



**Progressive Education Society's**

**Modern College of Arts, Science and Commerce,  
Ganeshkhind, Pune-16**

**(An Autonomous College Affiliated to Savitribai Phule Pune University)**

## **Framework of Syllabus**

**For**

**Second Year**

**B.B.A.(Computer Application)**

**(2023-2024 Course)**

**(With effect from 2023-2024)**

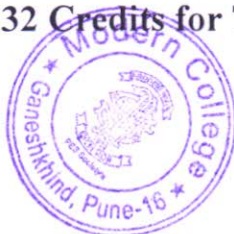
### SYBBA(CA) Sem III

Course Type	Sr. No.	Course(Subject) Title	Course (Subject) code	Credits	Weightage for Internal Marks	Weightage For External Marks	Weightage for practical	Total Marks
CCT-1	1	Digital Marketing	23-BBACA231	3	30	70		100
CCT-2	2	Data Structures	23-BBACA232	3	30	70		100
CCT-3	3	Software Engineering	23-BBACA233	3	30	70		100
CCT-4	4	Angular	23-BBACA234	3	30	70		100
CCT-5	5	Big Data Analytics	23-BBACA235	3	30	70		100
PR-1	6	Computer Laboratory based on 232,234 & 235	23-BBACA236	6			100	100
AECC -1	7	Environmental Awareness	23-BBACA237	2	50			50

### SYBBA(CA) Sem IV

Course Type	Sr. No.	Course(Subject) Title	Course(Subject) code	Credits	Weightage for Internal Marks	Weightage for External Marks	Weightage for practical	Total Marks
CCT-1	1	Networking	23-BBACA241	3	30	70		100
CCT-2	2	Object Oriented Concept Through CPP	23-BBACA242	3	30	70		100
CCT-3	3	Operating System	23-BBACA243	3	30	70		100
CCT-4	4	Node JS	23-BBACA244	3	30	70		100
PJ-1	5	Project	23-BBACA245	4			100	100
PR-1	6	Computer Laboratory based on 242 & 244	23-BBACA246	4			100	100
SEC-1	7	Add-On (Jquery)	23-BBACA247	2	50			50

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



*S. J. Mhalekar*  
BOS Chairman  
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**SYBBA (CA)**  
**SEMESTER III SYLLABUS**



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**Syllabus for B.B.A (CA) (CBCS 2022 Pattern)**  
**Semester III Subject Code: - 23-BBACA231**  
**Subject Name -: Digital Marketing**

**Total Contact Hours: -48**

**Total Credits: - 3**

**Course Objective:**

1. The aim of this syllabus is to give knowledge about using digital marketing in and as business.
2. To make SWOT analysis, SEO optimization and use of various digital marketing tools.

**Course Outcome:**

- CO1: Able to understand the new digital market and its terminology.  
 CO2: Greatest benefit of digital marketing is allowed to target the ideal buyer, through social media or with any digital platform.  
 CO3: will gain insight into the main components of digital marketing strategy and its impact on business objectives.  
 CO4: will be able to deliver as per current digital advertising market trends or standards.

Unit	Topic	No. of Lectures
1.	<b>E-Commerce</b> 1.1 Introduction 1.2 Understanding Internet Marketing 1.3 Search Engine Optimization 1.4 Search Engine Marketing 1.5 Digital Display Marketing	4
2.	Introduction to New Age Media (Digital) Marketing 2.1 Types of Digital Marketing -Affiliate Marketing(Niche ProductList, Amazon Affiliate Program, Flipkart Affiliate Program, Posting on social Media, Google Trends) 2.2 Overview of Internet Marketing ,Social Media Marketing, Mobile Marketing 2.3 Digital vs. Real Marketing 2.4 Digital Marketing Channels	4
3.	<b>Creating Initial Digital Marketing Plan</b> 3.1 Content management 3.2 SWOT analysis: Strengths, Weaknesses, Opportunities, and Threats. 3.3 Freelancing(Introduction about Freelancing, Branch in Freelancing- Designing, Video Making,Writing,Programming,Fun and Life Stylish, Social media Marketing, Business 3.4 Target group analysis EXERCISE: Define a target group	4



4.	<b>Marketing using Web Sites</b> 4.1 Web design 4.2 Optimization of Web sites 4.3 MS Expression Web EXERCISE: Creating web sites, MS Expression	4
5.	<b>Search Engine Optimization</b> 5.1 SEO Optimization 5.2 Writing the SEO content EXERCISE: Writing the SEO content	4
6.	<b>Customer Relationship Management</b> 6.1 Introduction to CRM 6.2 CRM platform 6.3 CRM models EXERCISE: CRM strategy	4
7.	<b>Social Media Marketing</b> 7.1 Social Networking (Facebook, LinkedIn, Twitter, etc.) Social Media (Blogging, Video Sharing - YouTube,  Photo sharing – Instagram, Podcasts) 7.2 Web analytics - levels 7.3 Modes of Social Media Marketing- 7.3.1 <b>Creating a Facebook page</b> Visual identity of a Facebook page , Types of publications, Facebook Ads , Creating Facebook Ads , Ads Visibility  <b>1. Creating Content For Facebook and Social Media</b> • <b>Why Content is the Foundation of SMW?</b> • <b>Psychology of Social Sharing</b> • <b>Building Content that is Inherently Shareable</b>  7.3.2 <b>Business opportunities and Instagram options</b> Optimization of Instagram profiles , Integrating Instagram with a Web Site and other social networks , Keeping up with posts 7.3.3 <b>Business tools on LinkedIn</b> Creating campaigns on LinkedIn , Analyzing visitation on LinkedIn 7.3.4 <b>Creating business accounts on YouTube</b> YouTube , Advertising , YouTube Analytics 7.3.5 <b>LinkedIn as a Marketing Platform</b> 7.3.6 <b>Twitter and Snapchat Marketing</b> 7.4 Digital Marketing tools: Google Ads, Facebook Ads, Google Analytic, Zapier, Google Keyword Planner EXERCISE: Social Media Marketing plan. EXERCISE: Making a Facebook page and Google Ads	20
8.	<b>Digital Marketing Budgeting</b> 8.1 Resource planning 8.2 Cost estimating 8.3 Cost budgeting 8.4 Cost control EXERCISE: Marketing Planning & Marketing Research	4
<b>Total</b>		<b>48</b>





### Reference Books:

- 1) Digital Marketing for Dummies By Ryan Deiss and Russ Hennesberry
- 2) Advertising and Promotion: An Integrated Marketing Communications Perspective, George Belch, San Diego University Michael Belch, San Diego University
- 3) Advertising Management: Rajeev Batra, John G. Myers, David A. Aaker
- 4) Belch: Advertising & Promotions (TMH)
- 5) The Social Media Bible: Tactics, Tools, & Strategies for Business Success by Lon Safko
- 6) Web Analytics 2.0 – Avinash Kaushik



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Semester -III

Subject Code-23-BBACA232

Subject Name : Data Structures

Total Contact Hours: 48

Total Credits: 3

**Course Objectives:**

1. To learn basics of Data Structures
2. To understand linear data structures – lists, stacks, and queues
3. To understand sorting, searching algorithms
4. To understand Applications of data structures

**Course Outcome:**

- CO1: Students will be able to learn basic terminologies of data structures  
CO2: Students will be able to understand applications of different data structures  
CO3: Students will be able to write programs of data structures to solve problems like sorting, searching.

Unit	Topic	No. of Lectures
1	<b>Introduction</b> 1.1 Types of Data structures 1.2 Abstract Data Types (ADT) 1.3 Pointers and Dynamic Memory Allocation 1.4 Algorithm- Definition and characteristics, Space Complexity -Time Complexity -Asymptotic Notation	4
2	<b>Arrays and Structures</b> 2.1 Introduction to Arrays - array representation 2.2 Polynomial - Polynomial Representation - Evaluation of Polynomial - Addition of Polynomial 2.3 Introduction to Structures, Self Referential Structure	3
3	<b>Sorting Techniques</b> 3.1 Sorting algorithms with efficiency - Bubble sort, Insertion sort, Merge sort, Quick Sort, Selection Sort 3.2 Searching techniques –Linear Search, Binary search	8
4	<b>Linked Lists</b> 4.1 Introduction to Linked List 4.2 Implementation of Linked List – Static & Dynamic representation, 4.3 Types of Linked List - Singly Linked list(All type of operation) - Doubly Linked list (Create , Display) - Circularly Singly Linked list (Create, Display) - Circularly Doubly Linked list (Create, Display)	6
5	<b>Stacks</b> 5.1 Introduction 5.2 Representation- Static & Dynamic 5.2 Primitive Operations on stack 5.4 Application of Stack 5.5 Conversion of Infix, prefix, postfix , Evaluation of postfix andprefix	7
6	<b>Queues</b> 6.1 Introduction 6.2 Representation - Static & Dynamic	6





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	6.3 Primitive Operations on Queue 6.4 Circular queue, priority queue ,Concept of doubly ended queue 6.5 Applications of Queues	
7	<b>Trees</b> 7.1 Concept & Terminologies 7.2 Binary tree, binary search tree 7.3 Representation – Static and Dynamic 7.4 Operations on BT and BST – create, Insert, delete, , counting leaf,non-leaf & total nodes , 7.5 Tree Traversals (preorder, inorder, postorder) 7.6 Application - Heap sort Height balanced tree- AVL trees- Rotations, AVL tree examples.	7
8	<b>Graphs</b> 8.1 Concept & terminologies 8.2 Graph Representation – Adjacency matrix, adjacency list, inverse Adjacency list 8.3 Degree of Graph 8.4 Traversals – BFS and DFS <b>8.5 Dijkstras Shortest Path Algorithm</b> Applications – AOV network – topological sort, AOE network –critical Path	7
		48

**Reference Books:**

1. Fundamentals of Data Structures ---- By Horowitz Sahani (Galgotia)
2. Data Structures using C and C++---- By YedidyahLangsam, Aaron M. Tenenbaum, Moshe J. Augenstein
3. Introduction to Data Structures using C --By Ashok Kamthane
4. Data Structures using C --- Bandopadhyay&Dey (Pearson)
5. Data Structures using C ---By Srivastava BPB Publication.



*S. J. Mhalekar*  
BOS  
Chairman  
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**Semester -III**

**Subject Code-23-BBACA233**

**Subject Name : Software Engineering**

**Total Contact Hours: 48**

**Total Credits: 3**

**Course Objectives:**

1. To understand the basics of System concepts.
2. To understand the basics of Software Engineering concepts.
3. To understand the applications of Software Engineering concepts and Design in Software development

**Course Outcome:**

CO1: Students will be able to learn basics of system engineering

CO2: Students will be able to understand each step involved in software development

CO3: Students will be able to use different design tools in the software development process.

Unit	Topic	No. of Lectures
1	<b>Introduction to System Concepts and Software Engineering</b> 1.1 Definition 1.2 Basic Components of system 1.3 Elements of the System 1.4 Types of System 1.5 System Characteristics 1.6 Definition of Software 1.7 Characteristics of Software 1.8 Definition of Software Engineering 1.9 Need for Software Engineering 1.10 Mc Call's Quality factors	10
2	<b>Software Development Life Cycle</b> 2.1 Introduction 2.2 Activities of SDLC 2.3 SDLC 2.4 Waterfall Model 2.5 Incremental Process Models 2.6 Prototyping Model 2.7 Spiral Model 2.8 V & V Model	8
3	<b>Agile Software Development</b> 3.1 Introduction to Agile Model 3.2 Agile methodology of software development 3.3 Principles of Agile Model 3.4 Advantages of Agile Software Development	3
4	<b>Requirement Engineering</b> 4.1 Introduction 4.2 Requirement Elicitation 4.3 Requirement Elaboration 4.4 Requirement Gathering	5



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	4.5 Feasibility study Fact Finding Techniques	
5	<b>Analysis And Design Tools (with case studies)</b> 5.1 Decision Tree and Decision Table 5.2 Data Flow Diagrams (DFD) (Up to 2 <sup>nd</sup> level) 5.3 Data Dictionary 5.4 Elements of DD 5.5 Advantages and Disadvantages of DD 5.6 Input and Output Design 5.7 Structured Design Concepts 5.8 Structure Chart 5.9 Coupling and Cohesion	8
6	<b>Software Testing</b> 6.1 Definition <b>6.2 Need for Software Testing</b> 6.3 Software Testing Process 6.4 Unit Testing 6.5 Integration Testing 6.5 System Testing	7
7	<b>Software Maintenance and Software Re-Engineering</b> 7.1 Maintenance definition and types 7.2 Software reengineering 7.3 Reverse Engineering 7.4 Restructuring and forward Engineering.	7
		<b>48</b>

**Reference Books:**

1. Software Engineering: A Practitioner's Approach- Roger S. Pressman, McGraw hill International Editions 2010(Seventh Edition)
2. System Analysis, Design and Introduction to Software Engineering (SADSE) - S. Parthsarthy, B.W. Khalkar
3. Analysis and Design of Information Systems(Second Edition) - James A. Senn, McGraw Hill
4. System Analysis and Design- Elias Awad, Galgotia Publication, Second Edition
5. <https://www.w3schools.in/sdlc/agile-model>



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 BBACA



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**Syllabus for B.B.A (CA) (CBCS 2022 Pattern)**

**Semester III - Subject Code: - 23-BBACA234**

**Subject Name -: Angular**

**Total Contact Hours: -48**

**Total Credits: - 3**

**Objectives:**

- By the end of this course, the students should be able to Understand Client Side MVC and SPA.
- Explore Angular Component.
- Develop an Angular Single Page Application.
- Create and bind controllers with JavaScript.
- Apply Template in Angular application.
- Design an Angular Templates.
- Special syntax can be used within template to build on many of Angular's framework.

**Course Outcomes: -**

- CO1: Student will be able to create single page applications with Angular.  
CO2: student will be able to understand how to create website in Angular.

Unit	Topics	No. of Lectures
1	<b>Introduction to Angular:</b> 1.1 What is Angular? 1.2 What is AngularJS? 1.3 Difference between JavaScript and AngularJS. 1.4 Difference between Angular with AngularJS. 1.5 Advantages and disadvantages of Angular 1.6 Introduction to OOP's Concept 1.6 Angular MVC Architecture 1.7 Introduction to SPA 1.8 Setting up the environment 1.9 First App using MVC architecture	8
2	<b>Understanding Angular and Directives:</b> 2.1Components: 2.1.1 Components Overview 2.1.2 Components Lifecycle 2.1.3 View Encapsulation	10





	<b>2.1.4 Communication between components</b> <b>2.1.5 Component Styles</b> <b>2.2 Directives: 2.2.1. Built in services</b> <b>2.2.2. Attribute Directives</b> <b>2.2.3 Structural Directives</b>	
3	<b>Angular Modules, Component View and Scope:</b> <b>3.1 Angular Modules</b> <b>3.2 Angular Component</b> <b>3.3 Angular View</b> <b>3.4 Scope hierarchy</b> <b>3.5 Introduction to Routing</b>	10
4	<b>Angular Template and Binding:</b> <b>4.1 Angular Template</b> <b>4.1.1 Introduction of template syntax</b> <b>4.1.2 Text Interpolation</b> <b>4.1.3 Template Statements</b> <b>4.2 Angular Binding</b> <b>4.2.1 Understanding Binding</b> <b>4.2.2 Attribute binding</b> <b>4.2.3 Class &amp; style binding</b> <b>4.2.4 Event Binding</b> <b>4.2.5 Property Binding</b> <b>4.2.6 Two-way Binding</b>	2
5	<b>Dependency Injection and Services: -</b> <b>5.1 Dependency Injection in Angular</b> <b>5.2 Understanding Dependency injection</b> <b>5.3. Understanding Services</b> <b>5.4 Creating an injectable service.</b> <b>5.5 Defining dependency providers.</b> <b>5.6 Hierarchical Injectors</b>	8
Total		48

#### Reference Books:

1. Beginning Angular with Typescript (updated to Angular 5) by Greg Lim
2. Mastering Web Application Development with AngularJS by Pawel Kozlowski, Peter Bacon Darwin
3. <https://www.tutorialsteacher.com/angularjs/angularjs-scope>
4. <https://www.angular.io>
5. <http://w3school.com>



*SJM haselkar*  
 BOS chairman  
 BOA (CA)

**S.Y.B.B.A.(C.A.) Semester – III**

**Course Code: 23-BBACA235**

**Course Title: Big Data Analytics**

**Total Contact Hours: 48**

**Total Credits: 3**

**Objectives:**

1. To enable learners to develop expert knowledge and analytical skills in current and developing areas of analysis statistics, and machine learning basics.
2. To enable the learner to identify, develop and apply detailed analytical, creative, problemsolving skills.

**Course Outcomes:**

CO1: Student understand and able to develop analytical skills in current and developing areas of analysis statistics, and machine learning.

CO2: Student can be able to identify, develop and apply detailed analytical, creative, problem solving skills.

CO3: Course provides a comprehensive platform for career development and innovation to the students.

Unit	Topic	No. of lectures
1	<b>INTRODUCTION TO BIG DATA</b> 1.1 Introduction to Big Data 1.2 Types of Digital Data 1.3 Big Data Analytics 1.4 Application of Big data	5
2	<b>INTRODUCTION TO STATISTICAL CONCEPTS</b> 2.1 Basics of Data Analytics 2.2 Types of Analytics – 2.2.1 Descriptive, 2.2.2 Predictive, 2.2.3 Prescriptive 2.2.4 Statistical Inference 2.3 Populations and samples 2.3.1 Statistical modelling, 2.3.2 Probability 2.3.3 Distribution 2.3.4 Correlation 2.3.5 Regression	10
3	<b>INTRODUCTION TO R PROGRAMING</b> 3.1 Basics of R Programming 3.2 Interaction /Features of R 3.3 Installation of R 3.4 Basic Computations in R 3.5 Objects, Attributes 3.6 Data Types in R with application 3.6.1 Vector 3.6.2 List 3.6.3 Matrices 3.6.4 Data Frame, Functions of Data Frame 3.7 Control Structures in R	20





	<b>3.8 String and functions in R</b> <b>3.9 Examples</b> <b>3.10 Introduction of Machine Learning with reference to R Programming</b> <b>3.10.1 Types of Machine learning</b>	
4	<b>DATA ANALYTICS WITH R/ WEKA</b> 4.1 Introduction 4.2 Data Manipulation 4.3 Data Visualization 4.4 Data Analysis	07
5	<b>BIG DATA ANALYSIS IN PRACTICE</b> 5.1 Case study 5.2 Preparation of Case study report 5.3 Case Study Presentation	06
<b>Total</b>		<b>48</b>

#### Reference Books:

1. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.
2. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC Press (2013)
3. Arvind Sathi, "Big Data Analytics: Disruptive Technologies for Changing the Game", MC Press, 2012
4. Hands-On Programming with R. by Garrett Golemund.
5. R for Data Science by Hadley Wickham.



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BOB chairman  
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**SYBBA (CA)**  
**SEMESTER IV SYLLABUS**

## Syllabus for BBACA CBCS 2022 Pattern

**Subject Code-23-BBACA241**

**Total Credits: 3****Total Credits: 3****Total Credits: 3**

1. To understand basics of computer networking.
2. To understand devices used in computer networking.
3. To understand the need of security in computer networks and basics of security

**Course Outcome:**

CO1: Students will be able to learn basics of networking, different devices used in networking

CO2: Students will be able to learn the working of networking models like OSI model And TCP IP Model

CO3: Students will be able to learn the basics of cryptography.

Unit	Topic	No. of Lectures
1	<b>Basics of Computer Networks</b> 1.1 Basics of Computer Network : Definition , Goals ,Applications, Network Hardware – 1) Broadcast, 2) Point to Point , Components of Data Communication 1.2 Network Topologies, Types and Communication : Mesh , Star, Bus, Ring , LAN, MAN, WAN, Internetwork, Wireless Network, Simplex, Half Duplex, Full Duplex 1.3 Server Based LANs & Peer-to-Peer LANs 1.4 Protocols and Standards 1.5 Network Software :Protocol Hierarchies, Layers, Peers, Interfaces, Design Issues of the Layers, Connection Oriented and Connectionless Service	13
2	<b>Network Models</b> 2.1 OSI Reference Model : Functions of each Layer , Working of <b>Physical Layer, Working of Data Link Layer</b> 2.2 TCP/IP Reference Model, Comparison of OSI and TCP/IP Reference Model 2.3 TCP/IP Protocol Suite 2.4 Addressing 2.4.1Physical ddresses 2.4.2 Logical Addresses 2.4.3Port Addresses, 2.4.4 Specific Addresses 2.5 IP Addressing 2.5.1 Classfull Addressing 2.5.2 Classless Addressing	8
3	<b>Transmission Media</b> 3.1 Introduction, Types of Transmission Media 3.2 Guided Media: 3.2.1 Twisted Pair Cable- Physical Structure,Categories,Connectors &Applications	8



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	3.2.2 Coaxial Cable – Physical Structure, Standards, Connectors & Applications 3.2.3 Fiber Optic Cable- Physical Structure, Propagation Modes, Connectors & Applications 3.3 Unguided Media: Electromagnetic Spectrum for Wireless Communication 3.3.2 Propagation Modes Ground, Sky, Line-of-Sight 3.3.3 Wireless Transmission: Radio Waves, Microwaves, Infrared	
4	<b>Wired and Wireless LAN</b> 4.1 IEEE Standards 4.2 Standard Ethernet MAC Sublayer, Physical Layer 4.3 Fast Ethernet – Goals, MAC Sublayer, Topology, Implementation 4.4 Gigabit Ethernet – Goals, MAC Sublayer, Topology, Implementation 4.5 Ten-Gigabit Ethernet – Goals, MAC Sublayer, Physical Layer 4.6 Backbone Networks -Bus Backbone, Star Backbone 4.7 Virtual LANs Membership, IEEE standards advantages 4.8 Wireless LAN 4.8.1 IEEE 802.11 Architecture, Bluetooth Architecture (Piconet, Scatternet)	9
5	<b>Network Devices</b> 5.1 Active and Passive Hubs 5.2 Repeaters 5.3 Bridges- Types of Bridges 5.4 Switches 5.5 Router 5.6 Gateways	8
6	<b>Basics of Network Security</b> 6.1 Definition of cryptography, 6.2 Encryption, Decryption 6.3 Public Keys , Private Keys, Symmetric and Asymmetric Keys	2
		48

**Reference Books:**

1. Computer Networks by Andrew Tanenbaum, Pearson Education.[4th Edition]
2. Data Communication and Networking by Behrouz Forouzan, TATA McGraw Hill. [4th Edition]
3. Cryptography and Network security By: Atul Kahate
4. Data Communication and Networks By: Achyut Godbole



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**Syllabus for B.B.A (CA) (CBCS 2022 Pattern)**  
**Semester IV Subject Code: - 23-BBACA242**  
**Subject Name -: Object Oriented Concepts Through CPP**

**Total Contact Hours: -48**

**Total Credits: - 3**

**Course Objective:**

- 1.Acquire an understanding of basic object-oriented concepts and the issues involved in effective class design.
- 2.Enable students to write programs using C++ features like operator overloading,constructor and destructor, inheritance, polymorphism and exception handling.

**Course Outcome:**

- CO1: Students will be able to understand the basic object-oriented concepts.
- CO2: Students will be able to apply C++ features like operator overloading, constructor and destructor, inheritance, polymorphism and exception handling.
- CO3: will be able to use functions and pointers in C++ program, understand tokens, expressions, and control structures
- CO4: will be able to understand and employ file management and demonstrate how to control errors with exception handling

Unit	Topic	No. of Lectures
1	<b>Introduction to C++</b> 1.1 Basic concepts, features, advantages and applications of OOP 1.2 Introduction, applications and features of C++ 1.3 Input and Output operator in C++ 1.4 Simple C++ program <b>1.5 Overview of OOP principles-encapsulation, inheritance and data binding polymorphism, abstraction</b>	2
2	<b>Beginning with C++</b> 2.1 Data type and Keywords 2.2 Declaration of variables, dynamic initialization of variables, reference variable 2.2.1 Scope resolution operator 2.2.2 Memory management operators 2.3 Manipulators 2.4 Functions: 2.4.1 Function prototyping, call by reference and return by reference 2.4.2 Inline functions 2.5 Default arguments	6
3	<b>Classes and Objects</b> 3.1 Structure and class, Class, Object 3.2 Access specifiers, defining data member 3.3 Defining member functions inside and outside class definition. 3.4 Simple C++ program using class 3.5 Memory allocation for objects 3.6 Static data members and static member functions 3.7 Array of objects, objects as a function argument 3.8 Friend function and Friend class 3.9 Function returning objects	8



4	<b>Constructors and Destructors</b> 4.1 Constructors 4.2 Types of constructor : Default, Parameterized, Copy 4.3 Multiple constructors in a class 4.4 Constructors with default argument 4.1Dynamic initialization of constructor 4.2Dynamic constructorDestructor	6
6	<b>Inheritance</b> 6.1 Introduction 6.2 Defining Base class and Derived class 6.3 Types of Inheritance 6.4 Virtual Base Class 6.5 Abstract class 6.6 Constructors in derived class	6
7	<b>Polymorphism</b> <b>Static and Dynamic binding</b> 7.1 Compile Time Polymorphism 7.1.1 Introduction, rules for overloading operators 7.1.2 Function overloading 7.1.3 Operator Overloading unary and binary 7.1.4 Operator Overloading using friend function 7.1.5 Overloading insertion and extraction operators 7.1.6 String manipulation using operator overloading 7.2 Runtime Polymorphism 7.2.1 this Pointer, pointers to objects, pointer to derived classes 7.2.2 Virtual functions and pure virtual functions	8
8	<b>Managing console I/O operations</b> 8.1 C++ streams and C++ stream classes 8.2 Unformatted I/O operations 8.3 Formatted console I/O operations 8.4 Output formatting using manipulators 8.5 User defined manipulators	3
9	<b>Working with Files</b> 9.1 Stream Classes for File operations 9.2 File operations - Opening, Closing and updating 9.3 File updating with random access. 9.4 Error handling during File operations 9.5 Command Line arguments	6
10	<b>Templates</b> 10.1 Introduction 10.2 Class Template and class template with multiple parameters, <b>static class member in class template</b> 10.3 FunctionTemplate and function template with multiple parameter, <b>overloading of function template</b> 10.4 ExceptionHandlingIntroduction	3
<b>Total</b>		<b>48</b>





**Reference Books:**

- 1) Object Oriented programming with C++ by EBalagurusamy
- 2) Object Oriented Programming with C++ by RobertLafore
- 3) The Complete Reference C++ by Herbert Schildt
- 4) C++ pocket reference by Kyle Loudon.
- 5) C++17 - The Complete Guide by Nicolai M. Josuttis



S.M.Hosekar

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**Syllabus for B.B.A (CA) (CBCS 2022 Pattern)**  
**Semester IV Subject Code: - 23-BBACA243**  
**Subject Name -: Operating System**

**Total Contact Hours: -48**

**Total Credits: - 3**

**Course Objective:**

1. Students will learn how Operating System is Important for Computer System.
2. To make aware of different types of Operating System and their services.
3. To learn different process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
4. To know virtual memory concepts.
5. To learn secondary memory management

**Course Outcome:**

CO1: Understands the use of different process scheduling algorithm and synchronization techniques to avoid deadlock

CO2: They learn real life applications of Operating System in every field.

CO3: Understands the different services provided by Operating System at different level.

CO4: They will learn different memory management techniques like paging, segmentation and demand paging etc.

Unit	Topic	No. of Lectures
1	<b>Introduction to Operating System</b> 1.1 What is operating system 1.2 Computer system architecture 1.3 Services provided by OS 1.4 Types of OS 1.5 Operating System Structure – - Simple structure - Layered approach - Micro kernels - Modules 1.6 Virtual Machines – Introduction, Benefits	3
2	<b>System Structure</b> 2.1 User operating system Interface 2.2 System Calls– - Process or job control - Device Management - File Management 2.3 System Program	3



3	<b>Process Management</b> 3.1 Process Concept – - The process - Process states - Process control block 3.2 Process Scheduling – - Scheduling queues - Schedulers -Context Switch 3.3 Operation on Process – - Process Creation -Process Termination 3.4 Interprocess Communication – Shared memory system Message passing systems	4
4	<b>CPU(Process) Scheduling</b> 4.1 What is scheduling 4.2 Scheduling Concepts – - CPU- I/O Burst Cycle - CPU Scheduler -Preemptive and Non-preemptive scheduling - Dispatcher 4.3 Scheduling criteria 4.4 Scheduling Algorithms – - FCFS - SJF ( Preemptive& non-preemptive) - Priority Scheduling (Preemptive& Non- preemptive) - Round Robin Scheduling - Multilevel Queues - Multilevel Feedback queues4.5 <b>Algorithm evaluation</b>	6
5	<b>Process Synchronization</b> 5.1 Introduction 5.2 Critical section problem 5.3 Semaphores – - Concept - Implementation - Deadlock & Starvation - Types of Semaphores 5.4 Classical Problems of synchronization – -Bounded buffer problem - Readers & writers problem - Dining Philosophers problem	6





6	<b>Deadlock</b> 6.1 Introduction 6.2 Deadlock Characterization 6.3 Necessary Condition 6.4 Deadlock Handling Technique– -Deadlock Prevention - Deadlock Avoidance – - Safe State - Resource allocation graph algorithm - Bankers algorithm - Deadlock Detection - Recovery from Deadlock – -Process Termination -Resource Preemption	7
7	<b>Memory Management</b> 7.1. Background – -Basic hardware - Address binding - Logical versus physical address space - Dynamic loading - Dynamic linking and shared libraries 7.2 Swapping 7.3 Contiguous Memory Allocation – - Memory mapping and protection -Memory allocation - Fragmentation 7.4 Paging – - Basic Method - Hardware support - Protection - Shared Pages 7.5 Segmentation – - Basic concept - Hardware 7.6 Virtual Memory Management – - Background - Demand paging - Performance of demand paging - Page replacement – - <b>Allocation of frames</b> - <b>thrashing</b> - FIFO - OPT - LRU - Second chance page replacement - MFU - LFU	8



8	<b>File System</b> 8.1 Introduction & File concepts (file attributes, Operations on files) 8.2 Access methods – - Sequential access - Direct access 8.3 File structure – - Allocation methods - Contiguous allocation - Linked Allocation - Indexed Allocation 8.4 Free Space Management – - Bit Vector - Linked List - Grouping 8.5 Directory and Disk Structure – Storage structure, Directoryoverview, Single level directory, Two level directory, Tree structure directory, Acyclic graph directory, General graph directory, Counting	7
9	<b>I/O System</b> 9.1 Introduction 9.2 I/O Hardware 9.3 Application of I/O Interface 9.4 Kernel I/O Subsystem 9.5 Disk Scheduling – - FCFS - Shortest Seek time first - SCAN - C- SCAN - C- Look	4
	<b>Total</b>	<b>48</b>

### Reference Books:-

1. Silberschatz, Galvin and Gagne, Operating System Principles, 7th Ed. Addison Wesley.
2. Gary Nutt, Operating Systems, 3rd Ed. Pearson Education, India Tanenbaum, Modern Operating Systems, PHI.
3. W. Stalling, Operating Systems, Macmillan.
4. H. M. Dietel, Operating Systems, Addison Wesley Longman.
5. Maurice J. Bach, The design of Unix Operating system, Pearson Education, India.  
Sumitabha Das, Unix Concepts & Applications: includes SCO UNIX & Linux, Tata McGraw Hill.



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**Syllabus for B.B.A (CA) (CBCS 2022 Pattern)**

**Semester IV - Subject Code: - 23-BBACA244**

**Subject Name -: NodeJS**

**Total Contact Hours: -48**

**Total Credits: - 3**

**Objectives:**

1. Understand the JavaScript and technical concepts behind Node JS
2. Structure a Node application in modules
3. Understand and use the Event Emitter
4. Understand Buffers, Streams, and Pipes
5. Build a Web Server in Node and understand how it really works
6. Connect to a SQL or Mongo database in Node

**Course Outcome: -**

CO1: Student able to understand one of the most popular runtime Environment to create server side application with JavaScript.

CO2: student understand how to create server application with node js, also get information about to connect with database and how to use third party module in current application

CO3: Get idea about Express Js Framework.

**Pre-requisite / Target Audience:**

- 1) Basic Knowledge of JavaScript and OOPS
- 2) Knowledge in async programming will be added advantage

Unit	Topics	No. of Lectures
1	<b>Introduction to Node JS</b> 1.1 Introduction 1.2 What is Node JS? 1.3 Advantages of Node JS 1.4 Traditional Web Server Model 1.5 Node.js Process Model 1.6 Install Node.js on Windows 1.7 Working in REPL	8
2	<b>Node JS Modules</b> 2.1 Functions 2.2 Buffer 2.3 Module 2.4 Module Types 2.5 Core Modules 2.6 Local Modules	8



	2.7 Module. Exports	
3	<b>Node Package Manager</b> 3.1 What is NPM ? 3.2 Installing Packages Locally 3.3 Adding dependency in package.json 3.4 Installing packages globally 3.5 Updating packages	6
4	<b>Web server</b> 4.1 Creating web server 4.2 Handling http requests 4.3 Sending requests	6
5	<b>File System</b> 5.1 Fs.readFile 5.2 Writing a File 5.3 Writing a file asynchronously 5.4 Opening a file 5.5 Deleting a file 5.6 Other IO Operations	8
6	<b>Events</b> 6.1 Event Emitter class 6.2 Returning event emitter 6.3 Inhering events	4
7	<b>Database connectivity</b> 7.1 Connection string 7.2 Configuring 7.3 Working with select command 7.4 Updating records 7.5 Deleting records <b>7.6 Template Engines</b> 7.6.1 Why template engine 7.6.2 What is Jade 7.6.3 what is vash 7.6.4 Example	8
<b>Total</b>		<b>48</b>

#### Reference Books:

- 1) Node.js complete reference guid , velentin Bojinov, David Herron, DiogeResende, packt Publishing ltd
- 2) Mastering Nod.js By Sandro Pasquali , packt Publishing
- 3) Smashing Node.js Javascript Everywhere, Guillermo Rauch, John wiley& Sons
- 4) <http://w3school.com>
- 5) **Node.js** by Azat Mardan · **Node.js Design Pattern** Second Edition ·



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**Syllabus for B.B.A (CA) (CBCS 2022 Pattern)**

**Semester IV - Subject Code: - 23-BBACA247**

**Subject Name -: JQuery**

**Total Contact Hours: -30**

**Total Credits: - 2**

**Prerequisite:** HTML, CSS, JavaScript.

**Objectives:**

- To get hands-on experience on JavaScript and jQuery.
- To learn how to work with binding events to the controls in JavaScript.
- To learn how to download jQuery library and refer it to the Html page.
- To learn the importance of `$(document).ready(function () { });`
- To learn selecting the Html elements by name, attribute name, id or by content.
- To Learn Traversing of Html elements.
- To learn handling different events for different Controls.
- To learn how to provide effects to the elements or sections in the Html page. - To learn manipulating elements by adding CSS classes dynamically, by inserting Elements.

**Course Outcome: -**

CO1: Students will able to understand the javascript language and the document object Model. JQuery is javascript library.

**Credit Distribution:** - 1 credit for theory (15 Lectures) and 1 credit for Practical.

**Syllabus**

Unit No	Contents	Lectures
1.	<b>Introduction</b> 1.1 jQuery Introduction 1.2 Install and Use jQuery Library 1.3 Un-Obstructive JavaScript 1.4 First jQuery Example 1.5 jQuery Syntax 1.6 How to escape a special character 1.7 Basic Selectors 1.8 Traversal Functions	5
2.	<b>HTML Manipulation</b> 2.1 Getting Setting values from elements 2.2 Handling attributes 2.3 Inserting New elements 2.4 Deleting/Removing elements 2.5 CSS manipulations 2.6 Dimensions 2.7 Positioning	5



3.	<b>Effects and Events</b> <b>Effects:</b> <ul style="list-style-type: none"> <li>3.1 Showing/Hiding elements</li> <li>3.2 Sliding elements</li> </ul>	5
	<ul style="list-style-type: none"> <li>3.3 Fading elements</li> <li>3.4 Deleting animation elements</li> <li>3.5 Custom animation <b>Events:</b></li> <li>3.6 Working with events.</li> </ul>	

#### References:

1. jQuery pocket reference by David Flanagan
2. Learning jQuery by Jonathan Chaffer
3. JavaScript and jQuery by David Sawyer McFarland
4. w3schools.com website.
5. [https://Slideshare.com](https://slideshare.com)



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**Syllabus for B.B.A (CA) (CBCS 2019 Pattern)**

**Semester IV - Subject Code: - 22-BBACA**

**Subject Name -: JQuery**

**Assignments:**

1. Write a jQuery code to check whether jQuery is loaded or not.
2. Write a jQuery code to scroll web page from top to bottom and vice versa.
3. Write a jQuery code to disable right click menu in html page.
4. Write a jQuery code to disable the submit button until the visitor has clicked a check box.
5. Write a jQuery code to fix broken images automatically.
6. Write a jQuery code to blink text continuously.
7. Write a jQuery code to create a zebra stripes table effect.
8. Write a jQuery code to print a page.
9. Write a jQuery code to allow the user to enter only 15 characters into the textbox.
10. Write a jQuery code to make first word of each statement to bold.
11. Write a jQuery code to create a division (div tag) using jQuery with style tag.
12. Write a jQuery code to select values from a JSON object.
13. Write a jQuery code to add list elements within an unordered list element.
14. Write a jQuery code to remove all the options of a select box and then add one option and select it.
15. Write a jQuery code to underline all the words of a text.
16. Write a jQuery code to demonstrate how to get the value of a textbox.
17. Write a jQuery code to remove all CSS classes from an application.
18. Write a jQuery code to distinguish between left and right mouse click.
19. Write a jQuery code to check if an object is a jQuery object or not.
20. Write a jQuery code to detect whether the user has pressed 'Enter key' or not.
21. Write a jQuery code to count number of rows and columns in a table.
22. Write a jQuery code to display form data onto the browser.
23. Write a jQuery code to find absolute position of an element.
24. Write a jQuery code to remove a specific value from an array.
25. Write a jQuery code to change button text.
26. Write a jQuery code to add options to a drop-down list.
27. Write a jQuery code to set background-image to the page.
28. Write a jQuery code to get the selected value and currently selected text of a dropdown box.
29. Write a jQuery code to disable a link.
30. Write a jQuery code to Restrict "number"-only input for textboxes including decimal points.
31. Write a jQuery code to set value in input text.



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