

**Rajarshi Shahu Mahavidyalaya, Latur**  
**(Autonomous)**  
**Department of Computer Science**  
**Program Structure for**  
**B. Voc. in Computer Technology**  
**B.Voc. S. Y. (Semester III + Semester IV)**

	Course Code	Course Title	Credits	Hrs / Week	Marks ESE	Marks CE	Total Marks	
<b>Semester III</b>	CT.GE.301	Soft Skills and Communication Skills I (General Education)	4	4	60	40	100	
	CT.GE.302	Operating System (General Education)	4	4	60	40	100	
	CT.GE.303	Business Communication (General Education)	4	4	60	40	100	
	<b>Total Credit (A)</b>			<b>12</b>		<b>Total Marks (A)</b>		<b>300</b>
	CT.SC.301	PHP , BootStrap and JQuery (Skill Component)	4	4	60	40	100	
	CT.SC.302	Object Oriented Programming through C++ (Skill Component)	4	4	60	40	100	
	CT.SC.303	Data Base Management System (Skill Component)	4	4	60	40	100	
	CT.SC.PR.1	LAB Course 7 Boot Strap(Skill Component)	2	4	30	20	50	
	CT.SC.PR.2	LAB Course 8 C++(Skill Component)	2	4	30	20	50	
	CT.SC.PR.3	LAB Course 9 MySQL (Skill Component)	2	4	30	20	50	
	<b>Total Credit (B)</b>			<b>18</b>		<b>Total Marks (B)</b>		<b>450</b>
	<b>Total Credit (Sem - III ) (A + B)</b>			<b>30</b>		<b>Total Marks(A+B)</b>		<b>750</b>

	Course Code	Course Title	Credits	Hrs / Week	Marks ESE	Marks CE	Total Marks	
<b>Semester-IV</b>	CT.GE.401	Soft Skills and Communication Skills II (General Education)	4	4	60	40	100	
	CT.GE.402	Basics of Networking (General Education)	4	4	60	40	100	
	CT.GE.403	Aptitude and Logical Reasoning (General Education)	4	4	60	40	100	
	<b>Total Credit (A)</b>			<b>12</b>		<b>Total Marks (A)</b>		<b>300</b>
	CT.SC.401	Programming in Java(Skill Component)	4	4	60	40	100	
	CT.SC.402	Introduction to Python programming(Skill Component)	4	4	60	40	100	
	CT.SC.403	Design and Analysis of Algorithm (Skill Component)	4	4	60	40	100	
	CT.SC.PR.1	LAB Course 10: (Java)(Skill Component)	2	4	30	20	50	
	CT.SC.PR.2	LAB course 11: (Python) (Skill Component)	2	4	30	20	50	
	CT.SC.PR.3	Micro Project (Skill Component)	2	4	30	20	50	
	<b>Total Credit (B)</b>			<b>18</b>		<b>Total Marks (B)</b>		<b>450</b>
	<b>Total Credit (Sem-IV) (A + B)</b>			<b>30</b>		<b>Total</b>		<b>750</b>
	<b>Total Credit (SemIII + SemIV)</b>			<b>60</b>	Total Marks (Sem III + SemIV)			<b>1500</b>

ESE- End Semester Examination

CE-Continuous Evaluation

### Split-up of Continuous evaluation marks

Total Marks: 40

Unit Test 1	Unit Test II	Total Marks	Converted Marks	Marks for Attendance	Total Marks
30	30	60	<b>30</b>	<b>10</b>	<b>40</b>

B.Voc. –Computer Technology  
Semester: III  
General Education-VII  
(Soft Skills and Communication Skills I)

Credit: 04

Periods:60

(To be implemented from the Academic year 2019-2020)

**Learning Objectives:**

- i. To enhance learner’s communication skills by giving adequate exposure (use of language lab) in listening and speaking skills and the related sub-skills.
- ii. To create learner’s confidence in oral and interpersonal communication by reinforcing the basics of pronunciation.
- iii. To help learners to recognize and make use of sentence structures in English

**Course Outcomes:**

- i. Students will be aware of listening and speaking skills and the related sub-skills.
- ii. They can focus a lot on listening style to be the better speaker of English language
- iii. Students can realize the proper style of English for oral communication and can use words and sentences with proper accent and intonation.
- iv. Students will speak English by using proper sentence structures

<b>UNIT I Speaking and Listening Skills(Activity Based)</b>	NOS	Hours
1) Introduction (self, friends, guest and colleagues) 2) Making Request 3) Oral Presentation 4) Interviews practice Listening- Interview, Radio Talk and Story To be assessed through MCQ, short /long answer questions.		15
<b>UNIT-II: Effective Writing Skill</b>		15
1) Work place Instructions and guidelines (10 samples collection) 2) Notice, Agenda and Minutes (10 samples collection) 3) Business letter, Memo, Resume and Curriculum Vitae (10 samples) 4) Conducting Meeting To be assessed through MCQ, short /long answer questions.		
<b>UNIT-3: Introduction to Soft Skills</b>		15

1) Definition of Soft skills 2) Need of soft skills 3) Nature and scope of Soft skills 4) Acquiring and Advantages of soft skills. To be assessed through MCQ, short /long answer questions.		
<b>UNIT-4: Soft Skills</b>		15
1) Critical, Creative and Positive thinking 2) Self-Management 3) Problem-solving Skills 4) Effective teamwork Skills To be assessed through MCQ, short /long answer questions.		

B..Voc. –Computer Technology  
Semester: I  
General Education-VII  
(CT.GE.302 Operating System)

Credit: 04

Periods:60

(To be implemented from the Academic year 2019-2020)

**Learning Objectives:**

- To learn the fundamentals of Operating Systems.
- To learn the mechanisms of OS to handle processes and threads and their communication
- To learn the mechanisms involved in memory management in contemporary OS
- To know the components and management aspects of concurrency management
- To learn programmatically to implement simple OS mechanisms

**Course Outcomes:**

- After successful completion of this course student will be able to
- Analyze the structure of OS and basic architectural components involved in OS design
  - Analyze and design the applications to run in parallel either using process or thread
  - Models of different OS.
  - Understand the Mutual exclusion, Deadlock detection.
  - Conceptualize the components involved in designing OS.

<b>Unit I Introduction to Operating System</b>	<b>NOS</b>	<b>Hours</b>
What is an operating system? History of operating system, Computer hardware & Software, Different operating systems, Various System Software associated with Operating Systems, Shell and Kernel, Systems Calls and Theirs types and implementation		10
<b>Unit II Process &amp; Thread Management</b>	<b>NOS</b>	<b>Hours</b>
Processes, PCB, Process States, Threads & TCB, difference and Similarities in Threads and Process.Inter-process communication, CPU scheduling, IPC problems. Process Synchronization & deadlocks Critical Section Problems &Semaphores, Classical Problems of process Synchronization, Introduction to deadlocks, Deadlock detection and recovery, Deadlock avoidance, Deadlock prevention, issues		20
<b>Unit III Memory Management</b>	<b>NOS</b>	<b>Hours</b>
Address Spaces and Address Translation, Swapping & memory		15

allocation, Paging & Segmentation, Virtual Memory & Demand Paging, Page Replacement Algorithm, Thrashing		
<b>Unit IV File and Disk Management</b>		
File Systems: Files, directories, file system & Directories implementation, file-system management and optimization, File Allocation Methods, MS-DOS file system, UNIX V7 file system Disk Structure ,Disk Scheduling Algorithm (FCFS, RAID, Network Operating System, Real Time Operating System, Distributed Operating System		15
	Total	60

**Reference Books:**

- 1) Operating System Principles, Silberschatz, Galvin, Gagne-Wiley William Stalling
- 2) Operating System-Internal and Design Principles, Andrews Tanenbaum, Pearson Education India
- 3) Operating System, AchyutGodbole&AtulKahat, McGraw Hill Education

B.Voc. –Computer Technology  
Semester: I  
General Education-III  
**(CT.GE.303 Business Communication)**

Credit: 04

Periods:60

(To be implemented from the Academic year 2018-2019)

---

**Learning Objectives:**

- The meaning and objectives of business communication, effective principles of business communication.
- To make students familiar with various forms of communication.
- The central idea of group communication and soft skills like personality traits, interpersonal skills and leadership.

---

**Course Outcomes:**

After completion of this course students will be able to

- Learn about the concept of Business communication process, Objectives and principles.
- Create awareness of the importance of the soft skills and assist the learners to improve them and develop personality traits, leadership, negotiating, consensus building, and emotional intelligence quotient among the students.
- Prepare various types of business letters such as enquiry, adjustment, complaint and job application etc. and get familiarize with legal deed, gift deed power of attorney etc.

<b>Unit 1: I Introduction to business Communication</b>	NOS	Hours
Definition and objectives of business communication. Process of communication Barriers to communication. Effective communication. SWOC Analysis.		12
<b>Unit II Forms of business communication</b>	NOS	Hours
Introduction – Classification of communication Verbal Communication – written and oral. Non-Verbal communication – Kinesics, Para-language, space		15

Dimensions/ Directions of communication Formal and Informal communication. Modern forms of communication- E-mail, Video conferencing, and Social media.		
<b>Unit III : Business Correspondence</b>	NOS	Hours
Introduction, Principles of Business Writing Business Correspondence-format. Letter of Enquiry and Letter of Responding to an order. Complaint letters and Adjustment letters. Job Application. Curriculum vitae/Bio-data.		15
<b>Unit IV: Basic understanding of Legal Deeds and Documents</b>	NOS	Hours
Partnership Deed & Lease Deed Power of Attorney, Affidavit Indemnity Bond, Gift Deed. Memorandum & Articles of Association of a Company. Annual Report of a Company.		18

**Reference Books:**

- 1) Business Communication by Dr. V.K. Jain & Dr. Omprakash Biyani, S.Chand & Company Ltd, New Delhi
- 2) Business Communication by H.S. Patange, Nikita Publication.
- 3) Business Communication – IPCC- Group by ICAI
- 4) Effective Business Communication by Asha Kaul, Second Edition, PHI Publication.
- 5) Essentials of Business Communication by C.B. Gupta, Cengage Learning India Pvt. Ltd.



B.Voc. –Computer Technology  
Semester: III  
Skill Component-VII  
(PHP, BootStrap and JQery)

Credit: 04

Periods:60

(To be implemented from the Academic year 2019-2020)

## SSC NASSCOM - NOS-501

### Learning Objectives

- i. Understand how server-side programming works on the web.
- ii. PHP Basic syntax for variable types and calculations.
- iii. Understanding POST and GET in form submission
- iv. The purpose of jQuery is to make it much easier to use JavaScript on your website.
- v. Bootstrap is easy to use and allows a designer to specify exactly how the site will look and behave on a number of different displays, including mobile, desktop, and tablet.

### Course Outcomes:

After Completion of this course Students should be able to

- i. Build dynamic Web sites with PHP framework, syntax and important techniques.
- ii. Learn how to connect to any modern database.
- iii. Perform hands on practice with a MySQL database to create database-driven HTML forms and reports.

UNIT I: PHP	NOS	Hours
Introduction Syntax Variables Print/Echo Datatypes Strings, Constants, Operators If.....Else....Elseif, Switch, While Loops, For Loops Function Arrays Forms		15
UNIT II: BootStrap	NOS	Hours
Bootstrap- GetStarted , What is Bootstrap? ,Bootstrap CDN Bootstrap is Mobile–First, Containers, Basic Bootstrap Pages, Bootstrap Grids, Bootstrap Grid System, Grid Classes, and Basic Structure of a Bootstrap Grid, Equal Columns, and Unequal Columns. Typography, Table, Images, Wells, Alerts, .		20

<b>UNIT III : BootStraps</b>	NOS	Hours
Button, Button groups , Badges/Labels Progress Bars , Pagination, pager, List groups, Panels, Drop Down, Collapse, Tabs/Pills, Navbars		10
<b>Unit IV JQuery</b>		
What is jQuery?, Downloading and installing jQuery Creating a simple jQuery, enabled page Overview of jQuery's Retrieving Page Content - Using basic jQuery selectors, filters, attribute filters, Child, visibility, and content filters, Form selectors and filters. Traversing documents , Understanding jQuery statement, Binding and unbinding events, Convenient event helper methods, Using the jQuery event object, jQuery Animations and Effects . Using the jQuery UI Plug In Manipulating Page , Working with Events.		15

**Reference Books:**

- 1) Programming PHP- RasmusLerdorf and Kevin Tatroe O'Reilly publication
- 2) PHP: The Complete Reference-Steven Holzner.
- 3) Step by Step Bootstrap -RiwantoMegosinarso
- 4) JQuery Pocket Reference –David Flanagan.

B.Voc. –Computer Technology

Semester: III

Skill Component-VIII

(CT.SC.302 Object Oriented Programming through C++)

Credit: 04

Periods:60

(To be implemented from the Academic year 2019-2029)

---

SSC NASSCOM - NOS-

**Learning Objectives:**

- i. Understand the features of C++ supporting object oriented programming
- ii. Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation and polymorphism
- iii. Understand advanced features of C++ specifically stream I/O, templates, operator overloading, Inheritance paradigm.
- iv. Ability to handle possible errors during program execution.

**Course Outcomes:**

Upon successful completion of this course, students should be able to:

- i. Understand in-depth coverage of object-oriented programming principles and techniques.
- ii. Use concepts of classes, overloading, data abstraction, information hiding, encapsulation, inheritance, polymorphism, file processing, templates, exceptions, container classes for programming.
- iii. Also student will learn data structures and arrays.

<b>Unit I: Introduction to OOPs and Basics of C++</b>	NOS	Hours
Need object oriented programming comparison of procedural and object oriented approach object classes polymorphism inheritance reusability data hiding and abstraction applications of OOPs Character Set, identifiers and keywords, data types, constants, variables and arrays, Operators and Expressions, Conditional Statements and Loops, Switch Statement		15
<b>Unit II Functions, Classes and Objects</b>	NOS	Hours
defining a function accessing a function		

Passing arguments to a function specifying argument data types function prototypes recursion Class declaration constructors constructor initialization lists access functions private member functions the copy constructor the class destructor pointers to object static data members static function members friend function Operator Overloading overloading the assignment operator the this pointer overloading arithmetic operators overloading the arithmetic assignment operators overloading the relational operators overloading the increment and decrement operators overloading the subscript operator		
<b>Unit III Inheritance and File Handling</b>	NOS	Hours
inheritance protected class members overriding, Private access verses protected access virtual functions and polymorphism virtual destructors abstract base classes File Handling Classes for file stream operations opening and closing a file detecting end of file file modes file pointers and their manipulations sequential input and output operations random access file operations error handling command line arguments		15
<b>Unit IV Templates and Exception Handling</b>	NOS	Hours
function templates class templates		15

container classes subclass templates passing template classes to template parameters Exception Handling Introduction Exception Handling Mechanism Concept of throw & catch with example		
---	--	--

**Reference Books:**

Object Oriented Analysis and Design, Timothy Budd(2012).: Tata McGraw Hill

Object Oriented Programming with C++, E. Balagurusamy.: Tata McGraw Hill

B.Voc. –Computer Technology  
Semester: III  
Skill Component-IX  
(Data Base Management System)

Credit: 04

Periods:60

(To be implemented from the Academic year 2019-2020)

---

SSC NASSCOM - NOS- 503

**Learning Objectives:**

- To implement the design of the tables in DBMS
- To write queries to get optimized outputs
- To store, retrieve and view the contents
- To generate report based on customized need

**Course Outcomes**

At the end of this course, student should be able to

- Identify the information that is needed to design a database management system for a business information problem.
- Create conceptual and logical database designs for a business information problem.
- Construct a database management system that satisfies relational theory and provides users with business queries, business forms, and business reports.
- Analyze the core terms, concepts, and tools of relational database management systems.
- Demonstrate skills to work in teams and utilize effective group techniques to manage a project.

<b>Unit-I Introduction to Databases and Data Models</b>	NOS	Hours
What is database system? Purpose of database system, View of data, Relational databases, Database architecture, Transaction management The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction		15
<b>Unit-II Database Design,ER-Diagram and Unified Modeling Language</b>	NOS	Hours

Database design and ER Model: Overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, weak entity sets, Codd's rules, Relational Schemas, Introduction to UML Relational database model: Logical view of data, keys, Integrity rules. Relational Database design features of good relational database design, Atomic domain and Normalization (1NF, 2NF, 3NF, BCNF).		15
<b>Unit- III Relational Algebra and Calculus</b>	NOS	Hours
Relational algebra: Introduction, Selection and projection, Set operations, Renaming, Joins, Division, Syntax, semantics. Operators, Grouping and ungrouping, Relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, Calculus vs algebra, Computational Capabilities.		15
<b>Unit- V Constraints, Views and SQL</b>		
What are constraints? Types of constrains, Integrity constraints, Views: Introduction to views, Data independence, security, Updates on views Comparison between tables and views SQL: data definition, Aggregate function, Null Values, nested sub queries, Joined relations,Triggers.		15
	Total	60

**Reference Books:**

- 1) Database System and Concepts-A Silberschatz, H Korth, S Sudarshan,fifthEditionMcGraw-Hill
- 2) Database Systems- Rob, Coronel,Seventh Edition, Cengage Learning.



B.Voc. –Computer Technology

Semester: III

Skill Laboratory Course VII

Credit: 02

Periods:60

(To be implemented from the Academic year 2019-2020)

---

- 1) Experiments based on Skill Component-VII
- 2) Write a Php program using Different types of datatypes.
- 3) Write a Php program using String Functions.
- 4) Write a Php program which displays the working of control statements.
- 5) Write a Php program which displays the working of Operators.
- 6) Write a Php program which displays the working of Arrays().
- 7) Write a program for tables using Bootstrap.
- 8) Write a program for different styles of buttons using Bootstrap.
- 9) Write a program for different progress bars using Bootstrap.
- 10)Write a program for dropdowns using Bootstrap.
- 11)Write a program for navbar using Bootstrap.
- 12)Write a program for JQuery Selectors.
- 13)Write a program for JQuery Event Methods.
- 14)Write a program for JQuery Effects
- 15)Write a program for JQuery HTML Elements & attributes.

## B.Voc. –Computer Technology

Semester: III

### Skill Laboratory Course-VIII

Credit: 02

Periods: 60

(To be implemented from the Academic year 2019-2020)

---

Experiments based on Skill Component-VIII

#### 1. Program to Demonstrate Classes and methods

- i. Design an employee class for reading and displaying the employee information, the get Info() and display Info() methods will be used respectively. Where get Info() will be private method
- ii. Design the class student containing get Data() and display Data() as two of its methods which will be used for reading and displaying the student information respectively. Where get Data() will be private method.
- iii. Design the class Demo which will contain the following methods: read No() ,factorial() for calculating the factorial of a number, reverse No() will reverse the given number, is Palindrome() will check the given number is palindrome, is Armstrong() which will calculate the given number is arm Strong or not. Where read No() will be private method.

#### 2. Program to Demonstrate Friend functions

- i. Write a friend function for adding the two different distances and display its sum, using two classes.
- ii. Design a class Complex for adding the two complex numbers and also show the use of constructor.

#### 3. Program to Demonstrate Constructor and method overloading

- i. Design a class Complex for adding the two complex numbers and also show the use of constructor.
- ii. Design a class Geometry containing the methods area() and volume() and also overload the area() function
- iii. Design a class Static Demo to show the implementation of static variable and static function.

#### 4. Program to Demonstrate Operator overloading

- i. Overload the operator unary (-) for demonstrating operator overloading
- ii. Overload the operator + for adding the timings of two clocks, And also pass objects as an argument
- iii. Overload the + for concatenating the two strings. For e.g "c" + "++" = c++

#### 5. Program to Demonstrate Inheritance

- i. Design a class for single level inheritance using public and private type derivation.
- ii. Design a class for multiple inheritances.
- iii. Implement the hierarchical inheritance.

#### 6. Program to Demonstrate Virtual function and abstract class

- i. Implement the concept of method overriding.
- ii. Show the use of virtual function
- iii. Show the implementation of abstract class

#### 7. Program to Demonstrate Exception handling

- i. Show the implementation of exception handling
- ii. Show the implementation for exception handling for strings
- iii. Show the implementation of exception handling for using the pointers.

#### 8. Program to Demonstrate File handling

- i. Design a class File Demo opens a file in read mode and display the total number of words and lines in the file.
- ii. Design a class to handle multiple files and file
- iii. Design an editor for appending and editing the files

#### 9. Program to Demonstrate Templates

- i. Show the implementation of template class library for swap function.
- ii. Design the template class library for sorting ascending to descending and vice-versa
- iii. Design the template class library for concatenating two strings

B.Voc. –Computer Technology

Semester: III

Skill Laboratory Course-IX

Credit: 02

Periods: 60

(To be implemented from the Academic year 2019-2020)

---

Experiments based on Skill Component-VI

- 1) Design a Database and create required tables. For e.g. Bank, College Database
- 2) Apply the constraints like Primary Key , Foreign key, NOT NULL to the tables.
- 3) Write a sql statement for implementing ALTER,UPDATE and DELETE
- 4) Write the queries to implement the joins
- 5) Write the query for implementing the following functions:  
MAX(),MIN(),AVG(),COUNT()
- 6) Write the query to implement the concept of Integrity constraints
- 7) Write the query to create the views
- 8) Perform the queries for triggers
- 9) Perform the following operation for demonstrating the insertion , updation and deletion using the referential integrity constraints
- 10) Write the query for creating the users and their role