



Progressive Education Society's

**Modern College Of Arts, Science
and
Commerce, Ganeshkhind, Pune -
411 016
(Autonomous)**

Syllabus for
S. Y. B.B.A(CA)

Introduction:

The degree shall be titled as Bachelor of Business Administration (B.B.A.)(Computer Application) under the Faculty of Commerce and Management. First Year B.B.A.(CA) Based on Credit System is implemented w.e.f. the academic year 2022-2023 , Second Year B.B.A.(CA) is implemented w.e.f. 2023-2024 , Third Year B.B.A.(CA) will be w.e.f. 2024-2025.

Programme Objectives:

BBA (CA) Graduate's will be able to

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

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

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

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

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

Suggested internal assessment tools for courses:

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

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

Teaching Methodology:

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

Subject List

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	Mini 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.

Subject Code: - 23-BBACA231

Subject Name -: Digital Marketing (3 Credit Course)

Total Lectures = 45

Unit	Topic	No. of Lectures
1.	E-Commerce 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 Product List, 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.	Creating Initial Digital Marketing Plan 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.	Marketing using Web Sites 4.1 Web design 4.2 Optimization of Web sites 4.3 MS Expression Web EXERCISE: Creating web sites, MS Expression	4
5.	Search Engine Optimization 5.1 SEO Optimization 5.2 Writing the SEO content EXERCISE: Writing the SEO content	4
6.	Customer Relationship Management 6.1 Introduction to CRM 6.2 CRM platform 6.3 CRM models EXERCISE: CRM strategy	4
7.	Social Media Marketing 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 Creating a Facebook page Visual identity of a Facebook page , Types of publications, Facebook Ads , Creating Facebook Ads , Ads Visibility 1. Creating Content For Facebook and Social Media • Why Content is the Foundation of SMW? • Psychology of Social Sharing	17

	<ul style="list-style-type: none"> Building Content that is Inherently Shareable <p>7.3.2 Business opportunities and Instagram options Optimization of Instagram profiles , Integrating Instagram with a Web Site and other social networks ,Keeping up with posts</p> <p>7.3.3 Business tools on LinkedIn Creating campaigns on LinkedIn , Analyzing visitation on LinkedIn</p> <p>7.3.4 Creating business accounts on YouTube YouTube ,Advertising , YouTube Analytics</p> <p>7.3.5 LinkedIn as a Marketing Platform</p> <p>7.3.6 Twitter and Snapchat Marketing</p> <p>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</p>	
8.	Digital Marketing Budgeting 8.1 Resource planning 8.2 Cost estimating 8.3 Cost budgeting 8.4 Cost control EXERCISE: Marketing Planning & Marketing Research	4
Total		45

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

Subject Code-23-BBACA232

Subject Name : Data Structures (3 Credit Course)

Total Lectures=45

Unit	Topic	No. of Lectures
1	Introduction 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	Arrays and Structures 2.1 Introduction to Arrays - array representation 2.2 Polynomial - Polynomial Representation - Evaluation of Polynomial -	3

	Addition of Polynomial 2.3 Introduction to Structures, Self Referential Structure	
3	Sorting Techniques 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	Linked Lists 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	Stacks 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	6
6	Queues 6.1 Introduction 6.2 Representation - Static & Dynamic 6.3 Primitive Operations on Queue 6.4 Circular queue, priority queue ,Concept of doubly ended queue 6.5 Applications of Queues	6
7	Trees 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.	6
8	Graphs 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 8.5 Dijkstras Shortest Path Algorithm Applications – AOV network – topological sort, AOE network –critical Path	6
		45

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.

Subject Code: 23 BBACA233**Subject: Software Engineering (3 Credit Course)****Total Lectures=45**

Unit	Topic	No. of Lectures
1	Introduction to System Concepts and Software Engineering 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	Software Development Life Cycle 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	Agile Software Development 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	Requirement Engineering 4.1 Introduction 4.2 Requirement Elicitation 4.3 Requirement Elaboration 4.4 Requirement Gathering 4.5 Feasibility study Fact Finding Techniques	5
5	Analysis And Design Tools (with case studies) 5.1 Decision Tree and Decision Table 5.2 Data Flow Diagrams (DFD) (Up to 2 nd 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	6
6	Software Testing 6.1 Definition 6.2 Need for Software Testing 6.3 Software Testing Process 6.4 Unit Testing 6.5 Integration Testing 6.5 System Testing	7
7	Software Maintenance and Software Re-Engineering 7.1 Maintenance definition and types 7.2 Software reengineering 7.3 Reverse Engineering 7.4 Restructuring and forward Engineering.	6
		45

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. Parthasarthy, 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>

Subject Code: 23-BBACA234

Subject : Angular (3 Credit Course)

Total Lectures=45

Unit	Topics	No. of Lectures
1	Introduction to Angular: 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	Understanding Angular and Directives: 2.1 Components: 2.1.1 Components Overview 2.1.2 Components Lifecycle 2.1.3 View Encapsulation 2.1.4 Communication between components 2.1.5 Component Styles 2.2 Directives: 2.2.1. Built in services 2.2.2. Attribute Directives 2.2.3 Structural Directives	10
3	Angular Modules, Component View and Scope: 3.1 Angular Modules 3.2 Angular Component 3.3 Angular View 3.4 Scope hierarchy 3.5 Introduction to Routing	8

4	Angular Template and Binding: 4.1 Angular Template 4.1.1 Introduction of template syntax 4.1.2 Text Interpolation 4.1.3 Template Statements 4.2 Angular Binding 4.2.1 Understanding Binding 4.2.2 Attribute binding 4.2.3 Class & style binding 4.2.4 Event Binding 4.2.5 Property Binding 4.2.6 Two-way Binding	2
5	Dependency Injection and Services: - 5.1 Dependency Injection in Angular 5.2 Understanding Dependency injection 5.3. Understanding Services 5.4 Creating an injectable service. 5.5 Defining dependency providers. 5.6 Hierarchical Injectors	7
Total		45

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>

Subject Code: 23-BBACA235

Subject: Big Data Analytics (3 Credit Course)

Total Lectures = 45

Unit	Topic	No. of lectures
1	INTRODUCTION TO BIG DATA 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	INTRODUCTION TO STATISTICAL CONCEPTS 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	INTRODUCTION TO R PROGRAMING 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 3.8 String and functions in R 3.9 Examples 3.10 Introduction of Machine Learning with reference to R Programing 3.10.1 Types of Machine learning	20
4	DATA ANALYTICS WITH R/ WEKA 4.1 Introduction 4.2 Data Manipulation 4.3 Data Visualization 4.4 Data Analysis 4.5	07
5	BIG DATA ANALYSIS IN PRACTICE 5.1 Case study	03

	5.2 Preparation of Case study report 5.3 Case Study Presentation	
Total no of lectures		45

Reference Books:

1. SeemaAcharya, SubhasiniChellappan, "Big Data Analytics" Wiley 2015.
2. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRCpress (2013)
3. ArvindSathi, "BigDataAnalytics: Disruptive Technologies for Changing the Game",MC Press, 2012
4. Hands-On Programming with R. by Garrett Grolemond.
5. R for Data Science by Hadley Wickham.

Subject Code: 23-BBACA236

Subject : Computer lab based on 232,234 & 235

(2 Credit each= 06 credit course)

(Total Practical= 30 P (30x2hrs. for each course)

Sr. No	Assignment Name	No. of lectures
1	Array	4
2	Sorting Techniques (Non-Recursive)	3
3	Sorting Techniques (Recursive)	4
4	Searching Techniques	4
5	Linked List	3
6	Stack	4
7	Queue	3
8	Trees	2
9	Graph	3
Total		30

Sr. No.	Assignment Name	No. of lectures
1	Introduction to Angular , Angular Components Directives , Expressions, Events	12
2	Angular Modules, Controller, View and Scope	10
3	Forms Validation	5
4	Angular Services	3
Total		30

Sr. No.	Assignment Name	No. of lectures
1	Basic R Programming	5
2	Decision making and loop control structures	4
3	String and Function in R Programming	4
4	Vector and List in R Programming	3
5	Array and Matrices in R Programming	4
6	Factor and Data Frame in R Programming	3
7	Data Analysis	4
8	Data Visualization	3
Total		30

Subject Code: 23-BBACA237

Subject: Environmental Awareness (2 Credit Course)

Total Lectures = 30

**Syllabus is designed under board of EVS at college level
(under commerce faculty)**

Semester IV

Subject Code: 23-BBACA241

Subject: Networking (3 Credit Course)

Total Lectures = 45

Unit	Topic	No. of Lectures
1	Computer Network Basics 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	10
2	Network Models 2.1 OSI Reference Model : Functions of each Layer, working of physical layer and working of data link layer 2.2 TCP/IP Reference Model, Comparison of OSI and TCP/IP Reference Model 2.3 TCP/IP Protocol Suite 2.4 Addressing 2.4.1 Physical addresses 2.4.2 Logical Addresses 2.4.3 Port Addresses, 2.4.4 Specific Addresses 2.5 IP Addressing 2.5.1 Classfull Addressing 2.5.2 Classless Addressing	8
3	Transmission Media 3.1 Introduction, Types of Transmission Media 3.2 Guided Media: 3.2.1 Twisted Pair Cable- Physical Structure,Categories,Connectors&Applications 3.2.2 Coaxial Cable – Physical Structure, Standards, Connectors &Applications 3.2.3 Fiber Optic Cable- Physical Structure,PropagationModes,Connectors & Applications	8

	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	Wired and Wireless LAN 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	Network Devices 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	Basics Network Security 6.1 Definition of cryptography 6.2 Encryption, decryption 6.3 Public Keys, Private Keys, Symmetric and Asymmetric Keys	2
	Total	45

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]

Subject Code: 23-BBACA242

Subject: Object Oriented Concepts Through CPP (3 Credit Course)

Total Lectures = 45

Unit	Topic	No. of Lectures
1	Introduction to C++ 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 1.5 Overview of OOP principles- encapsulation, inheritance and databinding polymorphism,abstraction	2
2	Beginning with C++ 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	Classes and Objects 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	7
4	Constructors and Destructors 4.1 Constructors 4.2 Types of constructor : Default, Parameterized, Copy 4.3 Multiple constructors in a class 4.4 Constructors with default argument 4.5 Dynamic initialization of constructor 4.6 Dynamic constructorDestructor	6

5	Inheritance 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
6	Polymorphism Static and Dynamic binding 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	6
7	Managing console I/O operations 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
8	Working with Files 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
9	Templates 10.1 Introduction 10.2 Class Template and class template with multiple parameters, static class member in class template 10.3 Function Template and function template with multiple parameter, overloading of function template 10.4 Exception Handling Introduction	3
Total		45

Reference Books:

- 1) Object Oriented programming with C++ by E Balagurusamy
- 2) Object Oriented Programming with C++ by Robert Lafore
- 3) The Complete Reference C++ by Herbert Schildt

Subject Code: 23-BBACA243

Subject:- Operating System (3 Credit Course)

Total Lectures = 45

Unit	Topic	No. of Lectures
1	Introduction to Operating System 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	System Structure 2.1 User operating system Interface 2.2 System Calls– -Process or job control -Device Management - File Management 2.3 System Program	3
3	Process Management 3.1 Process Concept – - The process - Process states - Process control block 3.2 Process Scheduling – - Scheduling queues - Schedulers -Context Switch 3.3Operation on Process – - Process Creation -Process Termination 3.4 Interprocess Communication – Shared memory system Message passing systems	4

<p>4</p>	<p>CPU(Process) Scheduling 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 queues 4.5- Algorithm evaluation</p>	<p>6</p>
<p>5</p>	<p>Process Synchronization 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</p>	<p>6</p>
<p>6</p>	<p>Deadlock 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</p>	<p>6</p>

7	<p>Memory Management</p> <p>7.1. Background –</p> <ul style="list-style-type: none"> -Basic hardware - Address binding - Logical versus physical address space - Dynamic loading - Dynamic linking and shared libraries <p>7.2 Swapping</p> <p>7.3 Contiguous Memory Allocation –</p> <ul style="list-style-type: none"> - Memory mapping and protection -Memory allocation - Fragmentation <p>7.4 Paging –</p> <ul style="list-style-type: none"> - Basic Method - Hardware support - Protection - Shared Pages <p>7.5 Segmentation –</p> <ul style="list-style-type: none"> - Basic concept - Hardware <p>7.6 Virtual Memory Management –</p> <ul style="list-style-type: none"> - Background - Demand paging - Performance of demand paging - Page replacement – - Allocation of frames - thrashing <ul style="list-style-type: none"> - FIFO - OPT - LRU - Second chance page replacement - MFU - LFU 	7
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8	<p>File System</p> <p>8.1 Introduction & File concepts (file attributes, Operations on files)</p> <p>8.2 Access methods –</p> <ul style="list-style-type: none"> - Sequential access - Direct access <p>8.3 File structure –</p> <ul style="list-style-type: none"> - Allocation methods - Contiguous allocation - Linked Allocation - Indexed Allocation <p>8.4 Free Space Management –</p> <ul style="list-style-type: none"> - Bit Vector - Linked List - Grouping <p>8.5 Directory and Disk Structure – Storage structure, Directory</p> <ul style="list-style-type: none"> - overview, Single level directory, - Two level directory, Tree structure directory, Acyclic graph - directory, General graph directory, Counting 	6
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9	I/O System 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
	Total	45

Reference Books:-

1. Operating System Concepts - Siberchatz, Galvin, Gagne (8th Edition).
2. Operating Systems : Principles and Design – Pabitra Pal Choudhary (PHI Learning Private Limited)

Subject Code: 23-BBACA244

Subject:- NodeJS (3 Credit Course)

Total Lectures = 45

Unit	Topics	No. of Lectures
1	Introduction to Node JS 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	Node JS Modules 2.1 Functions 2.2 Buffer 2.3 Module 2.4 Module Types 2.5 Core Modules 2.6 Local Modules	7

	2.7 Module. Exports	
3	Node Package Manager 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	Web server 4.1 Creating web server 4.2 Handling http requests 4.3 Sending requests	6
5	File System 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	7
6	Events 6.1 Event Emitter class 6.2 Returning event emitter 6.3 Inhering events	4
7	Database connectivity 7.1 Connection string 7.2 Configuring 7.3 Working with select command 7.4 Updating records 7.5 Deleting records 7.6 Template Engines 1.1 Why template engine 1.2 What is Jade 1.3 what is vash 1.4 Example	6
Total		45

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

Subject Code: 23-BBACA245

Subject : Mini Project(04 credit course)

Guidelines:

- Students should work in a team of maximum 2 students.
- Students can choose a project topic without any restriction on technology or domain.
- The student group will work independently throughout the project work including: problem identification, information searching, literature study, design and analysis, implementation, testing, and the final reporting.
- Project guide must conduct project presentations (minimum 4) to monitor the progress of the project groups.
- At the end of the project, the group should prepare a report which should conform to international academic standards. The report should follow the style in academic journals and books, with clear elements such as: abstract, background, aim, design and implementation, testing, conclusion and full references, Tables and figures should be numbered and referenced to in the report.
- The final project presentation with demonstration (UE) will be evaluated by the project guide (appointed by the college) and one external examiner (appointed by the University).

Evaluation guidelines:

CI (30 marks)			CE (70 marks)		
First presentation	Second presentation	Documentation	Project Logic/Presentation	Documentation	Viva
10	10	10	40	10	20

Recommended Documentation contents:

Abstract

Introduction

- motivation
- problem statement
- purpose/objective and goals
- literature survey
- project scope and limitations

System analysis

- Existing systems
- scope and limitations of existing systems
- project perspective, features
- stakeholders
- Requirement analysis - Functional requirements, performance requirements, security requirements etc.

System Design

- Design constraints
- System Model: DFD
- Data Model
- User interfaces

Implementation details

- Software/hardware specifications

Outputs and Reports Testing

Test Plan, Black Box Testing or Data Validation Test Cases, White Box Testing or Functional Validation Test cases and results

Conclusion and Recommendations

Future Scope

Bibliography and References

Subject Code: 23-BBACA246

Subject : Computer lab based on 242 & 244

(2 Credit each= 04 credit course)

(Total Practical= 30 P (30x2hrs. for each course))

Sr. No.	Assignment Name	No of Practical's
1	Beginning with C++	3
2	Operators and Functions in C++	4
3	Classes and Objects	3
4	Constructors and Destructors	5
5	Inheritance	4
6	Polymorphism	4
7	Managing Console I/O operations	3
8	Working with Files	2

9	Templates	2
Total		30

Sr. No.	Assignment Name	No of Practical's
1	Node.js web server, modules & npm	7
2	File system	6
3	Events in node.js	8
4	Node.js with database	9
Total		30

Subject Code: 23-BBACA247

Subject:- JQuery (2 Credit Course)

Total Lectures = 30

Unit No	Contents	Lectures
1.	Introduction 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.	HTML Manipulation 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.	Effects and Events Effects: 3.1 Showing/Hiding elements 3.2 Sliding elements 3.3 Fading elements 3.4 Deleting animation elements 3.5 Custom animation Events: 3.6 Working with events.	5
4	Practical Session/ 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.	15

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.

	Total Lectures	30
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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