S.Y.B.B.A.(C.A.) Semester –III

Course Code: CA-301

Subject: Digital Marketing

Objectives:

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.

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 Email Marketing 1.6 Digital Display Marketing	**4**
2.	**Introduction to New Age Media (Digital) Marketing** 2.1 What is Digital Marketing 2.2 Digital vs. Real Marketing 2.3 Digital Marketing Channels 2.4 Types of Digital Marketing(Overview)-Internet Marketing ,Social Media Marketing, Mobile Marketing	**4**
3.	**Creating Initial Digital Marketing Plan** 3.1 Content management 3.2 SWOT analysis: Strengths, Weaknesses, Opportunities, andThreats 3.3 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 Understanding Social Media Marketing 7.2 Social Networking (Facebook, Linkedin, Twitter, etc.) Social Media (Blogging, Video Sharing - Youtube, Photosharing – Instagram, Podcasts) 7.3 Web analytics - levels 7.4 Modes of Social Media Marketing- 7.4.1 **Creating a Facebook page** Visual identity of a Facebook page , Types of publications, Facebook Ads , Creating Facebook Ads , Ads Visibility 7.4.2 **Business opportunities and Instagram options** Optimization of Instagram profiles , Integrating Instagram with a Web Site and other social networks ,Keeping up with posts 7.4.3 **Business tools on LinkedIn** Creating campaigns on LinkedIn , Analyzing visitation on LinkedIn 7.4.4 **Creating business accounts on YouTube**YouTube ,Advertising , YouTube Analytics 7.4.5 **E-mail marketing** E-mail marketing plan , E-mail marketing campaign analysis , Keeping up with conversions 7.5 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	**1** **2** **2** **3** **3** **3** **3** **3** **(20)**
8.	**Digital Marketing Budgeting** 8.1 Resource planning 8.2 Cost estimating 8.3 Cost budgeting 8.4 Cost control	**4**
Total		**48**

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 – AvinashKaushik

S.Y.B.B.A(C.A) Semester – III

Course Code: CA-302

Subject : Data Structure

Objectives:

1. To understand the concepts of ADTs
2. To learn linear data structures – lists, stacks, and queues
3. To understand sorting, searching and hashing algorithms
4. To apply Tree and Graph structures

Unit	Topic	No. of Lectures
1	**Basic Concept and Introduction to Data Structure** 1.1 Pointers and dynamic memory allocation 1.2 Algorithm-Definition and characteristics 1.3 Algorithm Analysis -Space Complexity -Time Complexity - Asymptotic Notation Introduction to Data structure 1.4 Types of Data structure 1.5 Abstract Data Types (ADT) Introduction to Arrays and Structure 1.6 Types of array and Representation of array 1.7 Polynomial - Polynomial Representation - Evaluation of Polynomial - Addition of Polynomial 1.8 Self Referential Structure	5
2	**Linear data structures** 2.1 Introduction to Arrays - array representation 2.2 Sorting algorithms with efficiency - Bubble sort, Insertion sort, Merge sort, Quick Sort, Selection Sort 2.3 Searching techniques –Linear Search, Binary search	6
3	**Linked List** 3.1 Introduction to Linked List 3.2 Implementation of Linked List – Static & Dynamic representation, 3.3 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) 3.4 Generalized linked list – Concept and Representation	6
4	**Stacks** 4.1 Introduction 4.2 Representation- Static & Dynamic 4.3 Primitive Operations on stack 4.4 Application of Stack 4.5 Conversion of Infix, prefix, postfix , Evaluation of postfix and prefix	8

	4.6 Simulating recursion using stack	
5	**Queues** 5.1 Introduction 5.2 Representation - Static & Dynamic 5.3 Primitive Operations on Queue 5.4 Circular queue, priority queue 5.5 Concept of doubly ended queue	**4**
6	**Trees** 6.1 Concept & Terminologies 6.2 Binary tree, binary search tree 6.3 Representation – Static and Dynamic 6.4 Operations on BT and BST – create, Insert, delete, , counting leaf, non-leaf & total nodes , 6.5 Tree Traversals (preorder, inorder, postorder) 6.6 Application - Heap sort 6.7 Height balanced tree- AVL trees- Rotations, AVL tree examples.	**12**
7	**Graph** 7.1 Concept & terminologies 7.2 Graph Representation – Adjacency matrix, adjacency list, inverse Adjacency list, adjacency multilist, orthogonal list 7.3 Degree of Graph 7.4 Traversals – BFS and DFS 7.5 Applications – AOV network – topological sort, AOE network – criticalPath	**7**
Total		**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.Y.B.B.A. (C.A.) Semester –III

Course Code: CA-303

Subject: Software Engineering

Objectives:

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

Unit	Topic	No. of lectures
1	**Introduction to System Concepts** 1.1 Definition 1.2 Basic Components 1.3 Elements of the System 1.4 Types of System 1.5 System Characteristics	4
2	**Introduction to Software Engineering** 2.1 Definition of Software 2.2 Characteristics of Software 2.3 Definition of Software Engineering 2.4 Need for Software Engineering 2.5 Mc Call's Quality factors 2.6 The Software Process 2.7 Software Product and Process 2.8 V& V Model	6
3	**Software Development Life Cycle** 3.1 Introduction 3.2 Activities of SDLC 3.3 A Generic Process Model 3.4 SDLC 3.5 Waterfall Model 3.6 Incremental Process Models 3.7 Prototyping Model 3.8 Spiral Model	8
4	**Requirement Engineering** 4.1 Introduction 4.2 Requirement Elicitation 4.3Requirement Elaboration 4.4 Requirement Gathering 4.5 Feasibility study	8

	4.6 Fact Finding Techniques 4.7 SRS Format	
5	**Analysis And Design Tools** 5.1 Decision Tree and Decision Table 5.2 Data Flow Diagrams (DFD) (Up to 2nd 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 5.10 Compulsory Case Studies on above topics	**12**
6	**Software Testing** 6.1 Definition 6.2 Software testing Process 6.3 Unit Testing 6.4 Integration Testing 6.5 System Testing	**6**
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.	**4**
Total		**48**

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

S.Y.B.B.A.(C.A.) Semester – III

Course Code: CA- 304 (Option)

Subject: Angular - JS

Objectives:

- By the end of this course, the students should be able to Understand Client Side MVC and SPA
- Explore AngularJS Component
- Develop an AngularJS Single Page Application
- Create and bind controllers with Javascript
- Apply filter in AngularJS application

Unit	Topics	No. of Lectures
1	**AngularJS Core Concepts:** 1.1 What is AngularJS? 1.2 Difference between Javasript and Angular JS 1.3 Advantages of Angular 1.4 AngularJS MVC Architecture 1.5 Introduction to SPA 1.6 Setting up the environment 1.7 First App using MVC architecture	**8**
2	**AngularJS Directives and Expressions:** 2.1 Understanding ng attributes ng-app, ng-init, ng-model, ng-controller, ng-bind, ng-repeat, ng-show, ng-readonly, ng-disabled, ng-if, ng-click 2.2 Expression and Data Binding 2.3 Working with directives	**10**
3	**AngularJS Modules, Controller, View and Scope:** 3.1 Angular Modules 3.2 Angular Controller 3.3 Angular View 3.4 Scope hierarchy	**10**
4	**Filter, Forms and Ajax Filters** 4.1 Built-in filters - upper case and lower case filters, date ,currency and number formatting ,orderBy, filter ,custom filter, 4.2 Angular JS Forms – Working with AngularJS forms, model binding,	**12**

	form controller ,Using CSS classes, form events , custom model update triggers ,custom validation, $http service , 4.3 Ajax implementation using $http	
5	**Dependency Injection, Services** 5.1 What is dependency injection? 5.2 Understanding services 5.3 Using built-in service 5.4 Creating custom service, 5.5 Injecting dependency in service	**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

S.Y.B.B.A.(C.A.) Semester – IV

Course Code: CA- 304(Option)

Subject: PHP

Objectives:

1. Understand how server-side programming works on the web.
2. Using PHP built-in functions and creating custom functions
3. Understanding POST and GET in form submission.
4. How to receive and process form submission data.
5. Read and process data in a MySQL database.

Unit	Topic	No. of Lectures
1	**PHP Basics** 1.1 Setting up a development environment 1.2 Variables, numbers and strings 1.3 Calculations with PHP 1.4 Using Arrays	6
2	**Control Structures and Loops** 2.1 Conditional Statements 2.2 Using Loops for Repetitive tasks 2.3 Combing Loops and Arrays	7
3	**Functions, Objects and Errors** 3.1 PHP's Built-in functions 3.2 Creating Custom functions 3.3 Passing Values by Reference 3.4 Understanding Objects	7
4	**Working with Forms** 4.1 Building a Form 4.2 Processing a Form's Data 4.3 Differences between POST and GET 4.4 Preserving User Input	7
5	**More with Forms** 5.1 Dealing with checkboxes and radiobuttons 5.2 Retrieving values from lists 5.3 Validating and restricting data 5.4 Sending Email	7
6	**Storing and Protecting Data** 6.1 Setting and Reading Cookies 6.2 Protecting Online Files 6.3 Understanding Session Variables	7
7	**MySQL Database Overview**	7

	7.1 phpMyAdmin Overview 7.2 Using a MySQL Database 7.3 Reading and Writing Data	
Total		**48**

Reference Books:

1. Php: A Beginner's Guide 1st EditionMcGraw-Hill Osborne Media; 1 edition by VikramVaswani
2. Murach's PHP and MySQL (2nd Edition)by Joel Murach and Ray Harris
3. PHP: The Complete Reference Paperback – 1 Jul 2017by Steven Holzner (Author)

S.Y.B.B.A.(C.A.) Semester – III

Course Code: CA- 305(Option)

Course Title : Big Data

Objectives:

1. To enable learners to develop expert knowledge and analytical skills in current and developing areas of analysis statistics, and machine learning

2. To enable the learner to identify, develop and apply detailed analytical, creative, problem solving skills.

3. Provide the learner with a comprehensive platform for career development, innovation and further study.

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 DATA SCIENCE** 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 MACHINE LEARNING** 3.1 Basics of Machine Leaning 3.2 Supervised Machine Learning 3.2.1 K- Nearest-Neighbours, 3.2.2 Naïve Bayes 3.2.3 Decision tree 3.2.4 Support Vector Machines	20

	3.3 Unsupervised Machine Learning 3.3.1 Cluster analysis 3.3.2 K means 3.3.3 EM Algorithm 3.3.4 Association Rule Mining 3.3.5 Apriori algorithms 3.4 Regression Analysis 3.4.1 Linear Regression 3.4.2 Nonlinear Regression	
4	**DATA ANALYTICS WITH R/ WEKA MACHINE LEARNING** 4.1 Introduction 4.2 Data Manipulation 4.3 Data Visualization 4.4 Data Analysis	**13**
Total		**48**

Reference Books:

1. SeemaAcharya, SubhasiniChellappan, "Big Data Analytics" Wiley 2015.
2. Jay Liebowitz, “Big Data and Business Analytics” Auerbach Publications, CRC press (2013)
3. ArvindSathi, “BigDataAnalytics: Disruptive Technologies for Changing the Game”, MC Press, 2012

S.Y.B.B.A.(C.A.) Semester – III

Course Code: CA-305 (Option)

Course Title : BlockChain

PREREQUISITES:

This course is highly technical in nature and would require the student to be comfortable with coding. To prepare for the class all students MUST:

- Understanding of basic programming language like Java, or Javascript.
- Understanding of PKI and Docker.

WHAT YOU'LL LEARN

- Understand what and why of Blockchain
- Explore the major components of Blockchain
- Learn about Bitcoin, Cryptocurrency, Ethereum
- Deploy and exercise example smart contracts
- Identify a use case for a Blockchain application
- Create your own Blockchain network application

COURSE OBJECTIVES

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

1. Understand how blockchain systems (mainly Bitcoin and Ethereum) work,
2. To securely interact with them,
3. Design, build, and deploy smart contracts and distributed applications,
4. Integrate ideas from blockchain technology into their own projects.

Unit	Topic	No. of Lectures
1	**Introduction To Blockchain** 1.1 Digital Trust 1.2 Asset 1.3 Transactions 1.4 Distributed Ledger Technology 1.5 Types of network 1.6 Components of blockchain or DLT 1.7 Ledger 1.7.1. Blocks 1.7.2. Blockchain 1.8 PKI and Cryptography 1.8.1. Private keys 1.8.2. Public keys 1.8.3. Hashing 1.8.4. Digital Signature 1.9. Consensus	12

	1.9.1. Byzantine Fault 1.9.2. Proof of Work 1.9.3. Poof of Stake 1.10. Security 1.10.1.DDos 1.11 Cryptocurrency 1.12.Digital Token	
2.	**How Blockchain Works** 2.1 How Blockchain Works 2.2. Structure of Blockchain 2.3.Block 2.4. Hash 2.5. Blockchain 2.6. Distributed 2.7. Lifecycle of Blockchain 2.8. Smart Contract 2.9. Consensus Algorithm 2.10 Proof of Work 2.11 Proof of Stake 2.12 Practical Byzantine 2.13 Fault Tolerance 2.14 Actors of Blockchain 2.15 Blockchain developer 2.16 Blockchain operator 2.17 Blockchain regulator 2.18 Blockchain user 2.19 Membership service provider 2.20 Building A Small Blockchain Application	**12**
3.	**Introduction to Bitcoin** 3.1 Currency 3.2 Double Spending 3.3 Cryptocurrency 3.4 P2P Payment Gateway 3.5 Wallet 3.6 Mining	**8**
4.	**Ethereum** 4.1.Ethereum network 4.2. EVM 4.3.Transaction fee 4.4.Mist 4.5.Ether, gas 4.6.Solidity - Smart contracts 4.7.Truffle 4.8.Web3 4.9.Design and issue Cryptocurrency 4.10. Mining	**8**

	4.11. DApps 4.12. DAO	
5	**Introduction To Hyperledger Fabric V1.1** 5.1. Introduction to Hyperledger 5.2 What is Hyperledger 5.3 Why Hyperledger 5.4 Where can Hyperledger be used 5.5 Hyperledger Architecture 5.6 Membership 5.7 Blockchain 5.8 Transaction 5.9 Chaincode 5.10 Hyperledger Fabric 5.11 Features of Hyperledger	**8**
Total		**48**

References:

Text Book

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder,

Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).

Reference Books

1. Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies
2. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System
3. DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger,"Yellow paper.2014.
4. Nicola Atzei, Massimo Bartoletti, and TizianaCimoli, A survey of attacks on Ethereum smart contracts

SavitribaiPhule Pune University
Syllabus for BBA(CA) (CBCS 2019 Pattern)
Details for Skill Enhancement (Add-On) Courses

AECC - Course Title: - (M)Basic Course in Environmental Awareness
Credit -2 & Hours -30

Objectives:

1) To provide an opportunities to acquire the knowledge, values, attitudes, commitment, and skills needed to protect and improve the environment
2) To develop conscious towards a cleaner and better managed environment

Course content

1 Introduction - Environmental studies Definition, scope importance and need for public awareness. (Multidisciplinary nature of environmental studies)

2 Environmental Pollution -Definition, Causes, effects on human, water, soil, air (Mother Earth)

- Air pollution
- Water pollution
- Soil pollution
- Marine pollution
- Noise pollution
- Thermal pollution
- Nuclear hazards

3 Various Government initiatives for conservation of Environment. Controlling measures)

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution. Pollution case studies.
- Disaster management: floods, earthquake, cyclone and landslides.

4 Field work Visit / Project Report preparation

•Visit to a local area to document environmental assets - river / forest / grassland / hill / mountain.

• Visit to a local polluted site-Urban/Rural/Industrial/Agricultural

• Effects on plants, insects, birds – As Elements of ecosystem

Evaluation of the course: Continuous evaluation of the student through oral, necessary writing assignments / Quiz and presentations.

Certification: A Course Completion Certificate will be provided by the college to every student who has passed in the continuous evaluation and the Grade as per his / her performance in the evaluation will appear on the Certificate.

OR – (Select Any One Course In Semester III – For BBA , BBA- IB , and BBA –CA)

SavitribaiPhule Pune University
Syllabus for BBA (CA) (CBCS 2019 Pattern)
Details for Skill Enhancement (Add-On) Courses
AECC - Course Title: - (N)Advance Course in Environmental Awareness
Credit -2 & Hours -30

Course Objectives

- Understand current concern about our impact on the environment.
- Recognize the things they do affect the environment.
- Promote green practices at home and at work.
- Describe what is being done and what we all can do to help prevent harm to the environment.

Course Contents

- **Environmental and Ecosystem Management:**

Concept and scope, Systems of approaches, Standards – International and National, Ecomark, Environmental accounting and auditing, Green funding and taxes, Trade and environmental management. Ecosystem analysis, Modelling, Monitoring and Planning, Ecotourism and Heritage management, Eco restoration,

- **Management of solid waste**

Different types of solid wastes, Methods of disposal and management of Municipal and thermal power plant generated solid wastes, Bio medical wastes and Hazordous wastes, Recycling of wastes, Power generation and waste minimization techniques.

Sanction and enforcement bodies of environmental laws in India.

Legal, administrative and constitutional provisions for environmental protection in India; Role of Supreme Court and Green Bench of High Court; Public awareness and Government measures; Role of Pressure Groups and NGOs; Concepts and Aspects of Public Interest Litigation (PIL); Public Interest Litigation in India on different Environmental Issues.

- **National and Regional Environmental Issues Resource and its conservation;**

Ecological refugees; Conservation strategies of the environment: Mines, riverine networks; forest, soil and wild life

Current Environmental Movements in India. Silent Valley, Chipko, Narmada dam, Appiko, TehriGarwal Dam, Uttara Kannada and Almatti dam movements.

- **Environmental Ethics and Global Imperatives.**

Concepts and aspects of Environmental ethics, Anthropocentrism and Eco-centrism; Deep ecology.Global environmental problems.Green house effect, global warming and climate change, ozone layer depletion, acid rain, deforestation and loss of biodiversity, unplanned urbanization.

Evaluation of the course: Continuous evaluation of the student through oral, necessary writing assignments/ Quiz and presentations.

Certification: A Course Completion Certificate will be provided by the college to every student who has passed in the continuous evaluation and the Grade as per his / her performance in the evaluation will appear on the Certificate.

S.Y.B.B.A.(C.A.) Semester –IV

Course Code: CA-401

Subject: Networking

Objectives:

1. To gain knowledge about Computer Networks concepts.
2. To know about working of networking models, addresses, transmission medias and connectivity devices.
3. To acquire information about network security and cryptography.

Unit	Topic	No. of Lectures
1	**Introduction to Computer Network** 1.1Basics of Computer Network 1.1.1Definition 1.1.2Goals 1.1.3Applications, 1.1.4Network Hardware –Broadcast, Point to Point 1.1.5Components of Data Communication 1.2 Network Topologies 1.2.1Mesh 1.2.2 Star, 1.2.3 Bus, 1.2.4Ring 1.3Types of Networks 1.3.1LAN,MAN,WAN, 1.3.2 Internetwork, 1.3.3 Wireless Network 1.4 Modes of Communication 1.4.1 Simplex, 1.4.2 Half Duplex, 1.4.3 Full Duplex 1.5. Server Based LANs & Peer-to-Peer LANs 1.6. Protocols and Standards 1.7. Network Software 1.7.1 Protocol Hierarchies,Layers, Peers,Interfaces 1.7.2 Design Issues of the Layers 1.7.3 Connection Oriented and Connectionless Service	10
2	**Network Models** 2.1 OSI Reference Model : Functions of each Layer 2.2 TCP/IP Reference Model,Comparison of OSI and TCP/IP	8

	Reference Model 2.3 TCP/IP Protocol Suite 2.4 Addressing 2.4.1Physical Addresses 2.4.2 Logical Addresses 2.4.3Port Addresses, 2.4.4 SpecificAddresses 2.5 IP Addressing 2.5.1 ClassfullAddressing 2.5.2 Classless Addressing	
3	**Transmission Media** 3.1Introduction, Types of Transmission Media 3.2 Guided Media: 3.2.1Twisted Pair Cable- Physical Structure,Categories,Connectors &Applications 3.2.2Coaxial Cable – Physical Structure, Standards, Connectors & Applications 3.2.3Fiber Optic Cable- Physical Structure,Propagation Modes,Connectors & Applications 3.3 Unguided Media: 3.3.1Electromagnetic Spectrum for Wireless Communication 3.3.2Propagation Modes Ground,Sky,Line-of-Sight 3.3.3Wireless Transmission:Radio Waves,Microwaves, Infrared	**8**
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, 4.8.2 Bluetooth Architecture (Piconet, Scatternet)	**8**
5	**Network Devices** 5.1 Network Connectivity Devices 5.1.1 Active and Passive Hubs 5.1.2 Repeaters 5.1.3 Bridges- Types of Bridges 5.1.4 Switches 5.1.5 Router 5.1.6 Gateways	**6**

6	**Network Security** 6.1 Introduction 6.2 Need for Security 6.3 Security Services : 6.3.1 Message- -Confidentiality, Integrity, Authentication, Non repudiation. 6.3.2 Entity (User)- Authentication. 6.4 Types of Attack 6.5 Cryptography, PlainText,Cipher Text, Encryption,Decryption, Symmetric Key and Asymmetric Key Cryptography 6.6 SubstitutionTechniques, Caesar Cipher,and Transposition Cipher (Problems should be covered.) 6.7 Firewalls- Packet Filter firewall, Proxy firewall 6.8 Steganography,Copyright	**8**
Total		**48**

Reference Books:

1. Computer Networks by Andrew Tanenbaum, Pearson Education.[4th Edition]
2. Data Communication and Networking by BehrouzForouzan, TATA McGraw Hill. .[4th Edition]

S.Y.B.B.A.(C.A.) Semester –IV

Course Code: CA-402

Subject: Object Oriented Concepts Through CPP

Objectives:

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.

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	2
2	**Beginning with C++** 2.1 Data type and Keywords 2.2 Declaration of variables, dynamic initialization of variables, reference variable 2.3 Operators: 2.3.1 Scope resolution operator 2.3.2 Memory management operators 2.4 Manipulators 2.5 Functions: 2.5.1 Function prototyping, call by reference and return by reference 2.5.2 Inline functions 2.6 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	8
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	6

	4.5 Dynamic initialization of constructor 4.6 Dynamic constructor 4.7 Destructor	
6	**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**
7	**Polymorphism** 7.1 Compile TimePolymorphism 7.1.1 Introduction, rules for overloading operators 7.1.2 Functionoverloading 7.1.3 Operator Overloading unary and binary 7.1.4 Operator Overloading using friendfunction 7.1.5 Overloading insertion and extractionoperators 7.1.6 String manipulation using operatoroverloading 7.2 RuntimePolymorphism 7.2.1 this Pointer, pointers to objects, pointer to derived classes 7.2.2 Virtual functions and pure virtualfunctions	**8**
8	**Managing console I/O operations** 8.1 C++ streams and C++ streamclasses 8.2 Unformatted I/O operations 8.3 Formatted console I/Ooperations 8.4 Output formatting usingmanipulators 8.5 User defined manipulators	**3**
9	**Working with Files** 9.1 Stream Classes for File operations 9.2 File operations - Opening, Closing andupdating 9.3 File updating with random access. 9.4 Error handling during Fileoperations 9.5 Command Line arguments	**6**
10	**Templates** 10.1 Introduction 10.2 ClassTemplate and class template with multiple parameters 10.3 FunctionTemplate and function template with multiple parameter 10.4 ExceptionHandlingIntroduction	**3**
Total		**48**

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)

S.Y.B.B.A.(C.A.) Semester-IV

Subject: **Operating System**

Course Code:CA-403

Objectives:

1. To know the services provided by Operating System
2. To know the scheduling concept
3. To understand design issues related to memory management and various related algorithms.
4. To understand design issues related to File management and various related algorithms

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 2.4 Operating System Structure	3
3	**Process Management** 3.1 Process Concept – - The process - Process states - Process control block 3.2 Process Scheduling – - Scheduling queues - Schedulers -Context Switch 3.3 Operation on Process – - Process Creation -Process Termination 3.4 Interprocess Communication –	4

	- Shared memory system - Message passing systems.	
4	**CPU 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	**6**
5	**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	**6**
6	**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	**7**

7	**Memory Management** 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 – - FIFO - OPT - LRU - Second chance page replacement - MFU - LFU	**8**
8	**File System** 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	**7**

	- Counting	
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		**48**

Reference Books:

1. Operating System Concepts - Siberchatz, Galvin, Gagne (8th Edition).

2. Operating Systems : Principles and Design – Pabitra Pal Choudhary (PHI Learning Private Limited)

S.Y.B.B.A.(C.A.) Semester – IV

Course Code: CA- 404 (Option)

Course Title : Advance PHP

Objectives -:

1. To know & understand concepts of internet programming.
2. Understand how server-side programming works on the web.
3. Understanding How to use PHP Framework (Joomla / Druple)

Unit No	Topic	No. of Lectures
1	**Introduction to Object Oriented Programming in PHP** 1.1 Classes 1.2 Objects 1.3 Introspection 1.4 Serialization 1.5 Inheritance 1.6 Interfaces 1.7 Encapsulation	6
2	**Web Techniques** 2.1 Server information 2.2 Processing forms 2.3 Sticky forms 2.4 Setting response headers	4
3	**XML** 3.1 Introduction XML 3.2 XML document Structure 3.3 PHP and XML 3.4 XML parser 3.5 The document object model 3.6 The simple XML extension 3.7 Changing a value with simple XML	8
4	**Ajax with PHP** 4.1 Understanding java scripts for AJAX 4.2 AJAX web application model 4.3 AJAX –PHP framework 4.4 Performing AJAX validation 4.5 Handling XML data using php and AJAX 4.6 Connecting database using php and AJAX	6

5	**Introduction to Web Services** 5.1 Definition of web services 5.2 Basic operational model of web services, tools and technologies enabling web services 5.3 Benefits and challenges of using web services. 5.4 Web services Architecture and its characteristics 5.5 Core building blocks of web services 5.6 Standards and technologies available for implementing web services 5.7 Web services communication models 5.8 Basic steps of implementing web services.	10
6	**PHP Framework (Joomla / Druple)** **6.1 Introduction to Joomla/Druple** 6.1.1 Introduction 6.1.2 Joomla/Druple features 6.1.3 How joomla/Drupleworks ? 6.1.4 The platformComponents, Modules and Plugins **6.2 Administering Joomla/Druple** 6.2.1 Presentation Administration 6.2.2 Content Administration 6.2.3 System Administration **6.3 Working with Joomla/Druple** 6.3.1 Adding articles 6.3.2 Adding menus to point to content 6.3.3 Installing new templates 6.3.4 Creating templates 6.3.5 Adding a Module and Component 6.3.6 Modifying the existing templates 6.3.7 Creating templates with web editors 6.3.8 Creating real templates	14

Reference Books

- Php: A Beginner's Guide 1st EditionMcGraw-Hill Osborne Media; 1 edition by VikramVaswani
- Murach's PHP and MySQL (2nd Edition)by Joel Murach and Ray Harris
- PHP: The Complete Reference Paperback – 1 Jul 2017by Steven Holzner (Author)
- Building Web Services with Java, 2nd Edition, S. Graham and others, Pearson Edn., 2008.
- Java Web Services, D.A. Chappell & T. Jewell, O'Reilly,SPD.
- www.php.net.in
- www.W3schools.com

S.Y.B.B.A.(C.A.) Semester – IV

Course Code: CA- 404(Option)

Course Title : Node - JS

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

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	**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** 2.1Functions 2.2 Buffer 2.3 Module 2.4 Module Types 2.5 Core Modules 2.6 Local Modules 2.7 Module.Exports	**10**
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	**8**
6	**Events** 6.1 EventEmitter 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	**6**
Total		**48**

Reference Books:

1) Node.js complete reference guid , velentinBojinov, David Herron, DiogeResende, packt Publishing ltd
2) Mastering Nod.js By SandroPasquali , packt Publishing
3) Smashing Node.js Javascript Everywhere , Guillermo Rauch, John wiley& Sons

Acknowledgement

The Syllabus Restructuring of BBA (CA) Programme (CBCS-2019 Pattern) is a manifestation of excellence in the faculty of Commerce and Management. Savitribai Phule Pune University's focus has always been in raising the academic standards and excellence in the field of education.

The BBA (CA) Programme predominantly endeavours for holistic development of students. It has emphasized on cultivating various skills and has also desired software technology acumen amongst the students.

This revision has been possible only with the help and support of different eminent personalities. The contribution of all the members as a team has enabled the robust revision of all the titles of the Programme. This synergy of the contributors is very crucial in fine tuning of the BBA(CA) Programme in its present form.

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