

## 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
<b>1</b>	<b>Introduction to Computer Network</b> 1.1 Basics of Computer Network 1.1.1 Definition 1.1.2 Goals 1.1.3 Applications, 1.1.4 Network Hardware –Broadcast, Point to Point 1.1.5 Components of Data Communication 1.2 Network Topologies 1.2.1 Mesh 1.2.2 Star, 1.2.3 Bus, 1.2.4 Ring 1.3 Types of Networks 1.3.1 LAN, 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	<b>10</b>
<b>2</b>	<b>Network Models</b> 2.1 OSI Reference Model : Functions of each Layer 2.2 TCP/IP Reference Model, Comparison of OSI and TCP/IP	<b>8</b>

	<p>Reference Model</p> <p>2.3 TCP/IP Protocol Suite</p> <p>2.4 Addressing</p> <p>    2.4.1 Physical Addresses</p> <p>    2.4.2 Logical Addresses</p> <p>    2.4.3 Port Addresses,</p> <p>    2.4.4 Specific Addresses</p> <p>2.5 IP Addressing</p> <p>    2.5.1 Classful Addressing</p> <p>    2.5.2 Classless Addressing</p>	
<b>3</b>	<p><b>Transmission Media</b></p> <p>3.1 Introduction, Types of Transmission Media</p> <p>3.2 Guided Media:</p> <p>    3.2.1 Twisted Pair Cable- Physical Structure, Categories, Connectors &amp; Applications</p> <p>    3.2.2 Coaxial Cable – Physical Structure, Standards, Connectors &amp; Applications</p> <p>    3.2.3 Fiber Optic Cable- Physical Structure, Propagation Modes, Connectors &amp; Applications</p> <p>3.3 Unguided Media:</p> <p>    3.3.1 Electromagnetic Spectrum for Wireless Communication</p> <p>    3.3.2 Propagation Modes Ground, Sky, Line-of-Sight</p> <p>    3.3.3 Wireless Transmission: Radio Waves, Microwaves, Infrared</p>	<b>8</b>
<b>4</b>	<p><b>Wired and Wireless LAN</b></p> <p>4.1 IEEE Standards</p> <p>4.2 Standard Ethernet MAC Sublayer, Physical Layer</p> <p>4.3 Fast Ethernet – Goals, MAC Sublayer, Topology, Implementation</p> <p>4.4 Gigabit Ethernet – Goals, MAC Sublayer, Topology, Implementation</p> <p>4.5 Ten-Gigabit Ethernet – Goals, MAC Sublayer, Physical Layer</p> <p>4.6 Backbone Networks - Bus Backbone, Star Backbone</p> <p>4.7 Virtual LANs Membership, IEEE standards advantages</p> <p>4.8 Wireless LAN</p> <p>    4.8.1 IEEE 802.11 Architecture,</p> <p>    4.8.2 Bluetooth Architecture (Piconet, Scatternet)</p>	<b>8</b>
<b>5</b>	<p><b>Network Devices</b></p> <p>5.1 Network Connectivity Devices</p> <p>    5.1.1 Active and Passive Hubs</p> <p>    5.1.2 Repeaters</p> <p>    5.1.3 Bridges- Types of Bridges</p> <p>    5.1.4 Switches</p> <p>    5.1.5 Router</p> <p>    5.1.6 Gateways</p>	<b>6</b>

<b>6</b>	<b>Network Security</b> 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	<b>8</b>
<b>Total</b>		<b>48</b>

**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.

<b>Unit</b>	<b>Topic</b>	<b>No. of Lectures</b>
<b>1</b>	<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>2</b>
<b>2</b>	<b>Beginning with C++</b> 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	<b>6</b>
<b>3</b>	<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	<b>8</b>
<b>4</b>	<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	<b>6</b>

	4.5 Dynamic initialization of constructor 4.6 Dynamic constructor 4.7 Destructor	
<b>6</b>	<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	<b>6</b>
<b>7</b>	<b>Polymorphism</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	<b>8</b>
<b>8</b>	<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	<b>3</b>
<b>9</b>	<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	<b>6</b>
<b>10</b>	<b>Templates</b> 10.1 Introduction 10.2 Class Template and class template with multiple parameters 10.3 Function Template and function template with multiple parameter 10.4 Exception Handling Introduction	<b>3</b>
<b>Total</b>		<b>48</b>

### 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
- 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

<b>Unit</b>	<b>Topic</b>	<b>No. of Lectures</b>
<b>1</b>	<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	<b>3</b>
<b>2</b>	<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 2.4 Operating System Structure	<b>3</b>
<b>3</b>	<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 –	<b>4</b>

	<ul style="list-style-type: none"> <li>- Shared memory system</li> <li>- Message passing systems.</li> </ul>	
<b>4</b>	<p><b>CPU Scheduling</b></p> <p>4.1 What is scheduling</p> <p>4.2 Scheduling Concepts –</p> <ul style="list-style-type: none"> <li>- CPU- I/O Burst Cycle</li> <li>- CPU Scheduler</li> <li>-Preemptive and Non-preemptive scheduling</li> <li>- Dispatcher</li> </ul> <p>4.3 Scheduling criteria</p> <p>4.4 Scheduling Algorithms –</p> <ul style="list-style-type: none"> <li>- FCFS</li> <li>- SJF ( Preemptive&amp; non-preemptive)</li> <li>- Priority Scheduling (Preemptive&amp; Non- preemptive)</li> <li>- Round Robin Scheduling <ul style="list-style-type: none"> <li>- Multilevel Queues</li> <li>- Multilevel Feedback queues</li> </ul> </li> </ul>	<b>6</b>
<b>5</b>	<p><b>Process Synchronization</b></p> <p>5.1 Introduction</p> <p>5.2 Critical section problem</p> <p>5.3 Semaphores –</p> <ul style="list-style-type: none"> <li>- Concept</li> <li>- Implementation</li> <li>- Deadlock &amp; Starvation</li> <li>- Types of Semaphores</li> </ul> <p>5.4 Classical Problems of synchronization –</p> <ul style="list-style-type: none"> <li>-Bounded buffer problem</li> <li>- Readers &amp; writers problem</li> <li>- Dining Philosophers problem</li> </ul>	<b>6</b>
<b>6</b>	<p><b>Deadlock</b></p> <p>6.1 Introduction</p> <p>6.2 Deadlock Characterization</p> <p>6.3 Necessary Condition</p> <p>6.4 Deadlock Handling Technique–</p> <ul style="list-style-type: none"> <li>-Deadlock Prevention <ul style="list-style-type: none"> <li>- Deadlock Avoidance –</li> </ul> </li> <li>- Safe State</li> <li>- Resource allocation graph algorithm</li> <li>- Bankers algorithm <ul style="list-style-type: none"> <li>- Deadlock Detection</li> <li>- Recovery from Deadlock –</li> </ul> </li> <li>-Process Termination</li> <li>-Resource Preemption</li> </ul>	<b>7</b>

7	<p><b>Memory Management</b></p> <p>7.1. Background –</p> <ul style="list-style-type: none"> <li>- Basic hardware</li> <li>- Address binding</li> <li>- Logical versus physical address space</li> <li>- Dynamic loading</li> <li>- Dynamic linking and shared libraries</li> </ul> <p>7.2 Swapping</p> <p>7.3 Contiguous Memory Allocation –</p> <ul style="list-style-type: none"> <li>- Memory mapping and protection</li> <li>- Memory allocation</li> <li>- Fragmentation</li> </ul> <p>7.4 Paging –</p> <ul style="list-style-type: none"> <li>- Basic Method</li> <li>- Hardware support</li> <li>- Protection</li> <li>- Shared Pages</li> </ul> <p>7.5 Segmentation –</p> <ul style="list-style-type: none"> <li>- Basic concept</li> <li>- Hardware</li> </ul> <p>7.6 Virtual Memory Management –</p> <ul style="list-style-type: none"> <li>- Background</li> <li>- Demand paging</li> <li>- Performance of demand paging</li> <li>- Page replacement –</li> </ul> <ul style="list-style-type: none"> <li>- FIFO</li> <li>- OPT</li> <li>- LRU</li> <li>- Second chance page replacement</li> <li>- MFU</li> <li>- LFU</li> </ul>	8
8	<p><b>File System</b></p> <p>8.1 Introduction &amp; File concepts (file attributes, Operations on files)</p> <p>8.2 Access methods –</p> <ul style="list-style-type: none"> <li>- Sequential access</li> <li>- Direct access</li> </ul> <p>8.3 File structure –</p> <ul style="list-style-type: none"> <li>- Allocation methods</li> <li>- Contiguous allocation</li> <li>- Linked Allocation</li> <li>- Indexed Allocation</li> </ul> <p>8.4 Free Space Management –</p> <ul style="list-style-type: none"> <li>- Bit Vector</li> <li>- Linked List</li> <li>- Grouping</li> </ul>	7



	- Counting	
<b>9</b>	<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	<b>4</b>
<b>Total</b>		<b>48</b>

**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	<b>Introduction to Object Oriented Programming in PHP</b> 1.1 Classes 1.2 Objects 1.3 Introspection 1.4 Serialization 1.5 Inheritance 1.6 Interfaces 1.7 Encapsulation	6
2	<b>Web Techniques</b> 2.1 Server information 2.2 Processing forms 2.3 Sticky forms 2.4 Setting response headers	4
3	<b>XML</b> 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	<b>Ajax with PHP</b> 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	<b>Introduction to Web Services</b> 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	<b>PHP Framework (Joomla / Druple)</b> <b>6.1 Introduction to Joomla/Druple</b> 6.1.1 Introduction 6.1.2 Joomla/Druple features 6.1.3 How joomla/Drupleworks ? 6.1.4 The platformComponents, Modules and Plugins <b>6.2 Administering Joomla/Druple</b> 6.2.1 Presentation Administration 6.2.2 Content Administration 6.2.3 System Administration <b>6.3 Working with Joomla/Druple</b> 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 Edition McGraw-Hill Osborne Media; 1 edition by Vikram Vaswani
- Murach's PHP and MySQL (2nd Edition) by Joel Murach and Ray Harris
- PHP: The Complete Reference Paperback – 1 Jul 2017 by 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](http://www.php.net.in)
- [www.W3schools.com](http://www.W3schools.com)

**S.Y.B.B.A.(C.A.) Semester – IV**

**Course Code: CA- 404(Optional)**

**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

<b>Unit</b>	<b>Topics</b>	<b>No. of Lectures</b>
<b>1</b>	<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	<b>8</b>
<b>2</b>	<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 2.7 Module.Exports	<b>10</b>
<b>3</b>	<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	<b>6</b>
<b>4</b>	<b>Web server</b>	

	4.1 Creating web server 4.2 Handling http requests 4.3 Sending requests	<b>6</b>
<b>5</b>	<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	<b>8</b>
<b>6</b>	<b>Events</b> 6.1 EventEmitter class 6.2 Returning event emitter 6.3 Inhering events	<b>4</b>
<b>7</b>	<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>6</b>
<b>Total</b>		<b>48</b>

**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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