber Laws	
	4.2	Cyberlaw, Technology and Students in Cyber Laws Context	
	4.3	The Indian IT Act	
	4.4	Challenges and Cybercrime Scenario in India	
	4.5	Cybercrime and Punishment	

References:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives: - Nina Godbole & Sunit Belapure, Wiley India, Latest Edition: 2023
2. Cyber Security and Cyber Laws: - Alfred Basta, Nadine Basta & Mary Brown, Cengage Learning, Latest Edition: 2022
3. Cyber Law: Indian and International Perspectives: - Pavan Duggal, LexisNexis, Latest Edition: 2023
4. Information Security Principles and Practice: - Mark Stamp, Wiley, Latest Edition: 2022
5. Computer Forensics and Cyber Crime: An Introduction: - Marjie T. Britz, Pearson, Latest Edition: 2023

Choice Based Credit System Syllabus (2024 Pattern) (As Per NEP 2020)

Mapping of Program Outcomes with Course Outcomes

Class: T.Y. BBA (C.A.) **Subject:** BBA (C.A.)

Course: Cyber Security **Course Code:** BBACA-304-MRM

Weightage: 1=weak or low relation, 2=Moderate or partial relation, 3=Strong or direct relation

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	2	1	2	-	1	1	-	-	2	-	-	3	-
CO2	3	3	3	-	2	1	1	-	-	-	2	-	-	3	-
CO3	3	3	3	-	2	2	1	-	-	2	2	1	-	3	-
CO4	3	3	3	-	3	2	1	1	-	3	3	-	-	3	1
CO5	3	2	3	-	3	2	2	2	-	3	3	-	-	3	1
CO6	3	2	2	-	2	2	1	-	-	2	2	3	1	3	-
CO7	3	2	2	1	2	3	2	2	1	2	3	2	1	3	1

PO1: Broad Knowledge and Integrated Learning

CO1 to CO7 have strong and moderate correlation, as they provide comprehensive knowledge of cybercrime, cyber security, cyber laws, threats, tools, and digital forensics. Students gain integrated understanding relevant to computer science and business domains.

PO2: Procedural Understanding for Skill Building

CO2, CO3, CO4, CO5, and CO6 show strong relation by developing systematic procedural knowledge such as identifying cybercrimes, applying security measures, and analyzing digital evidence.

PO3: Logical Thinking and Problem-Solving Capability

CO2, CO3, CO4, and CO5 exhibit strong correlation, as learners detect threats, evaluate vulnerabilities, and propose security solutions in real-world scenarios using analytical and logical reasoning.

PO4: Professional and Technical Communication Skills

CO1 and CO7 have weak to moderate relation, as students communicate cyber security risks, legal aspects, and security awareness using technical terminology.

PO5: Analytical Judgment and Decision-Making Skills

CO3, CO4, and CO5 show strong correlation by evaluating security risks and selecting appropriate countermeasures for cyber threats.

PO6: Creativity, Employability, and Entrepreneurial Mindset

CO3, CO4, and CO7 demonstrate moderate to strong relation by preparing students for careers in cyber security, digital forensics, IT auditing, and cyber law consultancy, enhancing employability and entrepreneurial potential.

PO7: Interdisciplinary Awareness and Competence

CO1, CO5, and CO7 show moderate correlation by linking cyber security concepts with management, law, and social sciences, promoting interdisciplinary learning.

PO8: Ethical Values through Social Participation

CO5 and CO7 have moderate to strong relation, emphasizing ethical use of information, privacy protection, and legal compliance for social responsibility.

PO9: Integration of Indigenous Knowledge with Contemporary Practice

CO7 has weak relation as cyber laws integrate traditional legal governance principles into modern digital frameworks.

PO10: System Planning and Solution Development

CO3, CO4, and CO5 exhibit strong correlation by enabling learners to design security frameworks, risk mitigation strategies, and secure system architectures.

PO11: Ethical Awareness and Social Accountability

CO4, CO5, and CO7 show strong relation ensuring ethical handling of digital data, privacy protection, and compliance with cyber regulations.

PO12: Research Competence and Methodological Skills

CO6 and CO7 demonstrate moderate to strong correlation by encouraging research in cybercrime investigation, digital evidence analysis, and emerging cyber threats.

PO13: Collaborative and Team-Based Skills

CO6 and CO7 show moderate relation, as cyber security investigations and awareness programs involve teamwork and collaborative learning.

PO14: Specialized Knowledge Application

CO1 to CO7 have strong correlation, providing domain-specific expertise in cyber security, cybercrime analysis, and cyber laws for computer application professionals.

PO15: Environmental Responsibility and Risk Management

CO4, CO5, and CO7 have weak to moderate relation promoting digital systems, reducing paperwork, and supporting risk management practices.

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CBCS Syllabus as per NEP 2020 for T.Y. BBA (Computer Application) (2024 Pattern)

Name of the Programme : BBA (Computer Application)

Programme Code : BBACA

Class : TY BBA (C.A.)

Semester : V

Course Type : Major Mandatory

Course Code : BBACA-305-MRM

Course Title : Practical Lab on BBACA-301-MRM

No. of Credits : 02

No. of Teaching Hours : 30

Course Objectives:

1. Understand and apply Python data structures like dictionaries, arrays, and ndarrays.
2. Learn to manipulate and analyze data using Pandas Series and DataFrames.
3. Gain skills in visualizing data using charts, plots, and graphs.
4. Perform data pre-processing to clean, transform, and handle missing values.
5. Apply aggregation, grouping, and statistical operations on datasets.
6. Conduct exploratory data analysis (EDA) to extract insights from real-world datasets.
7. Develop problem-solving skills using Python programming for data analysis tasks.

Course Outcomes:

After successfully completing this course, students will be able to:

CO1: Write Python programs to work with dictionaries, arrays, and ndarrays.

CO2: Create and manipulate Pandas Series and DataFrames effectively.

CO3: Visualize data using different types of plots and charts.

CO4: Clean and preprocess data by handling missing values and outliers.

CO5: Perform grouping, aggregation, and basic statistical analysis on datasets.

CO6: Conduct exploratory data analysis (EDA) to identify patterns and insights.

CO7: Apply Python skills to solve practical data analysis problems.

Topics and Learning Points	Teaching Hours

1. Practical on Introduction to Data Science and Types of Data Analytics
2. Practical on Data Science Process and Project Life Cycle
3. Practical on Statistical Concepts: Population, Sample, and Probability Distributions
4. Practical on NumPy Arrays: Types and Creation Methods
5. Practical on NumPy Array Operations and Mathematical Functions
6. Practical on Creating and Manipulating Pandas Series
7. Practical on Creating and Managing DataFrames
8. Practical on Indexing, Selection, and Filtering in DataFrames
9. Practical on Handling Missing Data and Dropping Entries
10. Practical on Arithmetic Operations between Series and DataFrames
11. Practical on Combining and Merging Datasets
12. Practical on Reshaping, Pivoting, and Data Transformation
13. Practical on GroupBy Operations, Aggregation, and Cross Tabulation
14. Practical on Exploratory Data Analysis (EDA) using Summary Statistics and Plots
15. Practical on Data Visualization using Matplotlib (Line, Bar, Pie, Subplots, Tree Visualization)

Reference Books:

1) Data Mining concepts and Techniques by Jiawei Han and Micheline Kamber, ELSEVIER, Third Edition,
2) R and Data Mining, By Yanchang Zhao, Elsevier Inc., ISBN-10: 0123969638 Data Science from Scratch: First Principles with Python By O‟Reilly Media, 20153.
3) Wes McKinney **,**Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Jupyter, Third Edition
4) Febio Nilli, Python data Analytics with Pandas, Numpy and Matplotlib, Third Edition

Choice Based Credit System Syllabus (2024 Pattern) (As Per NEP 2020)

Mapping of Program Outcomes with Course Outcomes

Class: TYBBA (C.A) (Sem V) **Subject:** BBA (C.A.)

Course: Data Science & Analytics **Course Code:** BBACA-305-MRM

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	3	3	1	2	2	1	1	1	2	1	2	1	3	1
CO2	2	3	3	1	2	2	1	1	1	2	1	2	1	3	1
CO3	2	3	3	2	2	2	1	1	1	2	1	2	1	3	1
CO4	2	3	3	1	3	2	1	2	1	3	2	2	1	3	2
CO5	2	3	3	1	3	2	1	1	1	3	2	2	1	3	1
CO6	2	3	3	1	3	3	1	1	1	3	2	2	1	3	1
CO7	3	3	3	2	3	3	2	2	1	3	3	3	2	3	2

PO1: Broad Knowledge and Integrated Learning

CO7 is strongly mapped due to applying Python to real problems builds wide-ranging knowledge across disciplines. Whereas CO1, CO2, CO3, CO4, CO5, CO6 moderately mapped due to learning programming, data handling, visualization, and analysis expands general technical knowledge.

PO2: Procedural Understanding for Skill Building

All Course outcomes CO1, CO2, CO3, CO4, CO5, CO6, CO7 are strongly mapped as all involve step-by-step programming, data manipulation, and problem-solving.

PO3: Logical Thinking and Problem-Solving Capability

All Course outcomes CO1, CO2, CO3, CO4, CO5, CO6, CO7 are strongly mapped as programming, analysis and visualization require logical reasoning and solving problems.

PO4: Professional and Technical Communication Skills

The Course Outcome CO3 & CO7 are moderately mapped as Visualization and reporting results help communicate insights. Other are weakly mapped as coding and analysis have limited direct communication impact.

PO5: Analytical Judgment and Decision-Making Skills

The Course outcomes CO4, CO5, CO6, CO7 are strongly mapped as cleaning data, aggregating, and performing EDA develops critical thinking for decisions & CO1, CO2, CO3 are moderately mapped as programming and visualization support analysis but indirectly.

PO6: Creativity, Employability, and Entrepreneurial Mindset

The Course outcomes CO6, CO7 are strongly mapped as EDA and applying Python solutions foster creative problem-solving and employability and CO1, CO2, CO3, CO4, CO5 are moderately mapped as learning Python, Data Frames, and visualization also helps creativity.

PO7: Interdisciplinary Awareness and Competence

The Course outcomes CO7 is moderately mapped as applying Python to real-world problems involves multiple domains rest are weakly mapped as focus mainly on technical or statistical skills.

PO8: Ethical Values through Social Participation

The CO4, CO7are moderately mapped as data cleaning and applied projects may involve ethical handling of data rest of all CO'S weakly mapped as programming and analysis alone don't strongly impact social ethics.

PO9: Integration of Indigenous Knowledge with Contemporary Practice

All CO1–CO7 are weakly mapped as these COs focus on Python and data analysis, not directly on traditional knowledge integration.

PO10: System Planning and Solution Development

All CO1, CO2, CO4, CO5, CO6, CO7 are strongly mapped as programming, data cleaning, aggregation, EDA, and applying solutions involve system development whereas CO3 is moderately mapped as visualization contributes partially to system planning.

PO11: Ethical Awareness and Social Accountability

All CO1–CO7 are weakly mapped due to all focus on programming and analysis, not on ethics directly.

PO12: Research Competence and Methodological Skills

CO7 is strongly mapped as applying Python to problems supports research methodology and
CO1, CO2, CO3, CO4, CO5, CO6 are moderately mapped due to all focuses on coding, DataFrames, visualization, cleaning, and analysis support research indirectly.

PO13: Collaborative and Team-Based Skills

CO7 is moderately mapped as Real-world projects may require teamwork and remaining all weakly mapped as all require individual coding and analysis tasks contribute minimally to teamwork.

PO14: Specialized Knowledge Application

All CO1, CO2, CO3, CO4, CO5, CO6, CO7 strongly mapped due to all COs build and apply technical, data, and Python-specific skills.

PO15: Environmental Responsibility and Risk Management

CO4, CO7 are moderately mapped as Data handling and applied projects can consider responsible and sustainable data usage whereas CO1, CO2, CO3, CO5, CO6 weakly mapped due to most coding and analysis have limited environmental relevance.

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CBCS Syllabus as per NEP 2020 for T.Y. BBA (Computer Application) (2024 Pattern)

Name of the Programme : BBA (Computer Application)

Programme Code : BBACA

Class : TY BBA (C.A.)

Semester : V

Course Type : Major Mandatory

Course Code : BBACA-306-MRM

Course Title : Practical Lab on BBACA-302-MRM

No. of Credits : 02

No. of Teaching Hours : 30

Course Objectives:

1. Set up and configure a ReactJS development environment.
2. Develop applications using React components and JSX.
3. Manage data using props and state effectively.
4. Apply React Hooks in functional component development.
5. Implement events and user interactions in React apps.
6. Design and validate forms using controlled components.
7. Create responsive and styled React applications.

Course Outcomes:

After successfully completing this course, students will be able to:

CO1: To introduce ReactJS fundamentals and environment setup.

CO2: understand component-based development using JSX.

CO3: Use props and state for dynamic data handling.

CO4: pply React Hooks in functional components.

CO5: Implement event handling in applications.

CO6: Design and validate forms in React.

CO7: Develop responsive user interfaces using styling techniques.

Topics and Learning Points	Teaching Hour

Practical Assignments:

1. Installation and Setup of ReactJS Development Environment
2. Create and Explore React Application Structure
3. Develop a “Hello World” Application Using Functional Components
4. Create a JSX-Based Profile Card Component
5. Build a Reusable Functional Component with Props
6. Implement Component Composition Using Multiple Child Components
7. Create a Counter Application Using useState Hook
8. Develop a Theme Switcher Using useState and useEffect Hooks
9. Create a Simple Context API Example Using useContext
10. Implement Event Handling for Button Click and Input Events
11. Build a Form Using Controlled Components
12. Design a Registration Form with Input Validation
13. Create a Dynamic To-Do List Application with Form Submission
14. Apply CSS Styling and CSS Modules in React Component.
15. Develop a Responsive React Application Using CSS-in-JS Techniques

References:

1) Learning React: Modern Patterns for Developing React Apps, Alex Banks & Eve Porcello, O’Reilly Media, 2020

2) The Road to React: Your Journey to Master React.js, Robin Wieruch, CreateSpace Independent Publishing Platform, 2018

3) React in Action, Mark Tielens Thomas, Manning Publications, 2018

4) Fullstack React: The Complete Guide to ReactJS and Friends, Anthony Accomazzo, Nathan Murray, Ari Lerner, Clay Allsopp, David Guttman, Fullstack.io, 2017

Choice Based Credit System Syllabus (2024 Pattern) (As Per NEP 2020)

Mapping of Program Outcomes with Course Outcomes

Class: TYBBA (C.A.) (Sem V) **Subject:** BBA (C.A.)

Course: Practical Lab on BBACA-302-MRM **Course Code:** BBACA-306-MRM

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

CO–PO Mapping Table

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	–	–	–	–	–	–	–	–	–	–	–	–	3	–
CO2	3	3	–	–	–	–	–	–	–	–	–	–	–	3	–
CO3	–	3	3	–	–	–	–	–	–	–	–	–	–	3	–
CO4	–	3	3	–	–	–	–	–	–	3	–	–	–	3	–
CO5	–	3	3	–	–	–	–	–	–	3	–	–	–	3	–
CO6	–	–	3	–	–	–	–	3	–	3	–	–	–	3	–
CO7	–	–	3	–	–	3	–	3	–	3	–	–	3	3	–

PO1: Broad Knowledge and Integrated Learning

CO1 and CO2 strongly contribute by providing foundational knowledge of embedded systems, processors, and microcontrollers.

PO2: Procedural Understanding and Skill Development

CO2, CO3, CO4, and CO5 strongly develop technical understanding of IoT architecture, networking, and communication models.

PO3: Logical Thinking and Analytical Skills

CO3 to CO7 strongly enhance analytical and problem-solving abilities through IoT design, protocol comparison, and system analysis.

PO6: Innovation and Employability

CO7 strongly supports development of practical IoT system design skills aligned with industry needs.

PO8: Ethical Practices and Cyber Security Awareness

CO6 and CO7 strongly address IoT security threats, ethical concerns, and secure system implementation.

PO10: System Planning and Solution Development

CO4, CO5, CO6, and CO7 strongly contribute to system-level understanding, architecture planning, and secure solution design.

PO13: Teamwork and Collaborative Skills

CO7 strongly supports collaborative IoT system development projects.

PO14: Specialized Knowledge Application

CO1 to CO7 strongly apply domain-specific knowledge in Embedded Systems and IoT technologies

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CBCS Syllabus as per NEP 2020 for T.Y. BBA (Computer Application) (2024 Pattern)

Name of the Programme : BBA (Computer Application)
Programme Code : BBACA
Class : TY BBA (C.A.)
Semester : V
Course Type : Major Elective (MJE)
Course Code : BBACA-307-MJE (A)
Course Title : Software Testing and Quality Assurance
No. of Credits : 02
No. of Teaching Hours : 30

Course Objectives:

1. To understand fundamentals and principles of software testing.
2. To identify software errors and testing objectives.
3. To learn white box, black box, and gray box testing methods.
4. To develop skills in test case design.
5. To understand software testing strategies and life cycle.
6. To learn verification, validation, and performance testing.
7. To understand testing for specialized environments.

Course Outcomes:

After successfully completing this course, students will be able to:

CO1. Explain basic concepts of software testing.
CO2. Identify errors and apply suitable testing techniques.
CO3. Perform white box, black box, and gray box testing.
CO4. Design effective test cases.
CO5. Apply unit, integration, system, and acceptance testing.
CO6. Conduct performance and regression testing.
CO7. Test software in specialized environments.

Topics and Learning Points			Teaching Hour
Unit I		**Fundamentals of Software Testing**	**(05 Lecture)**
	1.1	Introduction to Software Testing	
	1.2	Software Quality and Quality Assurance	
	1.3	Errors, Defects, Bugs, and Failures	
	1.4	Objectives and Principles of Software Testing	
	1.5	Verification and Validation	
Unit II		**Software Testing Techniques**	**(10 Lecture)**
	2.1	Black Box Testing	
	2.2	White Box Testing Approach	
	2.3	Grey Box Testing Approach	
	2.4	Top-Down Testing Approach	
	2.5	Bottom-Up Testing Approach	
	2.6	Big Bang Integration Testing Approach	
	2.7	Unit Testing Approach	
	2.8	System Testing Approach	
	2.9	Acceptance Testing Approach	
	2.10	Manual and Automation Testing Approaches	
Unit III		**Software Testing Process and Documentation**	**(10 Lecture)**
	3.1	Software Testing Life Cycle (STLC)	
	3.2	Test Planning and Test Strategy	
	3.3	Test Case Design Techniques	
	3.4	Test Execution	
	3.5	Defect Reporting and Tracking	
	3.6	Testing Documentation	
	3.7	Test Plan Preparation	
	3.8	Test Case Development	
	3.9	Test Report Preparation	
	3.10	Testing Process Management	
Unit IV		**Software Quality Assurance**	**(05 Lecture)**
	4.1	Introduction to Software Quality Assurance (SQA)	
	4.2	Role of SQA in Software Development	
	4.3	Software Reviews and Audits	
	4.4	Quality Models and Standards (ISO, CMMI – Overview)	
	4.5	Continuous Quality Improvement, Case Study	

References:

1. Software Testing – Roger S. Pressman- Covers Unit I fundamentals, testing principles, verification & validation, and Unit IV SQA concepts.
2. Foundations of Software Testing – Dorothy Graham, Rex Black, Erik van Veenendaal Well aligned with Unit I and Unit II testing techniques including black box, white box, integration, system, and acceptance testing.
3. Software Testing Techniques – Boris Beizer, Detailed coverage of Unit II testing approaches and strategies.

Choice Based Credit System Syllabus (2024 Pattern) (As Per NEP 2020)

Mapping of Program Outcomes with Course Outcomes

Class: TYBBA (C.A.) (Sem V) **Subject:** BBA (C.A.)

Course: Software Testing and Quality Assurance **Course Code:** BBACA-307-MJE (A)

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

CO–PO Mapping Table

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CO2	–	3	–	–	–	–	–	–	–	–	–	–	–	3	–
CO3	–	–	3	–	–	–	–	–	–	–	–	–	–	3	–
CO4	–	–	3	–	–	–	–	–	–	3	–	–	–	–	–
CO5	–	–	3	–	3	–	–	–	–	3	–	–	–	–	–
CO6	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–
CO7	–	–	3	–	3	–	–	–	–	3	3	–	–	–	–

PO1: Broad Knowledge and Integrated Learning

CO1 strongly contributes by building foundational knowledge of software testing concepts, quality assurance principles, and their relevance to computer science and professional software development practices.

PO2: Procedural Understanding for Skill Building

CO2, CO3, CO4, CO5, CO6, and CO7 strongly support procedural understanding through systematic application of testing techniques, test case design, testing levels, performance evaluation, regression testing, and testing in specialized environments.

PO3: Logical Thinking and Problem-Solving Capability

CO2, CO3, CO4, CO5, CO6, and CO7 strongly develop analytical and problem-solving skills through defect identification, test case analysis, selection of appropriate testing strategies, performance analysis, and evaluation of complex software systems.

PO4: Professional and Technical Communication Skills

CO4 and CO5 moderately contribute by emphasizing test documentation, defect reporting, and clear communication of testing results using appropriate technical terminology.

PO5: Analytical Judgment and Decision-Making Skills

CO5, CO6, and CO7 strongly support analytical judgment by evaluating system behavior, performance metrics, risk assessment, and making informed decisions related to software quality and reliability.

PO7: Interdisciplinary Awareness and Competence

CO7 moderately contributes by applying testing concepts to specialized and interdisciplinary environments, promoting holistic understanding of software systems interacting with diverse domains.

PO10: System Planning and Solution Development

CO5, CO6, and CO7 strongly contribute by enabling learners to plan, design, and evaluate testing strategies for complex software systems, ensuring functional correctness, performance efficiency, and system reliability.

PO14: Specialized Knowledge Application

CO3, CO4, CO5, CO6, and CO7 strongly support the application of subject-specific software testing concepts, tools, and methodologies to practical and real-world software development scenarios.

Anekant Education Society's

Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati (Empowered Autonomous)

CBCS Syllabus as per NEP 2020 for T.Y. BBA (Computer Application) (2024 Pattern)

Name of the Programme : BBA (Computer Application)

Programme Code : BBACA

Class : TY BBA (C.A.)

Semester : V

Course Type : Major Elective

Course Code : BBACA-307-MJE (B)

Course Title : Cloud Computing

No. of Credits : 02

No. of Teaching Hours : 30

Course Objectives:

1. To understand the fundamentals, characteristics, and models of Cloud Computing.
2. To compare cloud computing with cluster and grid computing.
3. To study virtualization concepts, types, and hypervisors.
4. To understand cloud architecture and infrastructure components.
5. To explore major cloud platforms and services.
6. To learn SOA concepts and cloud management practices.
7. To understand cloud security risks and protection mechanisms.

Course Outcomes:

After successfully completing this course, students will be able to:

CO1. To understand the fundamentals, characteristics, and models of Cloud Computing.

CO2. To compare cloud computing with cluster and grid computing.

CO3. To study virtualization concepts, types, and hypervisors.

CO4. To understand cloud architecture and infrastructure components.

CO5. To explore major cloud platforms and services.

CO6. To learn SOA concepts and cloud management practices.

CO7. To understand cloud security risks and protection mechanisms.

Topics and Learning Points		Teaching Hour
Unit I	**Fundamentals of Cloud Computing**	**(05 Lecture)**
1.1	Introduction to Cloud Computing	
1.2	Cloud Computing vs Cluster Computing vs Grid Computing	
1.3	Cloud Service Models	
1.4	Cloud Deployment Models	
1.5	Characteristics, Advantages and Limitations	
Unit II	**Virtualization and Cloud Architecture**	**(10 Lectures)**
2.1	Introduction to Virtualization	
2.2	Concept of Virtualization	
2.3	Need for Virtualization	
2.4	Virtual Infrastructure	
2.5	Types of Virtualizations	
2.6	Hypervisor and types of Hypervisors	
2.7	Virtual Machines (VMs) and types	
2.8	Machine Image and Virtual Machine	
2.9	Virtualization Technology Examples	
2.10	Cloud Architecture	
Unit III	**Cloud Platforms, SOA and Applications**	**(10 Lectures)**
3.1	Cloud Platforms	
3.2	Google Cloud Platform	
3.3	Microsoft Azure	
3.4	Amazon Web Services (AWS) and Amazon Storage Services	
3.5	Salesforce Platform	
3.6	Service Oriented Architecture (SOA)	
3.7	Cloud Management	
3.8	Cloud Applications	
3.9	Moving Applications to the Cloud	
3.10	Cloud Migration and Quality of Service (QoS)	
UNIT IV	**Security in Cloud Computing**	**(05 Lectures)**
4.1	Risks and types of risks in Cloud Computing	
4.2	Cloud Security Services	
4.3	Security Challenges in Cloud	
4.4	Zero Trust Security Model for Cloud Storage	
4.5	Challenges in implementing Zero Trust to Cloud	

Reference Books:

1. Cloud Computing: Concepts, Technology & Architecture by Thomas Erl, Ricardo Puttini, and Zaigham Mahmood. Pearson, 2020.
2. Cloud Computing: A Hands-on Approach by Arshdeep Bahga and Vijay Madisetti. Universities Press, 2023.
3. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg, and Andrzej M. Goscinski. Wiley, 2024.
4. Architecting the Cloud: Design Decisions for Cloud Computing Service Models by Michael J. Kavis. Wiley, 2019.
5. AWS Certified Solutions Architect Official Study Guide by Joe Baron et al. Wiley, 2024.
6. Learning Virtualization by Vikas Kumar. BPB Publications, 2023.

Choice Based Credit System Syllabus (2024 Pattern) (As Per NEP 2020)

Mapping of Program Outcomes with Course Outcomes

Class: TYBBA (C.A.) (Sem V) **Subject:** BBA (C.A.)

Course: Cloud Computing **Course Code:** BBACA-307-MJE (B)

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

CO–PO Mapping Table

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CO2	–	3	–	–	–	–	–	–	–	–	–	–	–	3	–
CO3	–	–	3	–	–	–	–	–	–	–	–	–	–	3	–
CO4	–	–	3	–	–	–	–	–	–	3	–	–	–	–	–
CO5	–	–	3	–	3	–	–	–	–	3	–	–	–	–	–
CO6	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–
CO7	–	–	3	–	3	–	–	–	–	3	3	–	–	–	–

PO1: Broad Knowledge and Integrated Learning

CO1 strongly contributes by building foundational knowledge of embedded and real-time systems.

PO2: Procedural Understanding for Skill Building

CO2 strongly supports procedural understanding through study of processors, microcontrollers, and SoC technologies.

PO3: Logical Thinking and Problem-Solving Capability

CO3, CO4, CO5, and CO7 strongly develop analytical and problem-solving skills through IoT architecture analysis, networking evaluation, protocol comparison, and system design.

PO5: Analytical Judgment and Decision-Making Skills

CO5 and CO7 strongly support analytical evaluation of IoT protocols, cloud platforms, and secure system decisions.

PO10: System Planning and Solution Development

CO4, CO5, and CO7 strongly contribute to system design, planning, and implementation of IoT-based solutions.

PO11: Ethical Awareness and Social Accountability

CO6 and CO7 strongly support secure system development and ethical application of IoT technologies.

PO14: Specialized Knowledge Application

CO2 and CO3 strongly apply embedded and IoT concepts in specialized technical domains.

Anekant Education Society's

Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati (Empowered Autonomous)

CBCS Syllabus as per NEP 2020 for T.Y. BBA (Computer Application) (2024 Pattern)

Name of the Programme : BBA (Computer Application)
Programme Code : BBACA
Class : TY BBA (C.A.)
Semester : V
Course Type : Major Elective (MJE)
Course Code : BBACA-308-MJE (A)
Course Title : Practical Lab on Tableau /Power BI
No. of Credits : 02
No. of Teaching Hours : 30

Course Objectives:

1. To introduce fundamentals of data visualization using Tableau.
4. To understand data connection, preparation, and management techniques.
5. To develop interactive charts, dashboards, and reports.
6. To understand publishing, sharing, and security aspects in Tableau.
7. To apply analytical features for data-driven decision making.
8. To familiarize students with real-world business and analytical use cases.
9. To enhance data interpretation and presentation skills.

Course Outcomes:

After successfully completing this course, students will be able to:

CO1. Connect, prepare, and manage data from multiple sources in Tableau.
CO2. Create effective visualizations using charts, filters, and calculations
CO3. Design nteractive dashboards for business and analytical use cases.
CO4. Apply advanced features such as groups, sets, hierarchies, and parameters
CO5. Publish and share Tableau reports with appropriate access control.
CO6. Analyze datasets to derive insights and support decision making.
CO7. Present data findings clearly using visual storytelling techniques.

Practical Assignment:

1. Data Connection and Data Source Configuration in Tableau
2. Creating Basic Charts (Bar, Line, Pie) Using Sample Data
3. Designing Interactive Dashboards with Filters and Parameters
4. Working with Calculated Fields and Table Calculations
5. Data Blending and Data Joining in Tableau
6. Creating Story Points for Business Presentation
7. Building KPI Dashboard for Sales Analysis
8. Time Series Analysis and Forecasting in Tableau
9. Geographic Map Visualization and Spatial Analysis
10. Customer Segmentation Using Tableau Visualizations
11. Designing a Financial Performance Dashboard
12. HR Analytics Dashboard (Attrition & Performance Analysis)
13. Product Performance and Profitability Analysis
14. Creating Dynamic Reports with Actions (Filter, Highlight, URL)
15. Publishing and Sharing Dashboards on Tableau Server / Tableau Public

References Books:

1. Learning Tableau – Joshua N. Milligan, Covers data connections, basic charts, calculated fields, dashboards, actions, maps, and publishing.
2. Tableau Your Data! – Daniel G. Murray, Strong focus on interactive dashboards, storytelling, KPI design, and business analytics use cases.
3. Practical Tableau – Ryan Sleeper, Covers calculated fields, table calculations, forecasting, dynamic reports, and real-world business scenarios.

Choice Based Credit System Syllabus (2024 Pattern) (As Per NEP 2020)

Mapping of Program Outcomes with Course Outcomes

Class: TYBBA (C.A.) (Sem V) **Subject:** BBA (C.A.)

Course: Practical Lab on Tableau /Power BI **Course Code:** BBACA-308-MJE (A)

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

CO–PO Mapping Table

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	3	–	–	2	–	2	–	–	3	–	2	–	3	–
CO2	–	3	3	2	3	–	2	–	–	2	–	–	–	3	–
CO3	–	3	3	2	3	2	2	–	–	3	–	–	2	3	–
CO4	–	3	3	–	3	–	2	–	–	3	–	–	–	3	–
CO5	–	2	2	3	2	–	–	2	–	2	3	–	–	2	–
CO6	–	2	3	–	3	2	2	–	–	2	–	2	–	3	–
CO7	–	–	2	3	2	2	2	–	–	–	–	–	3	2	–

PO1: Broad Knowledge and Integrated Learning

CO1 strongly contributes by developing foundational knowledge of data visualization concepts and their integration with business, management, and computer science domains.

PO2: Procedural Understanding for Skill Building

CO1, CO2, CO3, CO4, CO5, and CO6 strongly support procedural understanding through systematic use of data preparation, visualization techniques, dashboard development, advanced features, and publishing processes in Tableau.

PO3: Logical Thinking and Problem-Solving Capability

CO2, CO3, CO4, CO6, and CO7 strongly develop analytical and problem-solving skills by enabling learners to analyze datasets, design dashboards, apply logical structures, and interpret insights for real-world decision making.

PO4: Professional and Technical Communication Skills

CO2, CO3, CO5, and CO7 enhance communication skills through effective visual representation, dashboard storytelling, report sharing, and presentation of analytical insights.

PO5: Analytical Judgment and Decision-Making Skills

CO2, CO3, CO4, CO6, and CO7 strongly contribute by enabling learners to critically analyze data, evaluate trends, compare outcomes, and support informed business decisions.

PO6: Creativity, Employability, and Entrepreneurial Mindset

CO3, CO6, and CO7 moderately support creativity and employability by encouraging innovative dashboard design, insight-driven thinking, and professional data presentation skills relevant to industry needs.

PO7: Interdisciplinary Awareness and Competence

CO1, CO2, CO3, CO4, CO6, and CO7 support interdisciplinary learning by applying visualization techniques across domains such as finance, marketing, HR, logistics, and computer applications.

PO8: Ethical Values through Social Participation

CO5 moderately supports ethical values by emphasizing responsible data sharing, access control, and adherence to ethical practices while publishing analytical reports.

PO10: System Planning and Solution Development

CO1, CO3, CO4, CO5, and CO6 strongly contribute by enabling learners to design, develop, and implement data-driven solutions and analytical systems using Tableau.

PO11: Ethical Awareness and Social Accountability

CO5 strongly contributes by promoting ethical data usage, role-based access, accountability, and responsible handling of sensitive business information.

PO12: Research Competence and Methodological Skills

CO1 and CO6 moderately support research competence by enabling data exploration, analysis, interpretation, and validation of analytical findings.

PO13: Collaborative and Team-Based Skills

CO3 and CO7 strongly contribute by encouraging teamwork in dashboard design, group analysis, and collaborative presentation of insights.

PO14: Specialized Knowledge Application

CO1, CO2, CO3, CO4, CO5, and CO6 strongly support specialized knowledge application by enabling learners to apply Tableau concepts in accounting, finance, marketing, HRM, and computer application domains.

Anekant Education Society's

Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati (Empowered Autonomous)

CBCS Syllabus as per NEP 2020 for T.Y. BBA (Computer Application) (2024 Pattern)

Name of the Programme : BBA (Computer Application)
Programme Code : BBACA
Class : TY BBA (C.A.)
Semester : V
Course Type : Major Elective
Course Code : BBACA-308-MJE (B)
Course Title : Practical Lab on BBACA-307-MJE (B)
No. of Credits : 02
No. of Teaching Hours : 30

Course Objectives:

1. To understand the fundamentals and architecture of cloud computing.
2. To study different cloud service models such as IaaS, PaaS, and SaaS.
3. To implement storage and document management using cloud services.
4. To create and manage virtual machines using virtualization tools.
5. To explore cloud platforms like AWS, Google Cloud, and Microsoft 365.
6. To configure cloud storage services and implement security permissions.
7. To develop practical skills in hosting applications and managing cloud resources.

Course Outcomes:

After successfully completing this course, students will be able to:

CO1. Use cloud-based SaaS tools for document creation, spreadsheets, presentations, and forms.
CO2. Create and manage virtual machines using VMware and Oracle VirtualBox.
CO3. Create and manage cloud storage resources such as buckets and files.
CO4. Configure permissions, versioning, and security settings in cloud storage.
CO5. Host static websites and implement cloud-based applications using AWS S3.
CO6. Use commercial cloud services such as Google Cloud, Microsoft 365, and Dropbox for real-world application.
CO7. Explain cloud computing concepts, architecture, and deployment models.

Practical Assignment

1. Study of Cloud Computing and its architecture.
2. Study of Storage as a Service using Google Service Provider (GSP).
3. Create a Word document of class timetable, store locally, and upload it to cloud in DOC and PDF formats.
4. Create a spreadsheet containing employee salary information and calculate gross and total salary using formulas on Google Cloud (SaaS).
5. Prepare a PPT on Cloud Computing models, services, and architecture (minimum 15 slides with images and explanations) using Google SaaS tools.
6. Create a professional resume using Google Cloud applications.
7. Create a Google Form using SaaS and share it via cloud.
8. Study installation of Virtual Machine using VMware and procedure to install VMware Workstation with Linux/Windows OS.
9. Create a Virtual Machine using Oracle VirtualBox.
10 Create an AWS account and study Amazon S3 service.
11 Create an S3 bucket and set permissions for public/general users.
12 Implement bucket versioning and deletion of objects and buckets in S3.
13 Host a static website using AWS S3.
14 Create a Microsoft 365 account.
15 Install and configure Dropbox as Storage as a Service.

References Books:

1. Cloud Computing: Concepts, Technology & Architecture by Thomas Erl, Ricardo Puttini, and Zaigham Mahmood. Pearson, 2020.
2. Cloud Computing: A Hands-on Approach by Arshdeep Bahga and Vijay Madisetti. Universities Press, 2023.
3. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg, and Andrzej M. Goscinski. Wiley, 2024.
4. Architecting the Cloud: Design Decisions for Cloud Computing Service Models by Michael J. Kavis. Wiley, 2019.
5. AWS Certified Solutions Architect Official Study Guide by Joe Baron et al. Wiley, 2024.
6. Learning Virtualization by Vikas Kumar. BPB Publications, 2023.

MICROSOFT ACCOUNT

Choice Based Credit System Syllabus (2024 Pattern) (As Per NEP 2020)

Mapping of Program Outcomes with Course Outcomes

Class: TYBBA (C.A.) (Sem V) Subject: BBA (C.A.)

Course: Practical Lab on BBACA-307-MJE (B) Course Code: BBACA-308-MJE (B)

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

CO–PO Mapping Table

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	2	–	1	–	1	–	–	–	1	–	–	3	–
CO2	3	2	3	–	2	–	1	–	–	–	1	–	–	3	–
CO3	3	3	3	–	2	1	1	–	–	2	2	–	–	3	–
CO4	3	3	3	–	2	1	1	–	–	3	2	–	–	3	–
CO5	3	2	2	–	2	2	1	–	–	3	2	1	–	3	–
CO6	3	2	2	–	2	2	1	–	–	2	2	2	1	3	–
CO7	3	2	3	1	3	2	2	2	–	3	3	2	–	3	1

PO1: Broad Knowledge and Integrated Learning

CO1 to CO7 have strong correlation as they provide comprehensive knowledge of cloud computing fundamentals, virtualization, architecture, platforms, management, and security concepts relevant to computer science and business domains.

PO2: Procedural Understanding for Skill Building

CO3, CO4, CO5, and CO6 show moderate to strong relation by developing structured procedural understanding of virtualization, cloud architecture, and cloud management practices.

PO3: Logical Thinking and Problem-Solving Capability

CO2, CO3, CO4, and CO7 exhibit strong correlation as learners analyze cloud models, virtualization types, architectures, and security risks to solve real-world computing problems.

PO4: Professional and Technical Communication Skills

CO7 shows weak relation as students learn to communicate cloud security risks and protection mechanisms using technical terminology.

PO5: Analytical Judgment and Decision-Making Skills

CO2, CO4, CO5, and CO7 demonstrate moderate to strong correlation enabling students to compare computing models, evaluate cloud platforms, and make informed technical decisions.

PO6: Creativity, Employability, and Entrepreneurial Mindset

CO3, CO5, CO6, and CO7 show moderate relation preparing students for cloud-based careers, system administration, cloud solution design, and entrepreneurial opportunities in cloud services.

PO7: Interdisciplinary Awareness and Competence

CO1, CO5, and CO6 have moderate correlation as cloud computing integrates computer science with business applications such as ERP, CRM, logistics, and management systems.

PO8: Ethical Values through Social Participation

CO7 has moderate relation emphasizing data security, privacy protection, and ethical use of cloud resources in society.

PO9: Integration of Indigenous Knowledge with Contemporary Practice

Cloud computing has no direct relation; hence COs show no mapping, as this course mainly focuses on modern technological frameworks.

PO10: System Planning and Solution Development

CO3, CO4, CO5, and CO7 exhibit strong correlation enabling learners to design cloud architectures, deploy platforms, and develop cloud-based solutions.

PO11: Ethical Awareness and Social Accountability

CO7 shows strong relation by ensuring ethical handling of cloud data, privacy compliance, and security responsibility.

PO12: Research Competence and Methodological Skills

CO5, CO6, and CO7 demonstrate moderate correlation by encouraging exploration of cloud platforms, service models, and security research practices.

PO13: Collaborative and Team-Based Skills

CO6 shows moderate relation as cloud projects and management practices involve teamwork and collaborative deployment environments.

PO14: Specialized Knowledge Application

CO1 to CO7 have strong correlation, providing domain-specific expertise in cloud computing, virtualization, architecture, and security for computer application professionals.

PO15: Environmental Responsibility and Risk Management

CO7 has weak to moderate relation as cloud computing reduces hardware usage and paper-based systems, indirectly supporting environmental sustainability and risk management.

Anekant Education Society's

Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati (Empowered Autonomous)

CBCS Syllabus as per NEP 2020 for T.Y. BBA (Computer Application) (2024 Pattern)

Name of the Programme : BBA (Computer Application)
Programme Code : BBACA
Class : TY BBA (C.A.)
Semester : V
Course Type : On Job Training (OJT)
Course Code : BBACA-309-OJT
Course Title : On Job Training
No. of Credits : 04
No. of Teaching Hours : 120

Course Objectives:

1. To introduce students to field-based experiential learning.
2. To develop research, data collection, and analysis skills.
3. To enhance problem-solving and critical thinking abilities.
4. To improve communication and teamwork skills.
5. To encourage the application of theoretical knowledge in practical scenarios.

Course Outcomes:

By the end of the course, students will be able to:

CO1: Identify and define a research problem relevant to real-world applications.
CO2: Design and develop an appropriate research methodology, including a questionnaire.
CO3: Conduct fieldwork and collect primary data systematically.
CO4: Analyze and interpret collected data using qualitative and quantitative methods.
CO5: Prepare a structured project report following academic guidelines.
CO6: Develop teamwork, ethical considerations, and professional communication skills.
CO7: Deliver an effective oral presentation, demonstrating clarity and confidence.

Topics and Learning Points

The National Education Policy 2020 emphasize Practical Assignments and Skill Development to the students across institutes of higher learning in various streams. In view of this, Tuljaram Chaturchand College, Baramati has come up with a concept to provide Field Project/On-Job Training Program to all students studying in third year UG programs in semester VI. The On-Job Training Program will provide valuable work experience to the students, help them explore a career path and develop and refine skills that will eventually give themselvesan edge in the job market.

Salient features of On-Job Training Program:

1. The fundamental framework of On-Job Training Program is as below:
2. The on-job training is of four credits and hundred (100) marks.
3. On-Job Training will be of one hundred and twenty clock hours.
4. A student has to complete on-job training in the related subject that he / she has opted in UG.
5. The On-Job Training Program has to be completed in the vacation between semester V and VI.
6. In case of backlog, he/ she can complete the On-Job Training Program prior to appearing for the semester VI examination.
7. Successful completion of the On-Job Training Program is mandatory, in case a student could not complete the On-Job Training as per prescribed standards, he / she has to undergo the Program again in different establishment.
8. A student is entitled to a 'Completion Certificate' after successful completion of the On- Job Training Program.
9. The On-Job Training provider establishment may select the student for regular employment depending on the skill set and nature of performance exhibited by the student.
10. A student is solely responsible for his behaviour in the business establishment during the on-job training program

Framework of the On-Job Training:

1. The area in which a student has to undergo On-Job Training Program will be finalized by the concerned teacher in consultation with the On-Job Training Program providing organization.
2. This will help a student to have hands - on experience of the important aspects of the Discipline Specific Special Subject chosen by him / her.
3. The contents of the On-Job Training Program should be adequate and a students should

be able to understand various concepts and put it into practice within a time frame of 120 hours.

4. On-Job Training Program is of 120 hours net.

Evaluation and credits:

The process of evaluation of On-Job Training Program is structured as below.

The student will prepare a plan for proposed On-Job Training Program. The plan may contain following aspects: -

Sr. No.	Particulars
1	Name of the organization where the On-Job Training is proposed to be carried out.
2	Details of the organization
3	The areas in which he/ she is planning to undergo On-Job Training.
4	Details of the various subject specific concepts learnt by the student before joining the On-Job Training.
5	Allocation of **120 hours** of On-Job Training Program.
6	List of the skills that he/she is planning to acquire during On-Job Training Program.
7	A brief note on how the On-Job Training Program may benefit him/her to develop better skills in his / her subject.
8	Details of the primary discussion that the student had with any officer/ authority of the On-Job Training Program providing organization about the proposed work.
9	Proposed outcome of the On-Job Training Program

- **Format of Slide wise presentation of work performed by the student during the On-Job Training program is given below.**

Slide No.	Contents
1.	Name of the organization where the On-Job Training was proposed to be carried out.
2.	Contents proposed to be learnt during the On-Job Training Program.
3.	Allocation of **120 hours** of On-Job Training Program.

4.	List of the officers and the staff members of the On-Job Training Providing organization with designations.
5.	Name and designation of the officer under whom the On-Job Training was completed.
6.	Work profile assigned during the On-Job Training Program
7.	Actual work performed during the On-Job Training Program
8.	Skills learnt during the On-Job Training Program
9.	Problems faced while performing the assigned task
10.	How the problems were addressed to
11.	Contribution made towards better functioning the organization, i.e. any techniques invented to save time, manpower or money, improvised documentation process, development of a model for better customer service etc. (Optional)
12.	List of the skills required to perform the assigned task
13.	Opinion of the student about the following - 1. Utility of the On-Job Training 2. Adequacy of the time allotted for program 3. Suggestions for improvement 4. Will the program improve employability? 5. Suggestions to make the On-Job Training program more meaningful and effective 6. Overall feedback about the On-Job Training experience 7. Any other information

Students need to submit following documents at the time of final evaluation of the work performed during the On-Job Training Program:-

1. On-Job Training Completion Certificate (Format Enclosed)
2. Duly signed and completed Log Sheet stating hour wise work done. (Format Enclosed)
3. Feedback form duly signed and stamped by the On- Job Training provider organization. (Format Enclosed)
4. Student Feedback form (Format Enclosed)

Evaluation of the Proposal:

1. The student is supposed to prepare a PowerPoint Presentation covering the above aspects.
2. The evaluation is to be done on the basis of the
   i. Regularity and punctuality
   ii. Actual work performed,
   iii. Feedback by the On-Job Training providing organisation
   iv. Nature of contribution made
   v. Skills learnt
   vi. Problem solving initiative taken
   vii. Learning attitude.
3. The evaluation panel will consist of two examiners. Industry experts may be invited to evaluate the proposal and make suggestion, if any.
4. Total evaluation of the proposal will be of 100 marks and it carries 4 credits.
5. Minimum marks required for passing are 40.

Formats required for On-Job Training program:

1. Letter to On-Job Training Providing Organisation for inclusion of students
2. Undertaking from student about his/ her behaviour to the college
3. Undertaking from student about his/ her behaviour to the organisation
4. Log Sheet of work performed during On-Job Training
5. On-Job Training completion certificate
6. Feedback from On-Job Training provider organization Feedback from student

Choice Based Credit System Syllabus (2024 Pattern) (As Per NEP 2020)

Mapping of Program Outcomes with Course Outcomes

Class: TYBBA (C.A.) (Sem V) Subject: BBA (C.A.)

Course: On Job Training Course Code: BBACA-385-OJT

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

CO–PO Mapping Table

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	-	-	-	-	-	3	-	-	-	3	-	3
CO3	-	3	3	-		-	-	-	3	-	-	-	3	-	3
CO4	-	3	3	-	3	-	-	-	3	-	-	-	3	-	3
CO5	-	-	3	-	3	-	-	-	3	-	-	-	3	-	3
CO6	-	-	2	-	3	-	-	-	3	-	-	-	3	-	3
CO7	3	3	3	-	3	3	-	-	3	-	3	-	3	3	3

PO1: A Fundamental Knowledge and Coherent Understanding:

CO1, CO2, and CO7 strengthen foundational understanding of software engineering concepts and practices essential for professional competence.

PO2: Procedural Knowledge for Skill Enhancement:

CO2, CO3, CO4, and CO7 develop the ability to identify, analyze, and select appropriate software process models for diverse projects.

PO3: Critical Thinking and Problem-Solving Skills:

CO3, CO4, CO5, CO6, and CO7 enable students to design, model, and test reliable software systems using structured and object-oriented approaches.

PO4: Communication Skills:

CO7 indirectly supports communication through project documentation, presentations, and teamwork activities.

PO5: Analytical Reasoning Skills:

CO4, CO5, CO6, and CO7 promote analytical reasoning for evaluating designs, ensuring quality, and managing risks effectively.

PO6: Innovation, Employability and Entrepreneurial Skills:

CO6 and CO7 enhance employability through exposure to modern tools and promote innovation in developing project solutions.

PO7: Multidisciplinary Competence:

CO7 integrates cross-disciplinary concepts from computer science, management, and business, promoting holistic application knowledge.

PO8: Value Inculcation through Community Engagement:

While not explicitly mapped, CO7 encourages ethics, discipline, and professionalism during collaborative project execution.

PO9: Traditional Knowledge into Modern Application:

CO2–CO7 focus on utilizing software engineering tools and technologies for efficient analysis, design, and testing.

PO10: Design and Development of System:

CO2–CO7 build proficiency in end-to-end software design and implementation practices aligned with industry standards.

PO11: Ethical and Social Responsibility:

CO6 and CO7 nurture awareness about ethical practices and social impact in software development.

PO12: Research-Related skills:

CO7 develops research aptitude through case studies, documentation, and innovation in project work.

PO13: Leadership &Teamwork:

CO7 cultivates leadership, coordination, and collaborative learning during team-based projects.

PO14: Area Specific Expertise:

CO1–CO7 together foster creativity, innovation, and entrepreneurial skills by solving real-world software problems.

PO15: Environmental Awareness:

CO7 encourages sustainable practices and the responsible use of technology for environmental well-being.

Anekant Education Society's

Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati

(Empowered Autonomous)

CBCS Syllabus as per NEP 2020 for T.Y. BBA (Computer Application) (2024 Pattern)

Name of the Programme : BBA (Computer Application)

Programme Code : BBACA

Class : TY BBA(C.A.)

Semester : V

Course Type : Major Mandatory

Course Code : BBACA-310-MN

Course Title : Programming Using GO

No. of Credits : 02

No. of Teaching Hours : 30

Course Objectives:

8. To introduce fundamentals of Go programming.
9. To understand variables, data types, and control structures.
10. To explain functions and parameter passing techniques.
11. To develop understanding of pointers and memory handling.
12. To implement arrays, slices, and structures in programs.
13. To understand methods and interfaces in Go.
14. To introduce basic concurrency using goroutines and channels.

Course Outcomes:

After successfully completing this course, students will be able to:

CO1: Explain basic concepts and syntax of Go programming.

CO2: Develop programs using variables, data types, and control statements.

CO3: Implement functions with appropriate parameter passing techniques.

CO4: Apply pointers and memory concepts in problem solving.

CO5: Develop applications using arrays, slices, and structures.

CO6: Implement methods and interfaces in Go programs.

CO7: Apply goroutines and channels for basic concurrent programming.

Topics and Learning Points			Teaching Hour
Unit I		**Introduction to GO**	**(05 Lecture)**
	1.1	Go Overview and Compilation	
	1.2	Identifiers, Variables and Constants	
	1.3	Data Types	
	1.4	Operators and Expressions	
	1.5	Control Statements	
Unit II		**Functions and Pointers**	**(10 Lecture)**
	2.1	Function Declaration	
	2.2	Parameters and Return Values	
	2.3	Multiple and Named Returns	
	2.4	Call by Value	
	2.5	Pointers and Call by Reference	
	2.6	Blank Identifier	
	2.7	Variadic Functions	
	2.8	Defer Statement	
	2.9	Recursion	
	2.10	Anonymous and Higher-Order Functions	
Unit III		**Data Structures**	**(10 Lecture)**
	3.1	Arrays	
	3.2	Multidimensional Arrays	
	3.3	Array Parameters	
	3.4	Slices	
	3.5	Slice Operations	
	3.6	Multidimensional Slices	
	3.7	Structures	
	3.8	Structure Initialization	
	3.9	Structure Parameters	
	3.10	Applications of Data Structures	
Unit IV		**Methods, Interfaces and Concurrency**	**(05 Lecture)**
	4.1	Methods	
	4.2	Receiver Types	
	4.3	Interfaces	
	4.4	Type Assertions and Empty Interface	
	4.5	Goroutines and Channels	

References:

1. The Go Programming Language- Alan A. A. Donovan, Brian W. Kernighan, Addison-Wesley Professional Covers: Go basics, data types, control statements, functions, pointers, slices, structures, methods, interfaces, and concurrency.

2. Introducing Go - Caleb Doxsey, O'Reilly Media, Covers: Fundamentals of Go, functions, pointers, arrays, slices, structs, and basic concurrency.

3. The Go Programming Language by Alan A. A. Donovan & Brian W. Kernighan Considered the definitive and most widely recommended Go book — covers fundamentals, syntax, data types, concurrency, and more. Great for beginners and intermediate learners.

4. Programming in Go: Creating Applications for the 21st Century by Mark Summerfield A solid book focused on practical Go programming with plenty of real code examples.

5. Get Programming with Go - Nathan Youngman & Roger Peppé Beginner-friendly with hands-on exercises and projects.

Choice Based Credit System Syllabus (2024 Pattern) (As Per NEP 2020)

Mapping of Program Outcomes with Course Outcomes

Class: TYBBA (C.A.) (Sem V) **Subject:** BBA (C.A.)

Course: Programming using GO **Course Code:** BBACA-310-MN

Weightage: 1= weak or low relation, 2= moderate or partial relation, 3= strong or direct relation

CO–PO Mapping Table

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	–	–	–	–	–	–	–	–	–	–	–	–	3	–
CO2	–	3	3	–	–	–	–	–	–	–	–	–	–	3	–
CO3	–	3	3	–	–	–	–	–	–	–	–	–	–	3	–
CO4	–	3	3	–	–	–	–	–	–	3	–	–	–	3	–
CO5	–	3	3	–	–	–	–	–	–	3	–	–	–	3	–
CO6	–	–	3	–	–	–	–	–	–	3	–	–	–	3	–
CO7	–	–	3	–	–	3	–	–	–	3	–	–	3	3	–

PO1: Broad Knowledge and Integrated Learning

CO1 strongly contributes by establishing foundational knowledge of Go programming concepts and syntax.

PO2: Procedural Understanding for Skill Building

CO2, CO3, CO4, and CO5 strongly develop structured programming and systematic implementation skills.

PO3: Logical Thinking and Problem-Solving Capability

CO2 to CO7 strongly enhance analytical thinking and problem-solving through program development and concurrency implementation.

PO6: Creativity, Employability, and Entrepreneurial Mindset

CO7 strongly supports development of concurrent applications, enhancing employability skills.

PO10: System Planning and Solution Development

CO4, CO5, CO6, and CO7 strongly contribute to structured system design and solution implementation.

PO13: Collaborative and Team-Based Skills

CO7 strongly supports teamwork through application-based development activities.

PO14: Specialized Knowledge Application

CO1 to CO7 strongly apply specialized programming knowledge in computing applications.