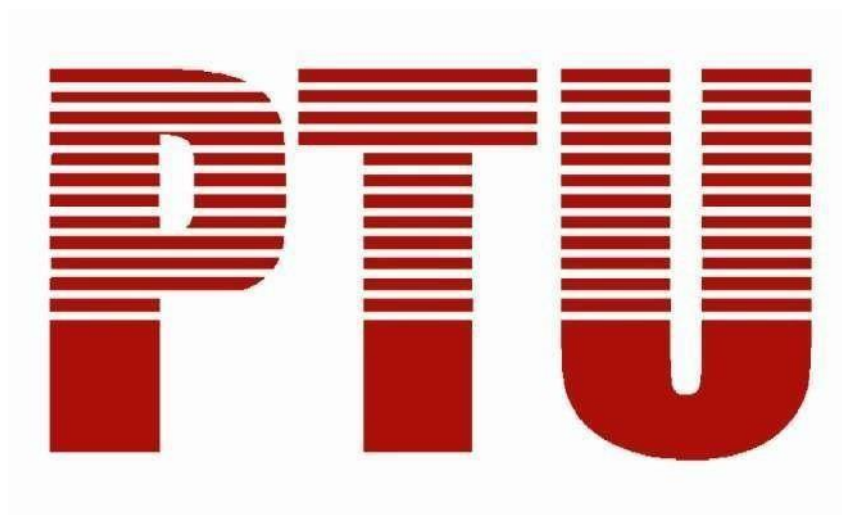# Scheme & Syllabus of

# Bachelor of Vocational Studies (B. Voc.)
## Data & Web Analytics

# Batch 2021

**By Department of Academics**

# IKG Punjab Technical University

## Semester 1st

| Course Code | Course Title | Load Allocation | | Marks Distribution | | Total | Credits |
|---|---|---|---|---|---|---|---|
| | | L | P | Internal | External | | |
| BVDW101-21 | **Introduction to Internet & MS-Office** | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW102-21 | **Programming Fundamentals in C++** | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW103-21 | **Communicative English** | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW104-21 | Basic IT Skills | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW105-21 | **Introduction to Internet & MS-Office Laboratory** | 0 | 3 | 30 | 20 | 50 | 1.5 |
| BVDW106-21 | **Programming Fundamentals in C++ Laboratory** | 0 | 3 | 30 | 20 | 50 | 1.5 |
| **On-Job Training / Qualification Pack*** | | | | | | | |
| BVDW107-21 | Test Engineer (SSC/Q1301) | On Job Training (OJT) in Collaboration with MoU industry | | | 200 | 200 | 15 |
| **Total** | | 12 | 6 | 220 | 480 | 700 | 30 |

**\*The qualification packs may vary from institute to institute.**

## Semester 2nd

| Course Code | Course Title | Load Allocation | | Marks Distribution | | Total | Credits |
|---|---|---|---|---|---|---|---|
| | | L | P | Internal | External | | |
| BVDW201-21 | **Database Management Systems** | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW202-21 | **Internet Tools and Applications** | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW203-21 | **Computer Architecture** | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW204-21 | **Mathematics** | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW205-21 | **Database Management Systems Laboratory** | 0 | 3 | 30 | 20 | 50 | 1.5 |
| BVDW206-21 | **Internet Tools and Applications lab** | 0 | 3 | 30 | 20 | 50 | 1.5 |
| **On-Job Training / Qualification Pack*** | | | | | | | |
| BVDW207-21 | Web Developer (SSC/Q0503) | On Job Training (OJT) in Collaboration with MoU industry | | | 200 | 200 | 15 |
| **Total** | | 12 | 6 | 220 | 480 | 700 | 30 |

## Semester 3rd

| Course Code | Course Title | Load Allocation | | Marks Distribution | | Total | Credits |
|---|---|---|---|---|---|---|---|
| | | L | P | Internal | External | | |
| BVDW301-21 | Programming with Python | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW302-21 | Introduction to Big Data | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW303-21 | Computer Fundamentals | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW304-21 | Advanced HTML & Java Script | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW305-21 | Programming with Python Lab | 0 | 2 | 30 | 20 | 50 | 1 |
| BVDW306-21 | Advanced HTML & Java Script Lab | 0 | 2 | 30 | 20 | 50 | 1 |
| BVDW307-21 | Introduction to Big Data Lab | 0 | 2 | 30 | 20 | 50 | 1 |
| On-Job Training / Qualification Pack* | | | | | | | |
| BVDW308-21 | Junior Software Developer (SSC/Q0508) | On Job Training (OJT) in Collaboration with MoU industry | | 200 | 200 | 15 | |
| Total | | 12 | 6 | 250 | 500 | 750 | 30 |

## Semester 4th

| Course Code | Course Title | Load Allocation | | Marks Distribution | | Total | Credits |
|---|---|---|---|---|---|---|---|
| | | L | P | Internal | External | | |
| BVDW401-21 | Data Warehouse & Data Mining | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW402-21 | Data Analytics using R | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW403-21 | Data Structures | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW404-21 | Digital Marketing | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW405-21 | Data Analytics using R Lab | 0 | 3 | 30 | 20 | 50 | 1.5 |
| BVDW406-21 | Data Structures Lab | 0 | 3 | 30 | 20 | 50 | 1.5 |
| On-Job Training / Qualification Pack* | | | | | | | |
| BVDW407-21 | On Job Training with MoU Industry based of data Analytics or Digital Marketing. | | | 200 | 200 | 15 | |
| Total | | 12 | 6 | 220 | 480 | 700 | 30 |

## Semester 5th

| Course Code | Course Title | Load Allocation | | Marks Distribution | | Total | Credits |
|---|---|---|---|---|---|---|---|
| | | L | P | Internal | External | | |
| BVDW501-21 | Probability and statistics | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW502-21 | Computer Networks | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW503-21 | Programming with PHP | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW504-21 | Linux Operating System | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW505-21 | Programming with PHP Lab | 0 | 2 | 30 | 20 | 50 | 1 |
| BVDW506-21 | Linux Operating System Lab | 0 | 2 | 30 | 20 | 50 | 1 |
| BVDW507-21 | Computer Networks Lab | 0 | 2 | 30 | 20 | 50 | 1 |
| **On-Job Training / Qualification Pack\*** | | | | | | | |
| BVDW508-21 | **On Job Training with MoU Industry based of data Analytics or Digital Marketing.** | | | 200 | | 200 | 15 |
| | **Total** | 12 | 6 | 220 | 480 | 700 | 30 |

## Semester 6th

| Course Code | Course Title | Load Allocation | | Marks Distribution | | Total | Credits |
|---|---|---|---|---|---|---|---|
| | | L | P | Internal | External | | |
| BVDW601-21 | Advanced Web Technologies | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW602-21 | Business Intelligence | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW603-21 | Data Visualization | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW604-21 | Web Analytics | 3 | 0 | 40 | 60 | 100 | 3 |
| BVDW605-21 | Data Visualization Lab | 0 | 2 | 30 | 20 | 50 | 1 |
| BVDW606-21 | Advanced Web Technologies Lab | 0 | 2 | 30 | 20 | 50 | 1 |
| BVDW607-21 | Web Analytics Lab | 0 | 2 | 30 | 20 | 50 | 1 |
| **On-Job Training / Qualification Pack\*** | | | | | | | |
| BVDW608-21 | **On Job Training with MoU Industry based of data Analytics or Digital Marketing.** | | | 200 | | 200 | 15 |
| **Total** | | **12** | **6** | **220** | **480** | **700** | **30** |

Course Code: BVDW101-21
Course Name: **Introduction to Internet & MS-Office**

| | |
|---|---|
| Program: **B. Voc.** | L: 3   T: 0  P: 0 |
| Branch: **Data & Web Analytics** | Credits: **3** |
| Semester: **1ˢᵗ** | Contact hours: **33** |
| Theory/Laboratory: **Theory** | Status (Elective/Core): **Core** |
| Internal max. marks: **40** | External max. marks: **60** |
| Total marks: **100** | |

**Course Outcomes:**

| CO# | Course outcomes |
|---|---|
| CO1 | To develop an understanding & practical exposure to MS Office used as business tool. |
| CO2 | To equip the students with the relevant skills and working knowledge of various office management tools |
| CO3 | To develop an understanding of the practices and technology required for the Internet. |

| Detailed contents | Contact hours |
|---|---|
| **Unit 1:**<br>Introduction: About internet and its working, business use of internet, services.<br>Internet Protocol: Introduction, file transfer protocol (FTP), Gopher, Telnet, other protocols like HTTP and TCPIP.<br>WWW: Introduction, working of WWW, Web browsing (opening, viewing, saving and printing a web page and bookmark) | 9 |
| **Unit 2:**<br>Microsoft Word: Interface, Toolbar, Working with a document (Create, open, Save, Export etc.), Working with text, Images and Tables, Page layout (Headers and footers, Margins, Page and line numbers), Mail Merge, Automating tasks (Smart documents, Macros), File formats and Export features. | 8 |
| **Unit 3:**<br>MS-Excel: Introduction, Components of Excel History, Creating, Saving, Opening, Spreadsheet, Formatting numbers and Text, Graph and Chart Formatting Commands, Menu Bar, Toolbars, Producing Charges, Protecting Cell Macro and Printing Operation, Spell Checking, Cell Editing, Calculation of various Financial and Statistical Functions using Formulas. | 8 |
| **Unit 4:**<br>Microsoft Power Point: Interface, Working with a document (Create, open, Save, Export etc.), Creating and editing power point presentations (Slideshows, Animations, Transitions, graphics and charts), File formats and Export features. | 8 |

**Text Books:**
1. Understanding The Internet by Kieth Sutherland, Butterworth-Heinemann.
2. Internet Technologies by S. K. Bansal, APH Publishing Corporation.
3. MS-Office 2007 Training Guide by S. Jain, BPB Publication.

**Reference Books:**
1. Computer Basics and Beyond by Michael A. Price.
2. MS-Office 2007 for Dummies by Wallace Wang, Wiley Publishing Inc.

**Course Code: BVDW102-21**
Course Name: **Programming Fundamentals in C++**

| | |
|---|---|
| Program: **B. Voc.** | L: **3**   T: **0**  P: **0** |
| Branch: **Data & Web Analytics** | Credits: **3** |
| Semester: **1ˢᵗ** | Contact hours: **33** |
| Theory/Laboratory: **Theory** | Status (Elective/Core): **Core** |
| Internal max. marks: **40** | External max. marks: **60** |
| Total marks: **100** | |

**Course Outcomes:**

| CO# | Course outcomes |
|---|---|
| CO1 | To learn programming from real world examples. |
| CO2 | To understand Object oriented approach for finding Solutions to various problems with the help of C++ language. |
| CO3 | To create computer based solutions to various real-world problems using C++. |
| CO4 | To learn various concepts of object oriented approach towards problem solving. |

| Detailed contents | Contact hours |
|---|---|
| **Unit 1:**<br>Fundamentals: Character set, Identifiers and Key Words, Data types, Constants, Variables, Expressions, Statements, Symbolic Constants.<br>Operations and Expressions: Arithmetic operators, Unary operators, Relational Operators, Logical Operators, Assignment and Conditional Operators.<br>Data Input and Output: single character Input, single character output, entering input data, writing output data. | 9 |
| **Unit 2:**<br>Control Statements: Preliminaries, While, Do–while and For statements, Nested loops, If– else, Switch, Break – Continue statements.<br>Functions: Declaring and defining function, Local, global variables, Passing argument to function, Reference arguments, Overloading functions. | 8 |
| **Unit 3:**<br>Object Oriented Programming: Objects & Classes, Constructor & Destructor, Operator overloading, Overloading unary operators, Overloading binary operators, Data conversion, Pitfalls operator overloading and conversion. | 8 |
| **Unit 4:**<br>Inheritance: Derived class and Base Class, Derived Class Constructors, Overriding member functions, Inheritance in the English distances class, class hierarchies, Public and Private inheritance, Level of inheritance.<br>Polymorphism: Problems with single inheritance, Multiple inheritance. | 8 |

**Text Books:**
1. Object Oriented Programming with C++, E. Balagurusami, 4ᵗʰ Edition, TMG.
2. Object Oriented Progg. in Turbo C++, Robert Lafore, 4ᵗʰ Edition Galgotia Publications.

**Reference Books:**
1. Computer Basics and Beyond by Michael A. Price.

3. Mastering Cloud Computing by Rajkumar Buyya.

Course Code: **BVDW104-19**
Course Code: **BVDW103-19**
Course Name: **Communicative English**

| | |
|---|---|
| Program: **B. Voc.** | L: **3**     T: 0    P: 0 |
| Branch: **Data & Web Analytics** | Credits: **3** |
| Semester: **1ˢᵗ** | Contact hours: **33** |
| Theory/Laboratory: **Theory** | Elective status: **Core** |
| Internal max. marks: **40** | External max. marks: **60** |
| Total marks: **100** | |

**Course Outcomes:**

| CO# | Course outcomes |
|---|---|
| CO1 | To introduce students to the theory, fundamentals and tools of communication. |
| CO2 | To help the students become the independent users of English language. |
| CO3 | To develop vital communication skills integral to their personal, social and professional interactions. |
| CO4 | The syllabus shall address the issues relating to the Language of communication. |
| CO5 | Students will become proficient in professional communication such as interviews, group discussions, office environments, important reading skills and writing skills. |

| Detailed contents | Contact hours |
|---|---|
| Unit1- 1 (Introduction) <br> • Theory of Communication, <br> • Types and modes of Communication | 9 |
| Unit- 2 (Language of Communication) <br> • Verbal and Non-verbal <br> • (Spoken and Written) <br> • Personal, Social and Business <br> • Barriers and Strategies <br> • Intra-personal, Inter-personal and Group communication | 8 |
| Unit-3 (Reading and Understanding) <br> • Close Reading <br> • Comprehension <br> • Summary Paraphrasing <br> • Analysis and Interpretation <br> • Translation(from Hindi/Punjabi to English and vice-versa <br> • Literary/Knowledge Texts | 8 |
| Unit-4 (Writing Skills) <br> • Documenting <br> • Report Writing <br> • Making notes <br> • Letter writing | 8 |

**Text Books:**
1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.

**Reference Books:**
1. Practical English Usage by Michael Swan. OUP. 1995.
2. Communication Skills by Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.

Course Name: **Basic IT Skill**

| | |
|---|---|
| Program: **B. Voc.** | L: **3**    T: 0    P: 0 |
| Branch: **Data & Web Analytics** | Credits: **3** |
| Semester: **1ˢᵗ** | Contact hours: **33** |
| Theory/Laboratory: **Theory** | Elective status: **Core** |
| Internal max. marks: **40** | External max. marks: **60** |
| Total marks: **100** | |

**Course Outcomes:**

| CO# | Course outcomes |
|---|---|
| CO1 | Understanding the concept of input and output devices of Computers. |
| CO2 | Learn the functional units and classify types of computers, how they process information and how individual computers interact with other computing systems and devices. |
| CO3 | Learn basic word processing, Spreadsheet and Presentation Graphics Software skills. |
| CO4 | Study to use the Internet safely, legally, and responsibly. |
| CO5 | To develop an understanding and practical exposure to different IT tools used as an aid in business and ecommerce. |

| Detailed contents | Contact hours |
|---|---|
| **Unit 1 :** <br> Human Computer Interface, Concepts of Hardware and Software; Data and Information. <br> Functional Units of Computer System: CPU, registers, system bus, main memory unit, cache memory, SMPS, Motherboard, Ports and Interfaces, expansion cards, ribbon cables, memory chips, processors. <br> Devices: Input and output devices, keyboard, mouse, joystick, scanner, OCR, OMR, bar code reader, web camera, monitor, printer, plotter. <br> Memory: Primary, secondary. | 9 |
| **Unit 2:** <br> Types of Languages: Machine, assembly and High level Language; Operating system as user interface, utility programs. <br> Word processing: Editing features, formatting features, saving, printing, table handling, page settings, spell-checking, macros, mail-merge, equation editors. | 8 |
| **Unit 3:** <br> Spreadsheet: Workbook, worksheets, data types, operators, cell formats, freeze panes, editing features, formatting features, creating formulas, using formulas, cell references, replication, sorting, filtering, functions, Charts & Graphs. <br> Presentation Graphics Software: Templates, views, formatting slide, slides with graphs, animation, using special features, presenting slide shows. | 8 |
| **Unit 4:** <br> The Impact of Computing and the Internet on Society. <br> Electronic Payment System: Secure Electronic Transaction, Types of Payment System: Digital Cash, Electronic Cheque, Smart Card, Credit/Debit Card E-Money, Immediate Payment System (IMPS). | 8 |

**Course Code: BVDW104-19**

**Text Books:**
1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2. Computer Fundamentals, A. Goel, 2010, Pearson Education.
3. Fundamentals of Computers, P. K.Sinha& P. Sinha, 2007, BPB Publishers.

**Reference Books:**
1. Introduction to Computers by Peter Norton.
2. Computers Today by D. H. Sanders, McGraw Hill.
3. Computers by Larry long & Nancy long, 12th edition, Prentice Hall.

# IK Gujral Punjab Technical University Jalandhar
## B. Voc. (Data & Web Analytics), Batch-2021

Course Code: **BVDW105-19**

Course Name: **Introduction to Internet & MS-Office Laboratory**

| | |
|---|---|
| Program: **B.Voc** | L: 0    T: 0  P: **3** |
| Branch: **Data & Web Analytics** | Credits: **1.5** |
| Semester: **1ˢᵗ** | |
| Theory/Laboratory : **Laboratory** | Percentage of numerical/design problems:- |
| Internal max. marks: **30** | Duration of end semester exam (ESE):- |
| External max. marks: **20** | Status (Elective/Core): **Core** |
| Total marks: **50** | |

**Course Outcomes:**

| CO# | Course outcomes |
|---|---|
| CO1 | Familiarizing with Open Office (Word processing, Spreadsheets and Presentation). |
| CO2 | To acquire knowledge on editor, spread sheet and presentation software. |
| CO3 | The students will be able to perform documentation and accounting operations. |
| CO4 | Students can learn how to perform presentation skills. |

| | |
|---|---|
| **Task 1:** | Microsoft Word: To familiarize with parts of Word, to create and save a document, to set page settings, create headers and footers, to edit a document and resave it, to use copy, cut and paste features, to use various formatting features such as bold face, italicize, underline, subscript, superscript, line spacing, etc. To use spelling and grammar checking feature, to preview print a document. To create a table with specified rows and columns, to enter data in a table, to select a table, a row, a column or a cell, to inset new row and/or a column, to delete a row and/or a column, to split and merge a row, column or a cell. To understand the mail-merge and to use mail merge feature of MS-Word. |
| **Task 2:** | Microsoft Excel: To familiarize with parts of Excel window, to create and save a workbook with single and/or multiple worksheets, to edit and format text as well numbers, to apply operations on range of cells using built-in formulae, to preview and print a worksheet, to insert new row and/or column in a worksheet, to delete a row and/or column in a worksheet, to create a variety of charts, to import and export data to or from worksheet. |
| **Task 3:** | Microsoft PowerPoint: To familiarize with parts of PowerPoint, to create and save a new presentation, to apply design templates to a presentation, to insert, edit and delete a slide, to use different views of slides, to use slide show from beginning or from the current slide, to preview and print a presentation, to check spellings in a presentation, to add clip art and pictures in a slide, to add chart, diagram and table in a slide, to set animation for a selected slide and/or for entire presentation, to create slide master and title master, to create a custom show. |

**Recommended Hardware & Software:**

Intel Core i-3 / i-5 / i-7 processor with a speed of minimum 2 GHz, RAM 2 GB or higher, HDD 200 GB or higher, LED / LCD screen and Microsoft MS Office 2003 / XP / 2007

**Test Books:**
1. IT Tools, R.K. Jain, Khanna Publishing House.
2. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.

Course Name: **Programming Fundamentals in C++ Laboratory**

| | |
|---|---|
| Program: **B. Voc.** | L: 0    T: 0    P: **3** |
| Branch: **Data & Web Analytics** | Credits: **1.5** |
| Semester: **1ˢᵗ** | Percentage of numerical/design problems:- |
| Theory/Laboratory: **Laboratory** | Duration of end semester exam (ESE):- |
| Internal max. marks: **30** | External max. marks: **20** |
| Total marks: **50** | Status (Elective/Core): **Core** |

**Course Outcomes:**

| CO# | Course outcomes |
|---|---|
| CO1 | To learn programming from real world examples. |
| CO2 | To understand Object oriented approach for finding Solutions to various problems with the help of C++ language. |
| CO3 | To create computer based solutions to various real-world problems using C++. |
| CO4 | To learn various concepts of object oriented approach towards problem solving**.** |

| | |
|---|---|
| **Task 1 :** | Write a program to enter mark of 6 different subjects and find out the total mark (Using cin and cout statement). |
| **Task 2 :** | Write a function using reference variables as arguments to swap the values of pair of integers. |
| **Task 3 :** | Write a function to find largest of three numbers. |
| **Task 4 :** | Write a program to find the factorial of a number. |
| **Task 5 :** | Define a class to represent a bank account which includes the following members as Data members: a)      Name of the depositor b)      Account Number c)      Withdrawal amount d)      Balance amount in the account Member Functions: e)      To assign initial values: i. To deposit an amount, ii. To withdraw an amount after checking the balance & iii. To display name and balance. |
| **Task 6 :** | Write a program for single inheritance. |
| **Task 7 :** | Write a program for use of constructor and destructors. |
| **Task 8 :** | Write a program for Multiple inheritances. |
| **Task 9 :** | Write a program for Multilevel inheritance |
| **Task 10 :** | Write a program for file handling. |

**Recommended Hardware & Software:**
Intel Core i-3 / i-5 / i-7 processor with a speed of minimum 2 GHz, RAM 2 GB or higher, HDD 200 GB or higher, LED / LCD screen and Borland C++ / Turbo C++

**Text Books:**
1. The C++ Programming Language, BjarnaStroustrup, Third Edition, AddisonWesley Publishing Company.
2. Object Oriented Programming Using C++, Salaria, R. S, Fourth Edition, Khanna Book Publishing.

Course Code: **BVDW106-19**
Course Code: **BVDW201-19**
Course Name: **Database Management Systems**

| | |
|---|---|
| Program: **B. Voc.** | L: **3**    T: 0    P: 0 |
| Branch: **Data & Web Analytics** | Credits: **3** |
| Semester: **2ⁿᵈ** | Contact hours: **33** |
| Theory/Laboratory: **Theory** | Status (Elective/Core): **Core** |
| Internal max. marks: **40** | External max. marks: **60** |
| Total marks: **100** | |

**Course Outcomes:**

| CO# | Course outcomes |
|---|---|
| CO1 | Understand the basic concepts of DBMS. |
| CO2 | Formulate, using SQL, solutions to a broad range of query and data update problems. |
| CO3 | Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database. |
| CO4 | Understand the concept of Transaction and Query processing in DBMS. |

| Detailed Contents | Contact hours |
|---|---|
| **Unit-I:**<br>Introduction of DBMS, Data Modeling for a Database, Three level Architecture of DBMS, Components of a DBMS. Introduction to Data Models, Hierarchical, Network and Relational Model, Comparison of Network, Hierarchical, Relational & Entity Relationship Model. | 9 |
| **Unit-II**<br>Relational Database, Relational Algebra and Calculus, SQL Fundamentals, DDL, DML, DCL, PL/SQL Concepts, Cursors, Stored Procedures, Stored Functions, Database Triggers. | 8 |
| **Unit-III**<br>Introduction to Normalization, First, Second, Third Normal Forms, Dependency Preservation, Boyce-Codd Normal Form, Multi-valued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form, Domain-key normal form (DKNF). | 8 |
| **Unit-IV**<br>Database Recovery, Concurrency Management, Database Security, Integrity and Control. Structure & Design of a Distributed Database. | 8 |

**Text Books:**
1. An Introduction to Database System by Bipin C. Desai, Galgotia Publications Pvt Ltd-New Delhi, Revised Edition, (2012).
2. An Introduction to Database Systems by C. J. Date, A. Kannan & S. Swamynathan, 8ᵗʰ Edition, Pearson Education, (2006).

**Reference Books:**
1. SQL, PL/SQL The Programming Language of Oracle", Ivan Bayross, BPB Publications, 4ᵗʰ Revised Edition (2009).
2. Database System Concepts by Abraham Silberschatz, Henry F. Korth & S. Sudharshan, Tata McGraw Hill, 6ᵗʰ Edition, (2013).
3. Database Management Systems, Raghu Ramakrishnan, McGraw-Hill, 3ʳᵈ Edition, 2014.

Course Name: **Internet Tools & Applications**

| | |
|---|---|
| Program: **B. Voc.** | L: **3**    T: 0    P: 0 |
| Branch: **Data & Web Analytics** | Credits: **3** |
| Semester: **2ⁿᵈ** | Contact hours: **33** |
| Theory/Laboratory: **Theory** | Status (Elective/Core): **Core** |
| Internal max. marks: **40** | External max. marks: **60** |
| Total marks: **100** | |

**Course Outcomes:** Students will be able to

| CO# | Course outcomes |
|---|---|
| CO1 | Understand basic concepts of Internet. |
| CO2 | Design a web page. |
| CO3 | Understand various applications of Internet . |

| Detailed contents | Contact hours |
|---|---|
| **Unit-I**<br><br>**Internet:** Internet, its advantages, disadvantages, internet facilities through WWW and HTML, Internet Protocols, TCP/IP, FTP, newsgroups, remote logins, chat groups etc. | 2 hours |
| **Unit-II**<br><br>**WWW:** Client side, Server side, web browsers, web pages, locating information on the web.<br><br>**E-Mail:** Architecture, various aspects, the user agent, message format, message transfer, e-mail privacy.<br><br>**Domain Name Server and its working** | 3 hours |
| **Unit-III**<br><br>**HTML:** Introduction to HTML, Web structure of HTML document.<br><br>**Starting an HTML document:** Head element, body element, style element, Script element, Text formatting, using lists to organize information.<br><br>**Organizing Data with Table:** Basic table Structures, individual cells and headings, vertical controls, database considerations, displaying real data with a table. | 3 hours |

| | |
|---|---|
| Course Code: BVDW-202-19 **Table Layout and Presentation:** Table Syntax, two column layout, staggered body with an index, traditional newspaper layout. | |
| **Unit-IV** **Uniform Resource Locators (URLs):** Absolute URLs, Relative URLs, fragment URLs, Types of URL Schemes- HTTP, mailto, news, FTP, Telnet, File etc. **Using Hyper Links and Anchors:** Uses to Hyper Links, Structure of Hyper Links, Links to specialized contents. **Images:** Adding Images to web page, using images as links, creating menus with image maps, image formats-GIF, JPEG etc. | 3 hours |

**Text Books:**

1. Corner, Internetworking with TCP-IP: Principles, Protocols and Architecture, PHI.
2. Stephan Mack, Janan Platt, HTML 4.0 No Experience Required, BPB Publication.
3. Rick Darnell et al, HTML 4 Unleashed, Tech media Publications.

Course Code: **BVDW203-21**

Course Name: **Computer Architecture**

| | |
|---|---|
| Program: **B. Voc.** | L: **3**     T: 0     P: 0 |
| Branch: **Data & Web Analytics** | Credits: **3** |
| Semester: **2nd** | Contact hours: **33** |
| Theory/Laboratory: **Theory** | Status (Elective/Core): **Core** |
| Internal max. marks: **40** | External max. marks: **60** |
| Total marks: **100** | |

**Course Outcomes**:

| CO# | Course outcomes |
|---|---|
| CO1 | To know about the basic functioning of various parts of computer system from hardware point of view and interfacing of various peripheral devices used with the system. |
| CO2 | To learn number system and various types of micro-operations of processor. |
| CO3 | To learn the communication of various components through common bus. |
| CO4 | To learn how to design Combinational & Sequential circuits. |

| Detailed Contents | Contact hours |
|---|---|
| **Unit-I**<br>**Logic Gates:** AND, OR, NOT, NAND, NOR, XOR, XNOR, NAND & NOR as Universal Gates, Logic Gates Applications.<br>**Boolean Algebra:** Introduction, Theorems, Simplification of Boolean Expression using Boolean Algebra, SOP & POS Forms, Realization of Boolean Expression using Gates, K-Maps, Simplification of Boolean Expression using K-Maps. | 9 |
| **Unit-II**<br>**Combinational Logic Circuits:** Half Adder & Half Subtractor, Full Adder & Full Subtractor, Parallel Binary Adder, Binary Adder/Subtractor.<br>**Combinational Logic Circuits:** Multiplexers & Demultiplexers, Implementation of Boolean equations using Multiplexer and Demultiplexer, Encoders & Decoders | 8 |
| **Unit-III**<br>**Sequential Logic Circuits:** Latch, Flip Flops- R-S Flip-Flop, J-K Flip-Flop, Race Around Condition, Removing Race Around Condition, Master-Slave JK Flip-Flop, D Flip-Flop, T Flip-Flop, Applications of Flip-Flops. | 8 |
| **Unit-IV**<br>**Introduction to Computer Organization:** Introduction to Computer and CPU (Computer Organization, Computer Design and Computer Architecture), Stored Program Concept- Von Neumann Architecture, Harvard Architecture, RISC and CISC Architecture.<br>**Register Transfer and Micro operations:** Introduction to Registers, Instruction Format, Types of Instructions- Memory Reference Instructions, Register Reference Instructions and Input-Output Instructions.<br>**Common Bus System:** Introduction to Common Bus System, Types of Buses (Data Bus, Control Bus, Address Bus), 16-bit Common Bus System--Data Movement among registers using Bus. | 8 |

**Text Books:**
1. Computer System Architecture, M.M. Mano, Third Edition, PHI.
2. Digital Computer Electronics, Malvino, Second Edition, Mc-Graw Hill.
3. Modern Digital Electronics, R. P. Jain, Fourth Edition, TMH.

**Reference Books:**
1. Computer Organization and Architecture, Stallings, Eighth Edition, PHI.
2. Computer Organization and Architecture, J.P.Hayes, Third Edition, TMH.
3. Digital and Electronic Circuits, T. C. Bartee, McGraw Hill.

Course Code: **BVDW204-19**
Course Name: **Mathematics**

| | |
|---|---|
| Program: **B. Voc.** | L: **3**    T: 0    P: 0 |
| Branch: **Data & Web Analytics** | Credits: **3** |
| Semester: **2nd** | Contact hours: **33** |
| Theory/Laboratory: **Theory** | Status (Elective/Core): **Core** |
| Internal max. marks: **40** | External max. marks: **60** |
| Total marks: **100** | |

**Course Outcomes**:

| CO# | Course outcomes |
|---|---|
| CO1 | Represent data using various mathematical notions. |
| CO2 | Explain different terms used in basic mathematics. |
| CO3 | Describe various operations and formulas used to solve mathematical problems. |

| Detailed Contents | Contact hours |
|---|---|
| **Unit-I**<br>Set Introduction, Objectives, Representation of Sets (Roster Method, Set Builder Method), Types of Sets (Null Set, Singleton Set, Finite Set, Infinite Set, Equal Set, Equivalent Set, Disjoint Set, Subset, Proper Subset, Power Set, Universal Set) and Operation with Sets (Union of Set, Intersection of Set, Difference of Set, Symmetric Difference of Set) Universal Sets, Complement of a Set. | 9 |
| **Unit-II**<br>Logic Statement, Connectives, Basic Logic Operations (Conjunction, Disjunction, Negation) Logical Equivalence/Equivalent Statements, Tautologies and Contradictions. | 8 |
| **Unit-III**<br>Matrices Introduction, Types of Matrix (Row Matrix, Column Matrix, Rectangular Matrix, Square Matrix, Diagonal Matrix, Scalar Matrix, Unit Matrix, Null Matrix, Comparable Matrix, Equal Matrix), Scalar Multiplication, Negative of Matrix, Addition of Matrix, Difference of two Matrix, Multiplication of Matrices, Transpose of a Matrix. | 11 |
| **Unit-IV**<br>Progressions Introduction, Arithmetic Progression, Sum of Finite number of quantities in A.P, Arithmetic Means, Geometric Progression, Geometric Mean. | 11 |

**Text Books:**
1. Discrete Mathematics and Its Applications by Kenneth H. Rosen, Mc Graw Hill, 6th Edition.
2. College Mathematics, Schaum's Series, TMH.

**Reference Books:**
1. Elementary Mathematics, Dr. RD Sharma.
2. Comprehensive Mathematics, Parmanand Gupta.
3. Elements of Mathematics, ML Bhargava.

Course Code: **BVDW205-19**
Course Name: **Database Management Systems Laboratory**

| | |
|---|---|
| Program: **B.Voc** | L: 0     T: 0     P: **3** |
| Branch: **Data & Web Analytics** | Credits: **1.5** |
| Semester: **2nd** | |
| Theory/Laboratory : **Laboratory** | Percentage of numerical/design problems:- |
| Internal max. marks: **30** | Duration of end semester exam (ESE):- |
| External max. marks: **20** | Status (Elective/Core): **Core** |
| Total marks: **50** | |

**Course Outcomes:**

| CO# | Course outcomes |
|---|---|
| CO1 | Able to understand various queries and their execution |
| CO2 | Populate and query a database using SQL DML/DDL commands. |
| CO3 | Declare and enforce integrity constraints on a database |
| CO4 | Programming PL/SQL including stored procedures, stored functions, cursors, packages |
| CO5 | Able to design new database and modify existing ones for new applications and reason about the efficiency of the result |

| | |
|---|---|
| **Task 1:** | Used of CREATE, ALTER, RENAME, DROP, INSERT INTO, DELETE and UPDATE statement in the database tables (relations) |
| **Task 2:** | Use of simple select statement, select query on two relations, nesting of queries, aggregate functions, substring comparison & order by statement |
| **Task 3:** | Write a PL/SQL code to add two numbers and display the result. Read the numbers during run time. |
| **Task 4:** | Write a PL/SQL code to find sum of first 10 natural numbers using while and for loop. |
| **Task 5:** | Write a program to create a trigger which will convert the name of a student to upper case before inserting or updating the name column of student table. |
| **Task 6:** | Write a PL/SQL block to increase the salary of all doctors by 1000. |
| **Task 7:** | Write a PL/SQL code to multiply two numbers using procedure inside the block. |
| **Task 8:** | Design database for Student Management System for your college using E-R model and Normalization. |
| **Task 9:** | Design and Develop Conceptual Data Model (E-R Diagram) for Library Management System with all the necessary entities, attributes, constraints and relationships. Design and build Relational Data Model for application specifying all possible constraints. |

**Recommended Hardware & Software:**
Intel Core i-3 / i-5 / i-7 processor with a speed of minimum 2 GHz, RAM 2 GB or higher, HDD 200 GB or higher, LED / LCD screen and Oracle/ Microsoft SQL Server/ MySQL/ Microsoft Access.

**Text Books:**
1. SQL, PL/SQL Programming Language of Oracle by 4th Revised Edition, Ivan Bayross.
2. Oracle PL/SQL Programming by 5th Edition, Steven Feuerstein and Bill Pribyl.

Course Code: **BVDW206-19**
Course Name: **Internet Tools and Application Lab**

| | |
|---|---|
| Program: **B. Voc.** | L: 0    T: 0    P: **3** |
| Branch: **Data & Web Analytics** | Credits: **1.5** |
| Semester: **2ⁿᵈ** | Percentage of numerical/design problems:- |
| Theory/Laboratory: **Laboratory** | Duration of end semester exam (ESE):- |
| Internal max. marks: **30** | External max. marks: **20** |
| Total marks: **50** | Status (Elective/Core): **Core** |

**Course Outcomes:** Students will be able to

| CO# | Course outcomes |
|---|---|
| CO1 | Understand basic concepts of Internet. |
| CO2 | Design a web page. |
| CO3 | Understand various applications of Internet . |

**Instructions:**

| | |
|---|---|
| 1 | Create a web page to show the structure of HTML |
| 2 | Show the use of formatting tags in HTML |
| 3 | Write HTML code to show the use of absolute and relative URL with Anchor Tag |
| 4 | Create a table in which colspan and rowspan elements are used. |
| 5 | Create a webpage to show the use of different lists available in HTML |
| 6 | Create a webpage to show the use of frame tag in HTML. |
| 7 | Create a webpage to show the use of different types of CSS |
| 8 | Create admission form for a college |
| 9 | Show the use of image tag and show images as buttons |
| 10 | Create a web page to show the use of image maps. |

1. Corner, Internetworking with TCP-IP: Principles, Protocols and Architecture, PHI.
2. Stephan Mack, Janan Platt, HTML 4.0 No Experience Required, BPB Publication.
3. Rick Darnell et al, HTML 4 Unleashed, Tech media Publications.

**Text Books:**
Course Code: **BVDW-301-21**
Course Name: **Programming with Python**

| | |
|---|---|
| Program: **B. Voc.** | L: **3**   T: 0  P: 0 |
| Branch: **Data & Web Analytics** | Credits: **3** |
| Semester: **3ʳᵈ** | Contact hours: **33** |
| Theory/Laboratory: **Theory** | Status (Elective/Core): **Core** |
| Internal max. marks: **40** | External max. marks: **60** |
| Total marks: **100** | |

**Course Outcomes:**

| CO# | Course outcomes |
|---|---|
| CO1 | Explain environment, data types, operators used in Python. |
| CO2 | Compare Python with other programming languages |
| CO3 | Outline the use of control structures and numerous native data types with their methods. |
| CO4 | Design user defined functions, modules, files, and packages and exception handling methods. |
| CO5 | Write solutions for Object Oriented Programming Concepts. |

| Detailed contents | Contact hours |
|---|---|
| **Unit-I**<br> Introduction to Python Programming Language: Programming Language, History and Origin of Python Language, Features of Python, Limitations, Major Applications of Python, Getting, Installing Python, Setting up Path and Environment Variables, Running Python, First Python Program, Python Interactive Help Feature, Python differences from other languages.<br> Python Data Types & Input/Output:<br>Keywords, Identifiers, Python Statement, Indentation, Documentation, Variables, Multiple Assignment, Understanding Data Type, Data Type Conversion, Python Input and Output Functions, Import command. [CO1, CO2] | 9 |
| **Unit-II**<br>Control Structures:<br>Decision making statements, Python loops, Python control statements.<br>Python Native Data Types:<br> Numbers, Lists, Tuples, Sets, Dictionary, Functions & Methods of Dictionary, Strings (in detail with their methods and operations). [CO3] | 8 |
| **Unit-III**<br> Python Functions:<br>Functions, Advantages of Functions, Built-in Functions, User defined functions, Anonymous functions, Pass by value Vs. Pass by Reference, Recursion, Scope and Lifetime of Variables.<br> Python Modules:<br> Module definition, Need of modules, Creating a module, Importing module, Path Searching of a Module, Module Reloading, Standard Modules, Python Packages. CO4, CO5] | 9 |
| **Unit-IV**<br>Exception Handling:<br> Exceptions, Built-in exceptions, Exception handling, User defined exceptions in Python.<br>File Management in Python:<br> Operations on files (opening, modes, attributes, encoding, closing), read() & write() methods, tell() & seek() methods, renaming & deleting files in Python, directories in Python.  [CO4, CO5] | 7 |

1. Programming in Python, Pooja Sharma, BPB Publications, 2017.
2. Core Python Programming, R. Nageswara Rao, 2nd Edition, Dreamtech.
**Reference Books:**
  1. Python, The complete Reference, Martin C. Brown, Mc Graw Hill Education.
  2. 2. Python in a Nutshell, A. Martelli, A. Ravenscroft, S. Holden, OREILLY.

Course Code: **BVDW302-21**
Course Name: **Introduction to Big Data**

| Program: **B. Voc.** | L: **3**    T: 0    P: 0 |
|---|---|
| Branch: **Data & Web Analytics** | Credits: **3** |
| Semester: **3rd** | Contact hours: **33** |
| Theory/Laboratory: **Theory** | Status (Elective/Core): **Core** |
| Internal max. marks: **40** | External max. marks: **60** |
| Total marks: **100** | |

**Course Outcomes**:

| CO# | Course outcomes |
|---|---|
| CO1 | Discuss the need of handling Big Data |
| CO2 | Set Environment for Big Data Handling |
| CO3 | Explain the role of Hadoop and its components |
| CO4 | Write basic Big Data Applications. |

| Detailed Contents | Contact hours |
|---|---|
| **Unit I**<br>**Getting an Overview of Big Data:**<br>What is Big Data? History of Data Management – Evolution of Big Data, Structuring Big Data, Elements of Big Data, Big Data Analytics, Careers in Big Data, Future of Big Data.[CO1]<br>**Exploring the Use of Big Data in Business Context**:<br>Use of Big Data in Social Networking, Use of Big Data in Preventing Fraudulent Activities, Use of Big Data in Detecting Fraudulent Activities in Insurance Sector, Use of Big Data in Retail Industry. [CO2]<br>**Understanding Hadoop Ecosystem**:<br> Hadoop Ecosystem, Hadoop Distributed File System, MapReduce, Hadoop YARN, Introducing HBase, Combining HBase and HDFS, Hive, [CO3] | 9 |
| **UNIT-II**<br>Overview of HDFS. Architecture of HDFS, Advantages and disadvantages of HDFS, HDFS Daemons, HDFS Blocks, HDFS file write and read, NameNode as SPOF, Hadoop HA, heartbeats, block reports and rereplication, Safemode of Namenode, Hadoop fs commands: cat, ls, put, get, rm, df, count, fsck, balancer, mkdir, du, copyfromlocal, copytolocal. [CO3] | 8 |
| **UNIT-III**<br> Hadoop fs commands: expunge, chmod, chown, chgrp, setrep, stat. Hadoop dfsadmin commands. Introduction to Apache Pig, Need of Pig, Installation of Pig, Execution modes of Pig, Pig – Architecture, Grunt shell and basic utility commands, Data types and Operators in Pig, Analysing data stored in HDFS using Pig, Pig operators for Data analysis: Dump, Describe, Explanation, Illustration, Store. [CO4] | 8 |
| **UNIT- IV**<br>Group, cogroup, join, split, filter, distinct, foreach, order by, limit operators. Functions in Pig: Eval functions, Load and store functions, Bag and tuple functions, String functions, Date time functions, Math functions, Case Studies: Analyzing various datasets with Pig. [CO4] | 8 |

**Reference Books** :
1. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics, "Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley.
 2. Big-Data Black Book, DT Editorial Services, Wiley India

3. Massive Online Open Courses (MOOCS): Big Data University, Udacity and Coursera.

4. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.

5. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.

6. Eric Sammer, "Hadoop Operations", O'Reilley, 2012".

Course Code: **BVDW303-21**

Course Name: **Computer Fundamentals**

| | |
|---|---|
| Program: **B. Voc.** | L: **3**   T: 0   P: 0 |
| Branch: **Data & Web Analytics** | Credits: **3** |
| Semester: **3rd** | Contact hours: **33** hours |
| Theory/Practical: **Theory** | Elective status: core/elective: **Core** |
| Internal max. marks: 40 | External max. marks: **60** |
| Total marks: **100** | |

**Prerequisite:** Information Technology

**Co requisite: -NA-**

**Additional material required in ESE: -NA-**

**Course Outcomes:** Students will be able to

| CO# | Course Outcomes |
|---|---|
| CO 1 | Explain importance of operating System in computer science. |
| CO 2 | Describe different types of Operating System and its services. |
| CO 3 | Build an understanding of the fundamental concepts of computer networking. |
| CO 4 | Define basic data structure concepts. |

| Detailed Contents | Contact hours |
|---|---|
| **Unit – I :** Operating System- I <br> **Fundamentals of Operating system**: Functions of an operating system; Evolution and types of operating systems; Operating system as a resource manager; Structure of operating system (Role of kernel and Shell). <br><br> **Process & Management**: Program vs. Process; State transition diagram; CPU Scheduling - Need of CPU scheduling, Different scheduling criteria's, scheduling algorithms (FCSC, SJF, Round-Robin). [CO1] | **9** |
| **Unit – II :** Operating System- II <br> **Advanced Operating systems:** Introduction to Distributed Operating system, Multiprocessor Operating system and Real Time Operating System. <br> Case study of Linux, Window. [CO2] | **9** |
| **Unit – III :** Computer Networks <br> **Networks: Types-** LAN, MAN and WAN; **Topologies:** Bus, Star, Ring, Mesh, Tree, Hybrid <br> **Network Reference Models**: OSI Reference Model – Services, design issues & applications; TCP/IP Reference Model,Comparison of OSI and TCP/IP Reference Models. <br> **Communication Channels:** Different types of transmission media. [CO3] | **7** |
| **Unit – IV :** Data Structures <br> **Introduction to Data Structures:** Classification of Data, Analysis and Complexity of Algorithm. Introduction to different types of data structures. (array, linked list, stack, queue, tree and graph). | **8** |

| | |
|---|---|
| **Searching and Sorting:** Searching: Linear and binary search. Sorting: bubble sort, selection sort. [CO4] | |

**Recommended Books** :

1. Abraham Silberschatz and Peter Baer Galvin, Operating System Principles,Seventh Edition, Published by Wiley-India.
2. Tanenbaum, Andrew, Computer Networks, , Fifth Edition, PHI.
3. Horowitz & Sawhaney: Fundamentals of Data Structures, Galgotia Publishers.
4. Aho Alfred V., Hopperoft John E., UIlman Jeffrey D., "Data Structures and Algorithms", AddisonWesley
5. S.K. Basandra, Computer Today, Galgotia.

# Reference books :

1. Naresh Chauhan, Principals of Operating System, Published by OXFORD University Press, India.
2. Behrouz A. Forouzan, Data Communication and Networking, Fourth Edition.
3. Stalling. Data and Computer Communications, , Ninth Edition, PHI.
4. Kruse R.L. Data Structures and Program Design in C; PHI
5. Yashwant Kanetkar, Understanding Pointers in C, BPB Publications.
6. Horowitz, S. Sahni, and S. Rajasekaran, Computer Algorithms, Galgotia Pub. Pvt. Ltd., 1998.

## IK Gujral Punjab Technical University Jalandhar
## B. Voc. (Data & Web Analytics), Batch-2021

Course Code: **BVDW304-21**

Course Name: **Advanced HTML & Java Script**

| | |
|---|---|
| Program: **B. Voc.** | L: **3**    T: 0    P: 0 |
| Branch: **Data & Web Analytics** | Credits: **3** |
| Semester: **3rd** | Contact hours: **33** |
| Theory/Laboratory: **Theory** | Status (Elective/Core): **Core** |
| Internal max. marks: **40** | External max. marks: **60** |
| Total marks: **100** | |

**Course Outcomes:**

| CO# | Course outcomes |
|---|---|
| CO1 | Organize data on web pages. |
| CO2 | Create multiple sections or frames on a wepages |
| CO3 | Design forms with special controls using HTML |
| CO4 | Outline the key web designing concepts using java script |

| Detailed Contents | Contact hours |
|---|---|
| **Unit-I:**<br>**Lists in HTML**<br>Type of Lists (Unordered List (Bullets), Ordered Lists (Numbering), Definition Lists.<br>**Tables in HTML**<br> Introduction (Header, Data rows, The Caption Tag), Using the Width and Border Attribute, Using the Cell padding Attribute, Using the Cell spacing Attribute, Using the BGCOLOR Attribute, Using the COLSPAN and ROWSPAN Attributes. [CO1] | 9 |
| **Unit-II**<br>**Linking Documents in HTML**<br>Links (External Document References, Internal Document References), Image As Hyperlinks.<br>**Frames in HTML**<br>Introduction to Frames: The tag, The tag, Targeting Named Frames. DHTML: Cascading Style Sheets, Style Tag. [CO2] | 8 |
| **Unit-III**<br>**Forms Used by a Web Site**<br>The Form Object, The Form Object's Methods (The Text Element, The Password Element, The Button Element, The Submit (Button) Element, The Reset (Button) Element, The Checkbox Element, The Radio Element, The Text Area Element, The Select and Option Element, The Multi Choice Select Lists Element). [CO3] | 8 |
| **Unit IV**<br>**Introduction to JavaScript**<br>JS Introduction, Where To, Output, Statements, Syntax, Comments, Variables, Operators, Arithmetic, Assignment, Data Types, Functions, Objects, Events, Strings, String Methods, Numbers, Number Methods, Arrays, Array Methods, Array Sort, Array Iteration, Dates, Date Formats, Date Get Methods, Date Set Methods, Math, Random, Booleans, Comparisons, Conditions, Switch, Loop For, Loop While, Break, Type Conversion, Bitwise, RegExp, Errors, Scope, Hoisting, Strict Mode. [CO4] | 8 |

**Text Books:**
1.  Internet for EveryOne: Alexis Leon, 1st Edition, Leon Techworld, Publication, 2009.
2. Greenlaw R; Heppe, "Fundamentals of Internet and WWW", 2nd Edition, Tata McGraw-Hill, 2007.
3. Raj Kamal, "Internet & Web Technologies", edition Tata McGraw-Hill Education.2009.

## IK Gujral Punjab Technical University Jalandhar
## B. Voc. (Data & Web Analytics), Batch-2021

Course Name: **Programming with Python Laboratory**

| | |
|---|---|
| Program: **B.Voc** | L: 0    T: 0    P: **3** |
| Branch: **Data & Web Analytics** | Credits: **1.5** |
| Semester: **3ʳᵈ** | |
| Theory/Laboratory : **Laboratory** | Percentage of numerical/design problems:- |
| Internal max. marks: **30** | Duration of end semester exam (ESE):- |
| External max. marks: **20** | Status (Elective/Core): **Core** |
| Total marks: **50** | |

**Course Outcomes:**

| CO# | Course outcomes |
|---|---|
| CO1 | Outline various programming constructs like data types and control structures of Python. |
| CO2 | Implement different data structures |
| CO3 | Implement modules and functions. |
| CO4 | Illustrate concept of object oriented programming. |
| CO5 | Implement file handling. |

| | |
|---|---|
| **Task 1:** | Compute sum, subtraction, multiplication, division and exponent of given variables input by the user |
| **Task 2:** | Compute area of following shapes: circle, rectangle, triangle, square, trapezoid and parallelogram |
| **Task 3:** | Compute volume of following 3D shapes: cube, cylinder, cone and sphere |
| **Task 4:** | Compute and print roots of quadratic equation $ax^2+bx+c=0$, where the values of a, b, and c are input by the user. |
| **Task 5:** | Print numbers up to N which are not divisible by 3, 6, 9,, e.g., 1, 2, 4, 5, 7,…. |
| **Task 6:** | Write a program to determine whether a triangle is isosceles or not? |
| **Task 7:** | Print multiplication table of a number input by the user. |
| **Task 8:** | Compute sum of natural numbers from one to n number. |
| **Task 9:** | Print Fibonacci series up to n numbers e.g. 0 1 1 2 3 5 8 13…..n |
| **Task 11:** | Compute factorial of a given number |
| **Task 12:** | Design a Python class named Circle constructed by a radius and two methods which will compute the area and the perimeter of a circle. |
| **Task 13:** | Design a Python class to reverse a string 'word by word' |
| **Task 14:** | Construct a Python program to write and append text to a file and display the text |
| **Task 15:** | Design a Python program to read first n lines of a text file. |

**Text Books:**
1. Programming in Python, Pooja Sharma, BPB Publications, 2017.
2. Core Python Programming, R. Nageswara Rao, 2ndEdiiton, Dreamtech.
**Reference Books:**
1. Python, The complete Reference, Martin C. Brown, Mc Graw Hill Education.
2. Python in a Nutshell, A. Martelli, A. Ravenscroft, S. Holden, OREILLY.

Course Code: **BVDW306-21**

Course Name: **Advanced HTML & Java Script Laboratory**

| | |
|---|---|
| Program: **B.Voc** | L: 0    T: 0    P: **3** |
| Branch: **Data & Web Analytics** | Credits: **1.5** |
| Semester: **3ʳᵈ** | |
| Theory/Laboratory : **Laboratory** | Percentage of numerical/design problems:- |
| Internal max. marks: **30** | Duration of end semester exam (ESE):- |
| External max. marks: **20** | Status (Elective/Core): **Core** |
| Total marks: **50** | |

**Course Outcomes:**

| CO# | Course outcomes |
|---|---|
| CO1 | Design pages with simple tags in HTML |
| CO2 | Create web pages with Auido and Video content in it |
| CO3 | Illustrate the movement from one web page to another |
| CO4 | Implement advanced web designing concepts using java script. |
| CO5 | Execute a small web pased project for the benefit of scoiety |

| | |
|---|---|
| **Task 1:** | Create a simple HTML page to demonstrate the use of different tags |
| **Task 2:** | Design index page of a book on web designing. |
| **Task 3:** | Display Letter Head of your college on a web page. |
| **Task 4:** | Create a Hyperlink to move around within a single page rather than to load another page. |
| **Task 5:** | Display letter using different Text formatting Tags |
| **Task 6:** | Design Time Table of your department and highlights of most important periods |
| **Task 7:** | Use Tables to provide layout to your web page. |
| **Task 8:** | Embed Audio and Video into your web page. |
| **Task 9:** | Divide a web page vertically and horizontally and display logo of your college in left pane and logo of university in right pane. |
| **Task 11:** | Design front page of hospital with different style sheets. |
| **Task 12:** | Write a program to create a login form. On submitting the form, the user should get navigated to a profile page using JavaScript. |
| **Task 13:** | Write a code to create a Registration Form. On submitting the form, the user should be asked to login with the new credentials using JavaScript. |
| **Task 14:** | Write an HTML code to create your Institute website/Department website/ Tutorial website for specific subject. Also use Java Script for validation |

Reference Books:
1. Greenlaw R; Hepp E, "Fundamentals of Internet and www", 2nd Edition, Tata. McGraw-Hill, 2007.
2. A Beginner's Guide to HTML http://www.Ncsa.Nine.Edit/General/Internet/www/ a. html.prmter.

Course Code: **BVDW**307**-21**

Course Name: **Introduction to Big Data Laboratory**

| | |
|---|---|
| Program: **B.Voc** | L: 0    T: 0    P: **3** |
| Branch: **Data & Web Analytics** | Credits: **1.5** |
| Semester: **4th** | |
| Theory/Laboratory : **Laboratory** | Percentage of numerical/design problems:- |
| Internal max. marks: **30** | Duration of end semester exam (ESE):- |
| External max. marks: **20** | Status (Elective/Core): **Core** |
| Total marks: **50** | |

**Course Outcomes:**

| CO# | Course outcomes |
|---|---|
| CO1 | Setting up environment for handling Big Data. |
| CO2 | Work with files and directories. |
| CO3 | Implement basic applications for Big Data. |

| | |
|---|---|
| **Task 1:** | Installation of Hadoop. |
| **Task 2:** | File management tasks in Hadoop.<br>• create directory<br>• list contents of directory<br>• upload and download a file in HDFS<br>• see contents of a file<br>• copy a file from source to destination<br>• move file from source to destination, etc. |
| **Task 3:** | Installation of pig |
| **Task 4:** | Exercises to work on different data types and operators in pig. |
| **Task 5:** | Exercises to implement different functions in pig. |
| **Task 6:** | Analyzing datasets with Pig. |

**Reference Books** :

1. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics, "Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley.
2. Big-Data Black Book, DT Editorial Services, Wiley India
3. Massive Online Open Courses (MOOCS): Big Data University, Udacity and Coursera.
4. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.
5. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
6. Eric Sammer, "Hadoop Operations", O'Reilley, 2012".

# IK Gujral Punjab Technical University Jalandhar
## B. Voc. (Data & Web Analytics), Batch-2021

**Course Code: BVDW401-21**
**Course Name: Data Warehouse and Mining**

| | |
|---|---|
| **Program:** B.Voc Web & Data Analytics | **L**: 3    **T**: 1    **P**: 0 |
| **Branch:** Computer Applications | **Credits:** 4 |
| **Semester:** 4th | **Contact hours:** 44 hours |
| **Theory/Practical:** Theory | **Percentage of numerical/design problems:** 20% |
| **Internal max. marks:** 40 | **Duration of end semester exam (ESE):** 3hrs |
| **External max. marks:** 60 | **Elective status:** Elective |
| **Total marks:** 100 | |

**Prerequisite: -NA-**
**Co requisite: -NA-**
**Additional material required in ESE: -NA-**
**Course Outcomes:** After completing this course, students will be able to:

| CO# | Course outcomes |
|---|---|
| CO1 | Highlight the need of Data Warehousing & Mining |
| CO2 | Differentiate between the Transactional and Analytical data models. |
| CO3 | Identify the real life applications where data mining can be applied. |
| CO4 | Apply different data mining algorithms on wide range of data sets. |
| CO5 | Explain the role of visualization in data representation and analysis. |

| Detailed Contents | Contact hours |
|---|---|
| **Unit-I**<br>Need for strategic information, difference between operational and Informational data stores (OLAP vs OLTP).<br>Data warehouse definition, characteristics, Data warehouse role and structure, Data warehouse architecture, Approaches to build a data warehouse, Building a data warehouse, Metadata & its types, OLAP Operations, OLAP servers, [CO1] | 11 |
| **Unit-II**<br>Data Pre-processing: Need, Data Summarization, Methods. Denormalization, Multidimensional data model, Schemas for multi-dimensional data (Star schema, Snowflake Schema, Fact Constellation Schema, Difference between different schemas.<br> [CO2] | 11 |
| **Unit-III**<br>Data Mining: Definition, Data Mining process, Data mining methodology, Data mining tasks, Mining various Data types & issues. Attribute-Oriented Induction, Association rule mining, Frequent itemset mining, The Apriori Algorithm, [CO3] | 12 |
| **Unit-IV**<br><br>Overview of classification, Classification process, Decision tree, Decision Tree Induction, Attribute Selection Measures. [CO4]<br>Introduction to Clustering, Types of clusters, Clustering methods, Data visualization & its tools, Implementation of classification and clustering algorithms using WEKA (open Source tool). [CO5] | 10 |

**Text Books:**
1. Data Warehousing, Data Mining & Olap by Berson, Tata Mcgraw- Hill.
2. Han J., Kamber M. and Pei J., Data mining concepts and techniques, Morgan Kaufmann Publishers (2011) 3rd ed.
3. Pudi V., Krishana P.R., Data Mining, Oxford University press, (2009) 1st ed.
4. Adriaans P., Zantinge D., Data mining, Pearson education press (1996), 1st ed.
5. Pooniah P., Data Warehousing Fundamentals, Willey interscience Publication, (2001), 1st ed.

**Course Code: BVDW402-21**
**Course Name: Data Analytics using R**

| | |
|---|---|
| **Program:** B.Voc Web & Data Analytics | **L**: 3    **T**: 1    **P**: 0 |
| **Branch:** Computer Applications | **Credits:** 4 |
| **Semester:** 4th | **Contact hours:** 44 hours |
| **Theory/Practical:** Theory | **Percentage of numerical/design problems:** 20% |
| **Internal max. marks:** 40 | **Duration of end semester exam (ESE):** 3hrs |
| **External max. marks:** 60 | **Elective status:** Elective |
| **Total marks:** 100 | |

**Prerequisite**: Logics of basic programming terminologies.
**Co requisite**: Simulation study.
**Additional material required in ESE**: -NA-
**Course Outcomes**:

| CO# | Course Outcomes |
|---|---|
| CO1 | Identify the key components of R programming Language. |
| CO2 | Define the concept of data Science. |
| CO3 | Differentiate between vectors and arrays. |
| CO4 | Outline the usage of data frames, lists, factors, tables and R structures. |
| CO5 | Explain the need and utilization of various visualization tools. |

| Detailed Contents | Contact hours |
|---|---|
| **Unit-I**<br><br>**R Programming Fundamentals:** Introduction to R, Installing R, Windows/Linux/Mac Installation, Setting up Path, Using Packages, and Running R: Interactive Mode, Batch Mode, Getting Help, Startup and Shut Down.[CO1]<br><br>**Vectors:** Scalars, Vectors, Arrays and Matrices, Declarations, Recycling, Common Vector Operations, Using all() and any(), Na and Null Values, Filtering, ifelse() Function.[CO3]<br><br>**Matrices and Arrays:** Creating Matrices, General Matrix Operations, Applying Functions to Matrix Rows and Columns, Adding & Deleting Matrix Rows and Columns, Difference Between Matrix and Vector.[CO3] | 11 |
| **Unit-II**<br><br>**Lists:** Creating Lists, General List Operations, Accessing List Components and Values, Applying Functions to Lists, Recursive Lists. **Data Frames:** | 11 |

| | |
|---|---|
| Creating Data Frames, Merging Data Frames, Applying Functions to Data Frames. [CO4] <br><br> **Factors and Tables:** Introduction, Common Functions use with Factors, Working with Tables.[CO4] <br><br> **R Programming Structures:** Control Statements, Arithmetic and Boolean Operators, Default Values for Arguments, Return Values, Recursion.[CO4] | |
| **Unit-III** <br><br> **Object Oriented Programming:** Concept of Classes, S3 Classes, S4 Classes, S3 Versus S4 Classes, Managing Objects.[CO1] <br><br> **Input/Output:** Accessing Keyboard and Monitor, Reading and Writing Files, Accessing the Internet. <br><br> **String Manipulation:** Overview of String Manipulation Functions [grep(), nchar(), paste(), sprintf(), substr(), strsplit(), regexpr(), gregexpr(), Regular expression].[CO5] | 12 |
| **Unit-IV** <br><br> **Graphics:** Creating Graphs, Customizing Graphs, Saving Graphs to Files, Creating 3D Plots. <br><br> **Debugging:** Principles of Debugging, Use of Debugging Tool, ~~Using~~ R Programming Debugging Facilities. [CO3] <br><br> **Simulation:** Generating Random Numbers, Setting the Random Number Seed, Simulating ~~a~~ Linear Model, Random Sampling.[CO5] | 10 |

**Text Books:**
1. The ART of R Programming, Norman Matloff, No Starch Press.
2. R Programming for Data Science, Roger D. Peng, Lean Publishing.
3. R Programming for Beginners, S. Rakshit, TMH.

**Reference Books:**
1. Data Analytics using R, Seema Acharya, TMH.

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**Course Code:** BVDW 403-21

**Course Name: Data Structures**

| | | |
|---|---|---|
| **Program**: B.Voc Web & Data Analytics | **L**: 3 **T**: 1 **P**: 0 | |
| **Branch**: Computer Applications | **Credits**: 4 | |
| **Semester**: 4th | **Contact hours:** 44 hours | |
| **Theory/Practical:** Theory | **Percentage of numerical/design problems:** -- | |
| **Internal max. marks:** 40 | **Duration of end semester exam (ESE):** 3hrs | |
| **External max. marks:** 60 | **Elective status:** Core | |
| **Total marks:** 100 | | |

**Prerequisite: -NA-**
**Co requisite: -NA-**
**Additional material required in ESE: -NA-**
**Course Outcomes:** Students will be able to

| CO# | Course outcomes |
|-----|-----------------|
| CO1 | Apply appropriate constructs of Programming language, coding standards for application development |
| CO2 | Select appropriate data structures for problem solving and programming |
| CO3 | Illustrate the outcome of various operations on data structures. |
| CO4 | Identify appropriate searching and/or sorting techniques for wide range of problems and data types. |
| CO5 | Differentiate between various types of data structures |

| Detailed Contents | Contact hours |
|-------------------|---------------|
| **Unit-I**<br><br>**Introduction to Data Structures:**<br>Algorithms and Flowcharts, Complexity of Algorithm, Introduction and Definition of Data Structure, pointer, declaration and use of pointer, pointer arithmetic and dynamic allocation using pointer, structures/classes with pointers, Various types of Data Structure, operations on data structure.<br><br>**Arrays:**<br>Introduction to Arrays, insertion and deletion in One Dimensional Array and Two Dimensional Array. [CO1] | 10 |
| **Unit-II**<br><br>**Linked Lists**<br>Introduction, Representation of Linked Lists, Singly Linked List, Doubly Linked List, Circular Linked List, And Circular Doubly Linked List, Operations of Linked Lists.[CO2,5] | 8 |
| **Unit-III**<br><br>**Stacks and Queue**<br>Introduction to Stack, Definition, Stack Implementation, Operations of Stack, Introduction to Queue, Definition, Queue Implementation, Operations of Queue. [CO 2,3,5] | 14 |
| **Unit-IV**<br><br>**Searching and Sorting:** Searching, Types of Searching like linear and binary search, Sorting, Types of sorting like quick sort, bubble sort, merge sort, selection sort. [CO4] | 12 |

**Text Books**
1. Brijesh Bakariya. Data Structures and Algorithms Implementation through C, BPB Publications.
2. Kruse R.L. Data Structures and Program Design in C; PHI

3. Aho Alfred V., Hopperoft John E., UIlman Jeffrey D., "Data Structures and Algorithms", AddisonWesley

**Reference books**
1. Horowitz & Sawhaney: Fundamentals of Data Structures, Galgotia Publishers.
2. Yashwant Kanetkar, Understanding Pointers in C, BPB Publications.
3. Horowitz, S. Sahni, and S. Rajasekaran, Computer Algorithms, Galgotia Pub. Pvt. Ltd., 1998.

**Course Code: BVDW 404-21**
**Course Name: Digital Marketing**

| | |
|---|---|
| **Program**: B.Voc Web & Data Analytics | **L**: 3    **T**: 1  **P**: 0 |
| **Branch**: Computer Applications | **Credits:** 4 |
| **Semester**: 4th | **Contact hours:** 44 hours |
| **Theory/Practical:** Theory | **Percentage of numerical/design problems:** -- |
| **Internal max. marks:** 40 | **Duration of end semester exam (ESE):** 3hrs |
| **External max. marks:** 60 | **Elective status:** Elective |
| **Total marks:** 100 | |

**Prerequisite: -NA-**
**Co requisite: -NA-**
**Additional material required in ESE: -NA-**
**Course Outcomes:**

| CO# | Course outcomes |
|---|---|
| CO1 | Highlight the key elements of a digital marketing strategy. |
| CO2 | Choose the right platform for digital marketing |
| CO3 | Identify the major digital marketing channels. |
| CO4 | Design content for digital marketing. |
| CO5 | Develop digital marketing strategy and plan. |

| Detailed Contents | Contact hours |
|---|---|
| **Unit-I**<br><br>**Introduction to Digital Marketing**<br>Difference between Traditional Marketing and Digital Marketing, Benefits of using Digital Media, Inbound and Outbound Marketing, Online marketing POEM: (Paid, Owned, and Earned Media), Components of Online Marketing (Email, Forum, Social network, Banner, Blog), Impact of Online Marketing, Basics of Affiliate Marketing, Viral Marketing, Influencer Marketing, Referral Marketing. [CO1]<br><br>**Email Marketing:** Email newsletters, Digests, Dedicated Emails, Lead Nurturing, Sponsorship Emails and Transactional Emails, Drawbacks of Email Marketing [CO1]<br><br>**Social Media Marketing (SMM):** Different types of Social Media Marketing like Facebook, LinkedIn, Twitter, Video, Instagram etc.[CO1] | 11 |
| **Unit –II**<br><br>**Search Engine Optimisation (SEO)** | 11 |

| | |
|---|---|
| About SEO, Need of an SEO friendly website, Importance of Internet and Search Engines; Role of Keywords in SEO. [CO2]<br><br>**On-Page Optimization (Onsite):** Basics of Website Designing / Development; HTML Basics for SEO; Onsite Optimization Basics; Website Structure and Navigation Menu Optimization; SEO Content Writing. Keywords Research and Analysis (eg. SWOT analysis of website, finding appropriate keywords). **Off Page Optimization:** Introduction; Local marketing of websites depending on locations; Promoting Subsequent pages of the website. Introduction to organic SEO vs non-organic SEO; Social Media Optimization Techniques and Page Rank Technology.[CO2] | |
| **Unit-III**<br><br>**Website Planning & Creation**<br>**Content Marketing Strategy:** Goals and concepts, Strategic building blocks, Content creation & channel distribution, Tools of the trade, Advantages and challenges.<br>**Keywords Research and Analysis:** Introduction to Keyword Research; Business Analysis; Types of Keywords; Keywords Analysis Tools.[CO3]<br><br>**Web Presence:** Online presence and driving more traffic for a website, Search result visibility in search engines for chosen keyword and phrases, Using e-mail marketing to drive traffic for a website, Posting social media content for lead generation, Tools to create and manage content, Use of Blogging as content strategy. [CO3]<br><br>**Creating content:** Writing and posting content on the web and in social networks, blog and video; Create, manage and implement a content marketing strategy; Monitoring and recording results to improve content marketing campaigns; Successful content marketing strategies and case studies.[CO4] | **12** |
| **Unit-IV**<br><br>**Online Advertising, Mobile Marketing and Web analytics**<br>Introduction to Online Advertising and its advantages, Paid versus Organic, Pay Per Click (PPC) Model. Basic concepts Cost per Click (CPC), CPM, CTR, CR etc. About Mobile Marketing, Objectives of Mobile Advertising, Creating a Mobile Marketing Strategy, Introduction to SMS Marketing. About Web Analytics, Types of Web Analytics (On-site, Off-site), Importance of Web Analytics [CO5] | **10** |

**Text Books:**

1. Puneet Singh Bhatia, Fundamentals of Digital Marketing First Edition, Publication Pearson.
2. Vandana Ahuja, Digital Marketing 1st Edition, Publication Oxford
3. Shivani Karwal, "Digital Marketing Handbook: A Guide to search Engine Optimization, Pay Per Click Marketing, Email Marketing and Content Marketing", CreateSpace Independent Publishing Platform, 1st edition.

**Reference Books:**

1. Ian Dodson, The Art of Digital Marketing: The Definitive Guide to Creating Strategic, Targeted and Measurable Online Campaigns, Publication Wiley India Pvt Ltd.

2. Philip Kotler, Hermawan Kartajaya, Iwan Setiawan, Marketing 4.0: Moving from Traditional to Digital, Publication Wiley India Pvt Ltd.

3. Venakataramana Rolla, "Digital Marketing Practice guide for SMB: SEO, SEM and SMM", CreateSpace Independent Publishing Platform, First edition.

4. Enge, E., Spencer, S., Stricchiola, J., & Fishkin, R. (2012). The art of SEO. " O'Reilly Media, Inc.".

**E Books/ Online learning material:**
1. www.sakshat.ac.in
2. https://swayam.gov.in
3. https://www.edx.org/course/online-marketing-strategies-curtinx- mkt5x
4.  https://www.emarketinginstitute. org/free-courses/ eMarketing Institute

**Course Code: BVDW 405-21**
**Course Name: Data Analytics using R Laboratory**

| | |
|---|---|
| **Program**: B.Voc Web & Data Analytics | **L**: 0   **T**: 0   **P**:4 |
| **Branch**: Computer Applications | **Credits**: 2 |
| **Semester**: 4th | **Contact hours**: 4 hours per week |
| **Theory/Practical**: Practical | **Percentage of numerical/design problems**: -- |
| **Internal max. marks**: 60 | **Duration of End Semester Exam (ESE)**: 3hrs |
| **External max. marks**: 40 | **Elective Status:** Elective |
| **Total marks**: 100 | |

**Prerequisite**: - Logics of basic programming terminologies.
**Co requisite**: - Simulation study.
**Additional material required in ESE**: - Record the *Simulation Results* on practical file.
**Course Outcomes**: Students will be able to

| CO# | Course Outcomes |
|---|---|
| CO1 | Write programs for arrays and matrices. |
| CO2 | Execute data frames and lists. |
| CO3 | Differentiate between arrays from vectors. |
| CO4 | Implement factors in R |
| CO5 | Execute minor projects using R. |

**Instructions**: All programs are to be developed in R Programming Language.

| | |
|---|---|
| 1. | Design a program to take input from the user (name and age) and display the values through R Programming. |
| 2. | Write a program to get the details of the objects in memory using R Programming. |
| 3. | Create a sequence of numbers from 20 to 50 and find the mean of numbers from 20 to 60 and sum of numbers from 51 to 91 using R Programming. |
| 4. | Create a vector which contains 10 random integer values between -50 and +50 using R Programming. |
| 5. | Demonstrate through a program to display the details of the objects in memory. |
| 6. | Write a R program to get the first 10 Fibonacci numbers. |
| 7. | Show all prime numbers up to a given number usingh R rogramming.. |
| 8. | Design a R program to find the factors of a given number. |
| 9. | Write a R program to find the maximum and the minimum value of a given vector. |

| | |
|---|---|
| 10. | Write a program to get the unique elements of a given string and unique numbers of vector. |
| 11. | Convert a given matrix to a 1 dimensional array through R programming. |
| 12. | Write a R program to create an array of two 3x3 matrices each with 3 rows and 3 columns from the given two vectors. |
| 13. | Create a 3 dimensional array of 24 elements using dim() function. |
| 14. | Write a R program to create an array using four given columns, three given rows and two given tables, also display the contents of the array. |
| 15. | To convert a given matrix to 1 dimensional array design a R program. |
| 16. | Write a R program to concatenate two given factor in a single factor. |
| 17. | Write a R program to create an 3 dimensional array of 24 elements using the dim() function. |
| 18. | Construct a R program to create an array of two 3x3 matrices each with 3 rows and 3 columns from the given two vectors. Print the second row of the second matrix of the array and the element in the 3rd row and 3rd column of the 1st matrix. |
| 19. | Write a R program to create a data frame from four given vectors. |
| 20. | Write a program to get the structure of a given data frame. |
| 21. | Design a R program to get the statistical summary and nature of the data of a given data frame. |
| 22. | Write a R program to extract specific column from a data frame using column name. |
| 23. | Design a R program to create a data frame from four given vectors. |
| 24. | Demonstrate a R program to get the structure of a given data frame. |
| 25. | Write a R program to get the statistical summary and nature of the data of a given data frame. |
| 26. | Design a R program to extract specific column from a data frame using column name. |
| 27. | Demonstrate a R program to create a data frame from four given vectors. |
| 28. | Write a R program to create a matrix taking a given vector of numbers as input. Display the matrix. |
| 29. | Construct a R program to create a matrix taking a given vector of numbers as input and define the column and row names. Display the matrix. |
| 30. | Write a R program to access the element at $3^{rd}$ column and $2^{nd}$ row, only the $3^{rd}$ row and only the $4^{th}$ column of a given matrix. |
| 31. | Develop a R program to create a vector of a specified type and length. Create vector of numeric, complex, logical and character types of length 6. |
| 32. | Write a R program to add two vectors of integers type and length. |
| 33. | Design a R program to append value to a given empty vector |
| 34. | Write a R program to multiply two vectors of integers type and length. |
| 35. | Design a R program to create a list containing strings, numbers, vectors and a logical values. |
| 36. | Write a R program to list containing a vector, a matrix and a list and give names to the elements in the list. |
| 37. | Demonstrate a R program to find the levels of factor of a given vector. |
| 38. | Write a R program to change the first level of a factor with another level of a given factor. |
| 39. | Design a R program to create an ordered factor from data consisting of the names of months. |
| 40. | Construct graphical output & display the results of any five tasks using simulator. |

**Text Books:**
1. The ART of R Programming, Norman Matloff, No Starch Press.
2. R Programming for Data Science, Roger D. Peng, Lean Publishing.
3. R Programming for Beginners, S. Rakshit, TMH.

**Reference Books:**
1. Data Analytics using R, Seema Acharya, TMH.

**Course Code: BVDW 406-21**
**Course Name: Data Structures Laboratory**

| | | | |
|---|---|---|---|
| **Program**: B.Voc Web & Data Analytics | **L**: 0     **T**: 0     **P**: 4 |
| **Branch**: Computer Applications | **Credits**: 2 |
| **Semester:** 4th | **Contact hours:** 4 hours per week |
| **Theory/Practical:** Practical | **Percentage of numerical/design problems:** -- |
| **Internal max. marks:** 60 | **Duration of end semester exam (ESE):** 3hrs |
| **External max. marks:** 40 | **Elective status:** Core |
| **Total marks:** 100 | |

**Prerequisite: -NA-**
**Co requisite: -NA-**
**Additional material required in ESE: - NA-**
**Course Outcomes:** Student will be able to

| CO# | Course outcomes |
|---|---|
| CO1 | Implement Dynamic memory allocation. |
| CO2 | Create different data structures in C/ C++ |
| CO3 | Implement various operations of all data structures |
| CO4 | Illustrate the outcome of various operations with the help of examples. |
| CO5 | Write programs to implement various types of searching and sorting algorithms |

**Instructions:** Programs may be developed in C/C++/Python/Java language.
**List of assignments:**

| | |
|---|---|
| 1 | Write a program to implement pointers. |
| 2 | Write a program to implement dynamic memory allocation using pointers. |
| 3 | Write a program to create self referential structure using pointers. |
| 4 | Program to insert, delete and traverse an element from an array |
| 5 | Program to merge one dimensional arrays |
| 6 | Program for implementing selection sort. |
| 7 | Program for implementing insertion sort. |
| 8 | Program for implementing bubble sort. |
| 9 | Program for implementing merge sort. |
| 10 | Program for implementing Queue using array. |
| 11 | Program to create linked list |
| 12 | Program to insert and delete in linked list |
| 13 | Program to search in linked list. |
| 14 | Write a program to implement linear search. |
| 15 | Write a program to implement binary search. |
| 16 | Write a program to find the sum of two 2-D arrays. |
| 17 | Write a program to multiply 2 2-D arrays. |

| 18 | Write a program to print the diagonal elements of the 2-D array. |
|----|-----------------------------------------------------------------|
| 19 | Write a program to implement push operation in stack. |
| 20 | Write a program to implement pop operation using stack. |

**Reference Books:**

1. Brijesh Bakariya. Data Structures and Algorithms Implementation through C, BPB Publications.
2. Aho Alfred V., Hopperoft John E., UIlman Jeffrey D., "Data Structures and Algorithms", AddisonWesley
3. Horowitz & Sawhaney: Fundamentals of Data Structures, Galgotia Publishers.

# *Fifth Semester*

**Course Code:  BVDW 501-21**
**Course Name: Probability and Statistics**

| | |
|---|---|
| **Program:** B.Voc Web & Data Analytics | **L: 3     T: 0     P: 0** |
| **Branch**: Computer Applications | **Credits:** 3 |
| **Semester:** 5th | **Contact hours: 3** hours |
| **Internal max. marks:** 40 | **Theory/Practical:** Theory |
| **External max. marks:** 60 | **Duration of end semester exam (ESE):** 3hrs |
| **Total marks:** 100 | **Elective status:** Core |

**Prerequisite:** Students must have the basic knowledge of mathematic terms.
**Co requisite:** NA
**Additional material required in ESE:** Minimum two exercises of each concept will be recorded in the file and the file will be submitted in End Semester Examinations.
**Course Outcomes:** After studying this course, students will be able to:

| CO# | Course Outcomes |
|---|---|
| CO1 | Understand the science of studying & analyzing numbers |
| CO2 | Define probability |
| CO3 | Describe various statistical formulas. |
| CO4 | Compute various statistical measures. |

| Detailed Contents | Contact hours |
|---|---|
| **Unit I**<br><br>Define probability, Random experiment, outcome, trial and event, Exhaustive events, favourable events, Independent events, sample space, definition of probability, addition theorem of probability, conditional probability, independent events, Mutually and pair wise independent events, multiplication theorem of probability for independent events, Baye's theorem. | 8 hours |
| **Unit II**<br><br>Random Variable (Univariate): Random Variable, Distribution function, discrete random variable, Probability mass function, Distribution function of discrete random variable, Continuous random variable, Probability density function. Distribution function of continuous random variable. Two dimensional probability mass function, Marginal probability function, conditional probability function, Two dimensional distribution function, marginal distribution function, Joint density function, marginal density function. | 8 hours |
| **Unit III**<br><br>Define statistics, Measures of Central tendency: Introduction to Central Tendency, Purpose and Functions of Average, Characteristics of a Good Average, Types of Averages, Meaning of Arithmetic Mean, Calculation of Arithmetic Mean, Merit and Demerits of Arithmetic Mean, Meaning of Median, Calculation of Median, Merit and Demerits of Median, Meaning of | 8 hours |

| | |
|---|---|
| Mode, Calculation of Mode, Merit and Demerits of Mode, Harmonic Mean- Properties- Merit and Demerits. | |
| **Unit IV**<br><br>Measures of Dispersion: Meaning of Dispersion, Objectives of Dispersion, Properties of a good Measure of Dispersion, Methods of Measuring Dispersion, Range Introduction, Calculation of Range , Merit and Demerits of Range, Mean Deviation, Calculation of Mean Deviation , Merit and Demerits of Mean Deviation, Standard Deviation Meaning, Calculation of Standard Deviation , Merit and Demerits of Standard Deviation, Coefficient of Variation, Calculation of Coefficient Variance, Merit and Demerits of Coefficient of Variation. | 9 hours |

**Text Books:**
1. Statistics and Data Analysis, A.Abebe, J. Daniels, J.W.Mckean, December 2000.
2. Statistics, Tmt. S. EzhilarasiThiru, 2005, Government of Tamilnadu.
3. Introduction to Statistics, David M. Lane.
4. Weiss, N.A., Introductory Statistics. Addison Wesley, 1999.
5. Clarke, G.M. & Cooke, D., A Basic course in Statistics. Arnold, 1998.

**Reference Books:**
1. Banfield J.(1999), Rweb: Web-based Statistical Analysis, Journal of Statistical Software.
2. Bhattacharya,G.K. and Johnson, R.A.(19977), Statistical Concepts and Methods, New York, John Wiley & Sons.

**E-Books/ Online learning material**
1. http://onlinestatbook.com/Online_Statistics_Education.pdf
2. https://textbookcorp.tn.gov.in/Books/12/Std12-Stat-EM.pdf
3. https://3lihandam69.files.wordpress.com/2015/10/introductorystatistics.pdf

**Course Code: BVDW502-21**

**Course Name: Computer Networks**

| | |
|---|---|
| Program: B.Voc Web & Data Analytics | L: **3**    T: 0    P: 0 |
| Branch: **Computer Applications** | Credits: **3** |
| Semester: **5th** | Contact hours: **33** |
| Theory/Laboratory: **Theory** | Elective status: **Core** |
| Internal max. marks: **40** | External max. marks: **60** |
| Total marks: **100** | |

**Course Outcomes:**

| CO# | Course outcomes |
|---|---|
| CO1 | Familiar with the different Network Models. |
| CO2 | Understand different protocols working at Medium Access Sub-layer. |
| CO3 | Learn the concept of network routing through algorithms. |
| CO4 | Learn and understand Internet protocols and network security. |

| Detailed contents | Contact hours |
|---|---|
| **Unit 1 :**<br>Data Communications Concepts: Digital and analog transmissions-Modem, parallel and serial, synchronous and asynchronous, Modes of communication: Simplex, half duplex, full duplex, Concept of multiplexing, De-multiplexing.<br>Types of Networks: LAN, MAN, WAN<br>Network Topologies: Bus, Star, Ring, Mesh, Tree, Hybrid<br>Communication Channels: Wired transmissions: Telephone lines, leased lines, switch line, coaxial cables-base band, broadband, optical fiber transmission. | 9 |
| **Unit 2 :**<br>Transmission Media: Guided Media(Twisted Pair Cable, Coaxial Cable, Fiber Optics Cable), Unguided Media (Radio Waves, Microwaves, Infrared)<br>Communication Devices (Switches, Hub, Routers, gateway etc)<br>Introduction to Switching: Circuit Switch Networks, Datagram Switch Networks<br>Network Models. | 8 |
| **Unit 3 :**<br>Introduction to OSI Model – Physical Layer, Data Link Layer, Network Layer, Transport Layer, Session Layer, Presentation Layer<br>TCP/IP (Layer Architecture) Data Link Layer, Internet Layer, Transport Layer, Application Layer | 8 |
| **Unit 4 :**<br>MAC sub layer: 802.4Token Bus, IEEE 802.5 Token Ring<br>Concept of Internetworking. | 8 |

**Text Books:**
1. Computer Networks, Tanenbaum, Andrew, Fifth Edition, PHI.
2. Data Communication and Networking, Behrouz A. Forouzan, Fourth Edition.
3. Computer Today, S.K. Basandra, First Edition, Galgotia.

**Reference Books:**
1. Data Communication System, Black, Ulysse, Third Edition, PHI.
2. Data and Computer Communications, Stalling, Ninth Edition, PHI.

**Course Code:  BVDW 503-21**
**Course Name:  Programming with PHP**

| | | |
|---|---|---|
| **Program**: B.Voc Web & Data Analytics | **L**: 3      **T**: 0     **P**: 0 | |
| **Branch**: Computer Applications | **Credits:** 3 | |
| **Semester**: 5th | **Contact hours:** 33 hours | |
| **Theory/Practical:** Theory | **Percentage of numerical/design problems:** 80% | |
| **Internal max. marks:** 40 | **Duration of end semester exam (ESE):** 3hrs | |
| **External max. marks:** 60 | **Elective status:** Core | |
| **Total marks:** 100 | | |

**Prerequisite:** Students must have basic knowledge of any text editor like notepad++ and Edit plus etc.
**Co requisite:** Students must know the background of HTML, Front-End, Back-End & concept of Structure Query Language.
**Additional material required in ESE:**
   ➢ Demonstration of the website of college/ specific department/specific cells etc. will be presented by the students during the final practical.

➢ Developed Website/s must be made online by the student/s.
➢ Printouts of the Main Page of the website must be arranged on Practical file during daily lab work and must be submitted in the final examinations.

**Course Outcomes:** After studying this course, students will be able to:

| CO# | Course Outcomes |
|------|------------------|
| CO1 | Outline the importance and benefits of PHP |
| CO2 | Compare Client Side Script & Server Side Script. |
| CO3 | Explain the use of control structures, data types used in PHP. |
| CO4 | Implement database connectivity. |
| CO5 | Develop Dynamic Website that can interact with different kinds of Database Languages. |

| Detailed contents | Contact hours |
|--------------------|----------------|
| **Unit-I**<br><br>**Introduction to PHP**<br>Evolution of PHP & its comparison Interfaces to External systems, Hardware and Software requirements, PHP Scripting. Basic PHP Development, Working of PHP scripts, Basic PHP syntax, PHP data types. [CO1]<br><br>**Displaying type information:** Testing for a specific data type, Changing type with Set type, Operators, Variable manipulation, Dynamic variables and Variable scope. [CO1] | 8 |
| **Unit-II**<br><br>**Control Statements**<br>if() and elseif() condition Statement, The switch statement, Using the? Operator, Using the while() Loop, The do while statement, Using the for() Loop. [CO3]<br><br>**Functions**<br>Function definition, Creation, Returning values, Library Functions, User-defined functions, Dynamic function, default arguments, Passing arguments to a function by value. [CO3]<br><br>**String Manipulation**<br>Formatting String for Presentation, Formatting String for Storage, Joining and Splitting String, Comparing String<br>.<br>**Array**<br>Anatomy of an Array, Creating index based and Associative array, Looping array using each() and foreach() loop. [CO2] | 9 |
| **Unit-III**<br><br>**Forms**<br>Working with Forms, Super global variables, Super global array, Importing user input, Accessing user input, Combine HTML and PHP code, Using hidden fields, Redirecting the user. | 9 |

| | |
|---|---|
| **Working with File and Directories**<br>Understanding file & directory, Opening and closing a file, Coping, renaming and deleting a file, Working with directories, File Uploading & Downloading. Generating Images with PHP: Basics computer Graphics, Creating Image. | |
| **Unit-IV**<br><br>**Database Connectivity with MySql**<br>Introduction to RDBMS, Connection with MySql Database, Performing basic database operation (DML) (Insert, Delete, Update, Select).[CO4] [CO5] | 7 |

**Text Books:**
1. PHP: The Complete Reference, "Steven Holzner" , Tata McGraw Hill.
2. Programming PHP, "Kevin Tetroi" , O' Reilly.
3. Robin Nixon, Learning PHP, MySQL, and JavaScript, Shroff/O'Reilly.

**E-Books/ Online learning material:**
1. https://www.tutorialspoint.com/php/php_tutorial.pdf
2. https://www.w3schools.com/php/
3. https://education.fsu.edu/wp-content/uploads/2015/04/Learning-PHP-MySQL-JavaScript-and-CSS-2nd-Edition-1.pdf

**Course Code: BVDW 504-21**
**Course Name: Linux Operating System**

| | |
|---|---|
| **Program**: B.Voc Web & Data Analytics | **L**: 3    **T**: 0    **P**: 0 |
| **Branch:** Computer Applications | **Credits**: 3 |
| **Semester**: 5th | **Contact hours:** 3 hours |
| **Theory/Practical:** Theory | **Percentage of numerical/design problems:** 60% |
| **Internal max. marks:** 40 | **Duration of end semester exam (ESE):** 3hrs |
| **External max. marks:** 60 | **Elective status:** Core |
| **Total marks:** 100 | |

**Prerequisite**: Operating System
**Co requisite: -NA-**
**Additional material required in ESE: -NA-**
**Course Outcomes:** After completing this course, students will be able to:

| CO# | Course outcomes |
|---|---|
| CO1 | Discuss the evolution of Open Source operating systems. |
| CO2 | Prepare environment for working on open source operating system like Linux. |
| CO3 | Perform resource management in Linux |
| CO4 | Write scripts in Linux. |
| CO5 | Execute user level privileges |

| Detailed contents | Contact hours |
|---|---|
| **Unit-I**<br><br>**Introduction to Linux**<br>History of Linux & Unix, Overview of Linux Operating System, structure of Linux Operating system, Installation. [CO1]<br>Desktops (The X window System, GNOME, KDE), desktop operations. Different types of editors, vi editor and its command. | 7 |
| **Unit-II**<br><br>**Shells and Utilities**<br>Role of shells in the Linux environment, Different types of shells in Linux Operating system, Shell configuration: Shell initialization & configuration directories & file, Aliases, Filename expansion, Standard Input/ Output & Redirection, Pipes, Managing Jobs.[CO3]<br><br>**Shell Scripting:** Different types of statements in shell script, variables in shell, assign values to shell variables, Default shell variables value, Rules for Naming variables, Display the value of shell variables Getting User writing simple shell scripts to accept input from the user and display a message on screen, Shell scripts to implement various control statements. [CO4] | 9 |
| **Unit-III**<br><br>**Files Systems & Linux Software**<br>Linux Files, File structure, commands for managing files & directories with other commonly used commands, Software Management, Office and Database Applications, Graphics Tools and Multimedia, Internet & Network services, Web, FTP & java Clients.<br>[CO3] | 9 |
| **Unit-IV**<br><br>**Linux Administration**<br>Managing users, Superuser Control, System Run levels, Managing File Systems, [CO3]<br><br>**Kernel Administration**: Linux kernel sources, rebuilding kernel, installing kernel, Virtualization, backup management. [CO5] | 8 |

**Text Books:**
1. Linux: The complete reference by Richard Petersen, Published by Tata McGraw- Hill Publication.
2. Linux in a Nutshell: A Desktop Quick Reference, 6th Edition by Stephen Figgins, Arnold Robbins, Ellen Siever & Robert Love Published by O'Reilly Media.
3. Linux Administration: A Beginner's Guide by Steve Shah & Wale Soyinka, Published by McGraw-Hill Education
4. Unix Shell Programming by Yashavant P. Kanetkar, Published by BPB Publishers.

-------------------------------------------------------------------------------------------------------------------------------

**Course Code: BVDW 505-21**
**Course Name: Programming with PHP Laboratory**

| | |
|---|---|
| **Program**: B.Voc Web & Data Analytics | **L**: 0    **T**: 0    **P**: 2 |
| **Branch**: Computer Applications | **Credits:** 1 |
| **Semester**: 5th | **Contact hours:** 2 hours per week |
| **Theory/Practical:** Practical | **Percentage of numerical/design problems:** 100 |
| **Internal max. marks:** 30 | **Duration of end semester exam (ESE):** |
| **External max. marks:** 20 | **Elective status:** Core |
| **Total marks:** 50 | |

**Prerequisite**: Students must have the knowledge of editors like Notepad++ and Edit plus etc.
**Co requisite:** Students must know the background of Markup Language, Front-End, Back-End & concept of Structure Query Language.

**Additional material required in ESE:**
➢ Demonstration of the website of college/ specific department/specific cells etc. will be presented by the students during the final practical.
➢ Developed Website/s must be made online by the student/s.
➢ Printouts of the Main Page of the website must be arranged on Practical file during daily lab work and must be submitted in the final examinations.

**Course Outcomes:** After studying this course, students will be able to:

| CO# | Course outcomes |
|---|---|
| CO1 | Write scripts for basic web page designs |
| CO2 | Design the work flow of web page with the help of various control statements |
| CO3 | Differentiate between client side and server side scripting |
| CO4 | Illustrate the concept of static and dynamic websites |
| CO5 | Implement the database concepts in PHP |

**Instructions:** Instructor can increase/decrease the experiments as per the requirement.

| | |
|---|---|
| 1. | Take values from the user and compute sum, subtraction, multiplication, division and exponent of value of the variables. |
| 2. | Write a program to find area of following shapes: circle, rectangle, triangle, square, trapezoid and parallelogram. |
| 3. | Compute and print roots of quadratic equation. |
| 4. | Write a program to determine whether a triangle is isosceles or not? |
| 5. | Print multiplication table of a number input by the user. |
| 6. | Calculate sum of natural numbers from one to n number. |
| 7. | Print Fibonacci series up to n numbers e.g. 0 1 1 2 3 5 8 13 21…..n |
| 8. | Write a program to find the factorial of any number. |
| 9. | Determine prime numbers within a specific range. |
| 10. | Write a program to compute, the Average and Grade of students marks. |
| 11. | Compute addition, subtraction and multiplication of a matrix. |
| 12. | Count total number of vowels in a word "Develop & Empower Individuals". |
| 13. | Determine whether a string is palindrome or not? |

| 14. | Display word after Sorting in alphabetical order. |
|---|---|
| 15. | Check whether a number is in a given range using functions. |
| 16. | Write a program accepts a string and calculates number of upper case letters and lower case letters available in that string. |
| 17. | Design a program to reverse a string word by word. |
| 18. | Write a program to create a login form. On submitting the form, the user should navigate to profile page. |
| 19. | Design front page of a college or department using graphics method. |
| 20. | Write a program to upload and download files. |

**Reference Books:**
1. PHP: The Complete Reference, "Steven Holzner" , January 1, 2007. Tata McGraw-Hill Education.
2. Programming PHP, "Kevin Tetroi", O' Reilly.
3. Published by Wiley Publishing, Inc. 10475 Crosspoint Boulevard Indianapolis, IN 46256

**E-Books/ Online learning material:**
1. http://cs.petrsu.ru/~musen/php/2013/Books/Beginning%20PHP%205.3%20by%20Matt%20Doyle.pdf
2. https://www.w3schools.com/php/

**Course Code: BVDW 506-21**
**Course Name: Linux Operating System Laboratory**

| **Program**: B.Voc Web & Data Analytics | **L**: 0    **T**: 0    **P**: 4 |
|---|---|
| **Branch**: Computer Applications | **Credits**: 2 |
| **Semester**: 5th | **Contact hours:** 4 hours per week |
| **Theory/Practical:** Practical | **Percentage of numerical/design problems:** 100 |
| **Internal max. marks:** 30 | **Duration of end semester exam (ESE):** |
| **External max. marks:** 20 | **Elective status:** Core |
| **Total marks:** 50 | |

**Prerequisite:** Operating system
**Co requisite: -NA-**
**Additional material required in ESE: -NA-**
**Course Outcomes:**

| CO# | Course outcomes |
|---|---|
| CO1 | Prepare the environment for installation and use of Linux operating system |
| CO2 | Write Shell Scripts |
| CO3 | Implement C programs using gcc compiler |
| CO4 | Impelment virtualization |
| CO5 | Execute commands related to grantinf and revoking user priviledges. |

**Instructions:**

| | |
|---|---|
| 1 | Installation of Linux OS. |
| 2 | Writing advanced shell programs |
| 3 | Installation and management of printers |
| 4 | Using gcc compiler to write c programs |

| 5 | Configuring mail server |
|---|---|
| 6 | Configuring FTP server |
| 7 | Connecting to internet |
| 8 | Implementing different commands to manage file system |
| 9 | Implementation of virtualization |
| 10 | Becoming super user and implementing configuration commands |
| 11 | Implementing commands to manage users |

- Instructor can select the commands, utilities and services to be managed on their own.

**Reference Books:**
1. Linux: The complete reference by Richard Petersen, Published by Tata McGraw- Hill Publication.
2. Linux in a Nutshell: A Desktop Quick Reference, 6th Edition by Stephen Figgins, Arnold Robbins, Ellen Siever & Robert Love Published by O'Reilly Media.
3. Unix Shell Programming by Yashavant P. Kanetkar, Published by BPB Publishers.

Course Code: **BVDW 507-21**
Course Name: **Computer Networks Laboratory**

| Program: B.Voc Web & Data Analytics | L: 0     T: 0     P: **2** |
|---|---|
| Branch: Computer Applications | Credits: **1** |
| Semester: **5th** | Percentage of numerical/design problems:- |
| Theory/Laboratory: **Laboratory** | Duration of end semester exam (ESE):- |
| Internal max. marks: **30** | External max. marks: **20** |
| Total marks: **50** | Status (Elective/Core): **Core** |

**Course Outcomes:**

| CO# | Course outcomes |
|---|---|
| CO1 | To execute and evaluate network administration commands and demonstrate their use in different network scenarios. |
| CO2 | To demonstrate the installation and configuration of network simulator. |
| CO3 | Demonstrate and measure different network scenarios and their performance behavior. |

| Task 1 : | Preparing Computer Network Cable using Connectors and Networking tools |
|---|---|
| Task 2 : | LAN & WAN Connectivity using Hub, Switch and Router |
| Task 3 : | Installation of Windows and Server |
| Task 4 : | Sharing Peripheral Devices. |
| Task 5 : | Configuration of Network Connectivity |
| Task 6 : | Troubleshooting of Computer Hardware and Network |

**Recommended Hardware:**

Simple Network Components, Networking Components like Switch, Router, Hub, NIC, PC/Laptop, Router, Connectivity Network lab

**Text Books:**
1. Computer Networks, Tanenbaum, Andrew, Fifth Edition, PHI.
2. Data Communication and Networking, Behrouz A. Forouzan, Fourth Edition.
3. Computer Today, S.K. Basandra, First Edition, Galgotia.

**Course Code: BVDW601-21**
**Course Name: Advanced Web Technologies**

| | |
|---|---|
| **Program**: B. Voc. (Data &Web Analytics) | **L**: 3     **T**: 0     **P**: 0 |
| **Branch**: Computer Applications | **Credits**: 3 |
| **Semester**: 6th | **Contact hours:** 33 hours |
| **Theory/Practical:** Theory | **Percentage of numerical/design problems:** 80% |
| **Internal max. marks:** 40 | **Duration of end semester exam (ESE):** 3hrs |
| **External max. marks:** 60 | **Elective status:** Skill Enhancement |
| **Total marks:** 100 | |

**Prerequisite: - basic Web Programming**
**Co requisite: -NA-**
**Additional material required in ESE: -NA-**
**Course Outcomes:** Students will be able to:

| CO# | Course outcomes |
|---|---|
| CO1 | Learn to represent web data and XML document handling. |
| CO2 | Understand AJAX and relevance. |
| CO3 | Able to learn how to perform basic CRUD database operations in a Dynamic Website. |
| CO4 | Learn about web services and their development. |

| Detailed contents | Contact hours |
|---|---|
| **Part A**<br>**PHP**: Server-side web scripting, Installing PHP, Adding PHP to HTML, Syntax and Variables, Passing information between pages, Strings, Arrays and Array Functions, Numbers, Basic PHP errors/ problems.<br><br>**Advanced PHP and MySQL**: PHP/MySQL Functions, Displaying queries in tables, Introduction to PHP OOPs concepts, Building Forms from queries, String and Regular Expressions, Sessions, Cookies and HTTP, Type and Type Conversions, E-Mail<br><br>**Introduction to Web Services:** Use of Web Services, Types of Web Services, Introduction to Content Management System CMS (Types, Usages, Benefits). | 22 Hours |
| | |

| **Part B** | 22 Hours |
|---|---|
| **XML**: Introduction to XML, XML Basics, XML Syntax and Editors, documents, Elements, Attributes. Creating XML documents.<br><br>**Ajax** : Introduction and Use of Ajax in Website.<br>**jQuery** : Introduction, jQuery UI: Date picker, auto complete, tooltip, accordion, retrieving page content, manipulating page content, working with events.<br><br>**Introduction to Bootstrap :** Components of Bootstrap<br><br>**Introduction to Node.js**: Node Package Manager (NPM), Node.js Webserver – Server and Clients. | |
| **React**: Introduction to ReactJS, Environment Setup, JSX, Components, State, Props, Validating Props, Component API, Component Life Cycle, Forms, Events | |
| | |

**Text Books:**
1. Steven Holzner, "PHP: The Complete Reference", TATA McGraw Hill, 2015.
2. Roger S Pressman, David Lowe, "Web Engineering: A Practitioner's Approach", TMH.
3. W. Jason Gilmore,"Beginning PHP and MySQL: From Novice to Professional", Apress.
4. "Learning PHP, MySQL, JavaScript, CSS and HTML 5", Robin Nixon, O'Reilly publication
5. Web Technologies, Black Book, dreamtech Press
6. Alex Young, "Node.js in Action", 2ed, Bradley Meck

**Reference Books:**
1. Jesus Caspagnetto, "Professional PHP Programming", Wrox Publication.
2. P.J. Deitel & H.M. Deitel, "Internet and World Wide Web How to program", Pearson
3. Harwani, "Developing Web Applications in PHP and AJAX", McGrawHill
4. Ralph Moseley and M. T. Savaliya, "Developing Web Applications", Wiley-India
5. HTML 5, Black Book, Dreamtech Press

**Course Code: BVDW606-21**
**Course Name: Advanced Web Technology Laboratory**

| **Program**: B. Voc. (Data &Web Analytics) | **L**: 0    **T**: 0    **P**: 2 |
|---|---|
| **Branch**: Computer Applications | **Credits**: 1 |
| **Semester**: 6th | **Contact hours:** 2 hours per week |
| **Theory/Practical:** Practical | **Percentage of numerical/design problems:** 100% |
| **Internal max. marks:** 30 | **Duration of End Semester Exam (ESE):** |
| **External max. marks:** 20 | **Elective status:** Skill Enhancement |
| **Total marks:** 50 | |

**Course Outcomes:** After studying this course, students will be able to:

| CO# | Course Outcomes |
|-----|-----------------|
| CO1 | Understand the advance concepts of website development. |
| CO2 | Provide skills to design and develop dynamic web sites. |
| CO3 | Work independently for database programming for web applications |
| CO4 | Understand concepts of jQuery methods, AJAX, Bootstrap and REACT |
| CO5 | Connect Website with an Database Server and perform basic CRUD operations. |
| CO6 | Develop market ready website, to be used by clients. |

**Instructions:** Instructor can increase/decrease the experiments as per the requirement.

**Assignments:** All the Practical Assignments need to be carried on specific applications. (Example: Inventory Management System, Bus/Airline/Railway Reservation System, Student Management System etc.)

| | Practice Programs with PHP |
|-----|-----------------|
| 1. | PHP Code to display today's date in dd-mm-yyyy format. |
| 2. | PHP Code to check if number is prime or not. |
| 3. | PHP Code to print first 10 Fibonacci Numbers. |
| 4. | PHP Code to read data from txt file and display it in html table (the file contains info in format Name: Password: Email ) |
| 5. | PHP Script for login authentication. Design an HTML form which takes username and password from user and validate against stored username and password in file. |
| 6. | PHP Script for storing and retrieving user information from MySql table. <br> • Design A HTML page which takes Name, Address, Email and Mobile No. From user (register.php ) <br> • Store this data in MySql database / text file. <br> • Next page display all user in html table using PHP (display.php) |
| 7. | PHP Script for user authentication using PHP-MYSQL. Use session for storing username. |
| | Implement the following with specific web applications |
| 8. | Create HTML page for chosen application that contain textbox, submit / reset button. Write php program to display this information and also store into text file. |
| 9. | Create XML documents for chosen application and validate using DTD and schema. Also render the content of XML document using XSL. <br> Scenarios include <br> • XML document must have attributes and elements so that they can be validated against DTD/Schema. <br> • Check the data types of variables declared in XML document using Schema. <br> • Display the details of data contained in XML document in a table using XSL. |

| 10. | Embed the JQuery features for the application chosen. Perform the Scenarios using JQUERY ready function<br>• In login form, define username and password constraints and ensure that the credentials follow them.<br>• In registration form, username must be of atleast 6 characters. Password must be of atleast 8 characters and follow password constraints. Password and confirm password fields must match with each other. E-mail id must be of the form "yourname@domain.com". Mobile number must be of 10 digits only and starting digit must be any number from 6-9 etc…<br>• Use the get and post methods for server side communication. |
|---|---|
| 11. | Modify the specific web applications to use AJAX to show the result on the same page. |
| 12. | Enhance functionality of the specific web applications using BOOTSTRAP |
| 13. | Create a responsive Photo Gallery in BOOTSTRAP |
| 14. | Suppose you have a list of Students having Student's Name, Roll Number, Marks in five subjects, Show this list in a responsive table in BOOTSTRAP |
| 15. | Modify your answer for above question with PHP and MYSQL database and Perform CRUD operations with AJAX |
| 16. | Build a Password Strength Check App with JQuery. You can use AJAX for form validation and add an alert when the user enters a weak password. |
| 17. | Build a Registration Form and Validate it with JQuery. Registration Form must have at least 10 elements. |

| 18. | Design a Sign In, Sign Up and Forgot Password Page with BOOTSTRAP. Use PHP and MYSQL to store Sign Up data in Database. |
|-----|-----|
| 19. | Create a Star Rating System in JQuery. |
| 20. | Create a simple To-do list Application with REACT |
| 21. | Create a Calculator with REACT |
| 22. | Create a Photo Gallery with REACT. Also implement search operation |
| 23. | How can you create a Portfolio App with Node.js? |
| 24. | Create a simple Shopping Cart with REACT and Node.js |
| 25. | Modify your Shipping Cart with JQuery, JSON and AJAX functionality. |

**Reference Books:**
1. Roger S Pressman, David Lowe, "Web Engineering: A Practitioner's Approach", TMH.
2. Steven Holzner, "PHP: The Complete Reference", TATA McGraw Hill, 2015.
3. W. Jason Gilmore,"Beginning PHP and MySQL: From Novice to Professional",

| CO# | Course outcomes |
|-----|-----|

Apress.
4. Learning PHP, MySQL, JavaScript, CSS and HTML 5, Robin Nixon, O'Reilly publication

| | | | |
|-----|-----|-----|-----|
| **Program**: B. Voc. (Data &Web Analytics) | **L**: 3 **T**: 1 **P**: 0 |
| **Branch:** Computer Applications | **Credits**: 4 |
| **Semester**: 6ᵗʰ | **Contact hours:** 44 hours |
| **Theory/Practical:** Theory | **Percentage of numerical/design problems:** 20% |
| **Internal max. marks:** 40 | **Duration of end semester exam (ESE):** 3hrs |
| **External max. marks:** 60 | **Elective status:** Elective |
| **Total marks:** 100 | |

**Course Code: BVDW602-21**
**Course Name: Business Intelligence**

**Prerequisite**:
**Co requisite: -NA-**
**Additional material required in ESE: -NA**
**Course Outcomes:** After completing this course, students will be able to:

| | |
|---|---|
| CO1 | Understand the fundamentals of business intelligence and link data mining with business  intelligence |
| CO2 | Apply various modeling techniques and business intelligence methods to various situations  using data mining principles and techniques |
| CO3 | Implement data analysis techniques to make better business decisions and demonstrate the  impact of business reporting, information visualization, and dashboards |

| Detailed contents | Contact hours |
|---|---|
| **Unit-I**<br><br>**DECISION SUPPORT SYSTEMS AND BUSINESS INTELLIGENCE**<br><br>The Concept of Decision Support Systems – A Framework for Business Intelligence  - Effective and timely decisions – A Work System View of Decision Support – The  Major Tools and Techniques of Managerial Decision Support - Data, information  and knowledge – Role of mathematical models – Business intelligence  architectures: Cycle of a business intelligence analysis – Enabling factors in  business intelligence projects – Development of a business intelligence system | 10 |
| **Unit-II**<br>**BASICS OF DATA INTEGRATION ETL**<br><br>Concepts of data integration - need and advantages of using data integration - introduction to common data integration approaches - introduction to ETL - introduction to data quality, data profiling concepts and applications. Introduction to data and dimension modeling - multidimensional data model - ER Modeling vs.  multi-dimensional modeling - concepts of dimensions, facts, cubes, attribute,  hierarchies, star and snowflake schema. | 10 |
| **Unit-III**<br><br>**Business intelligence applications & Classification:**<br><br>Marketing models: Relational marketing, Sales force management, Logistic  and production models: Supply chain optimization, Optimization models for  logistics planning, Revenue management systems.<br>Data envelopment analysis: Efficiency measures, Efficient frontier, The CCR model, Identification of good operating practices.<br><br>Classification:<br>Classification: Classification problems, Evaluation of classification  models, Bayesian methods, Logistic regression, Neural networks,  Support vector machines. | 12 |

| **Unit-IV** | 12 |
|---|---|
| **KNOWLEDGE MANAGEMENT AND KNOWLEDGE DELIVERY**<br>Introduction to Knowledge Management – Knowledge Management Activities – Approaches to Knowledge Management - Information Technology(IT) in Knowledge Management - The business intelligence user types - Standard reports - Interactive Analysis and Ad Hoc Querying -<br><br>Parameterized Reports and Self-Service Reporting - Dimensional analysis - Alerts/Notifications - Visualization: Charts, Graphs, Widgets, Scorecards  and Dashboards - Geographic Visualization - Integrated Analytics - Considerations: Optimizing the Presentation for the Right Message | |

**Course Code: BVDW603-21**
**Course Name: Data Visualization**

| **Program:** B. Voc. (Data &Web Analytics) | **L**: 3 **T**: 1 **P**: |
|---|---|
| **Branch**: Computer Applications | **Credits:**4 |
| **Semester:**6ᵗʰ | **Contacthours:**4hours per week |
| **Theory/Practical:** Theory | **Percentage of numerical/design problems:**-- |
| **Internal Max.marks:**40 | **Duration of end semester exam (ESE):** 3hrs |
| **External Max.marks:**60 | **Elective status:** core |
| **Total marks:** 100 | |

**Prerequisite: -NA**
**Co Requisite**: **-NA**
**Additional material required in ESE: -NA**

**Course Outcomes:** Students will be able to:

| CO# | Course Outcomes |
|---|---|
| CO1 | Familiarize students with the basic and advanced techniques of information visualization and  scientific visualization |
| CO2 | To learn key techniques of the visualization process |
| CO3 | A detailed view of visual perception, the visualized data and the actual visualization, interaction and  distorting techniques |

**Unit 1**

Introduction of visual perception, visual representation of data, Gestalt principles, information overloads.
Creating visual representations, visualization reference model, visual mapping, visual analytics, Design of visualization applications. **[co1]**

**Unit 2**
Classification of visualization systems, Interaction and visualization techniques misleading, Visualization of one, two and multi-dimensional data, text and text documents. **[co2]**

**Unit 3**
Visualization of volumetric data, vector fields, processes and simulations, Visualization of maps, geographic information, GIS systems, collaborative visualizations, Evaluating visualizations. **[co2]**

**Unit 4**
Recent trends in various perception techniques, various visualization techniques, data structures used in data visualization.
TOOLS: Programming Statistical Data Visualization, Google Map API, Google Chart, Tableau  - Heat Map Generation **[co3]**

**I. K. Gujral Punjab Technical University Bachelor of**
**Science in Data Analytic (B Sc. Data Analytics)**

**Suggested Books:**

1. Jon Raasch, Graham Murray, Vadim Ogievetsky, Joseph Lowery, "JavaScript and jQuery for Data Analysis and Visualization", WROX
2. Ritchie S. King, Visual story telling with D3" Pearson
3. Ben Fry, "Visualizing data: Exploring and explaining data with the processing environment", O'Reilly, 2008.
4. A Julie Steele and Noah Iliinsky, Designing Data Visualizations: Representing Informational Relationships, O'Relly
5. Andy Kirk, Data Visualization: A Successful Design Process, PAKT
6. Scott Murray, Interactive Data Visualization for Web, O'Relly
7. Nathan Yau, "Data Points: Visualization that means something", Wiley, 2013.
8. Tamara Munzner, Visualization Analysis and Design, AK Peters Visualization Series, CRC Press, Nov. 2014

**Course Code: BVDW605-21**

**Course Name: Data Visualization Laboratory**

| **Program:** B. Voc. (Data &Web Analytics) | **L**: 0 **T**: 0 **P**:4 |
|---|---|

| | |
|---|---|
| **Branch**: Computer Applications | **Credits:**2 |
| **Semester:**6ᵗʰ | **Contacthours:**4hours per week |
| **Theory/Practical:** Practical | **Percentage of numerical/design problems:**-- |
| **Internalmax.marks:**60 | **Duration of end semester exam (ESE):** 3hrs |
| **Externalmax.marks:**40 | **Elective status:** core |
| **Total marks:** 100 | |

**Prerequisite: -** Logics of basic programming terminologies
**Co requisite: -** Simulation Study.
**Additional material required in ESE: -**Record the Simulation Results on
Practical File.
**Course Outcomes:** Students will be able to:

| CO# | Course Outcomes |
|---|---|

| CO1 | Design effective data visualizations to communicate information to the viewer. |
|---|---|
| CO2 | Identify appropriate data that can be used in order to create a visualization. |
| CO3 | Organize data and visualizations in order to prepare them for reuse. |

**Instructions: All programs are to be developed in R Programming Language.**

1. Loading and Distinguishing Dependent and Independent

parameters 2. Exploring Data Visualization tools

3. Drawing Charts

4. Drawing Graphs

5. Data mapping

6. Creating Scatter Plot maps

7. Using BNF Notations

8. Working with REGEX

9. Visualize Network Data

10. Understanding Data Visualization frameworks

11. Design applications to implement **Google Map API, Google Chart,**

**Tableau - Heat  Map Generation**

**Reference Books:**
1. E. Tufte, The Visual Display of Quantitative Information, Graphics Press. 2nd
Edition, 2001
2. Alexandru C Telea, Data Visualization: Principles and Practice, 2nd Edition,
2014
3. Wang Kaining, Infographic & Data Visualizations, sew Edition. 2013
4. Andy Krik, Data Visualisation: A Handbook for Data Driven Design, 1st Edition, 2016

**Course Code: BVDW604-21**
**Course Name: Web Analytics**

| | |
|---|---|
| **Program**: B. Voc. (Data &Web Analytics) | **L**: 3 **T**: 1 **P**: 0 |
| **Branch:** Computer Applications | **Credits**: 4 |
| **Semester**: 6th | **Contact hours:** 44 hours |
| **Theory/Practical:** Theory | **Percentage of numerical/design problems:** 60% |
| **Internal max. marks:** 40 | **Duration of end semester exam (ESE):** 3hrs |
| **External max. marks:** 60 | **Elective status:** |
| **Total marks:** 100 | |

**IK Gujral Punjab Technical University Jalandhar**
**B. Voc. (Data & Web Analytics), Batch-2021**

**Prerequisite**:
**Co requisite: -NA**
**Additional material required in ESE: -NA**
**Course Outcomes:** After completing this course, students will be able to:

| CO# | Course outcomes |
|---|---|
| **CO1** | **Understand the concept and importance of Web analytics in an organization and the role of Web analytic in collecting, analyzing and reporting website traffic.** |
| **CO2** | **Identify key tools and diagnostics associated with Web analytics** |
| **CO3** | **Explore effective Web analytics strategies and implementation and Understand the importance of web analytic.** |

| Detailed contents | Contact hours |
|---|---|
| **Unit-I**<br><br>**INTRODUCTION TO WEB ANALYTICS:** Introduction to Web Analytics: Web Analytics Approach – A Model of Analysis – Context matters – Data Contradiction – Working of Web Analytics: Log file analysis – Page tagging – Metrics and Dimensions – Interacting with data in Google Analytics. | 10 |
| **Unit-II**<br><br>**LEARNING ABOUT USERS THROUGH WEB ANALYTICS:** Goals: Introduction – Goals and Conversions – Conversion Rate – Goal reports in Google Analytics – Performance Indicators – Analysing Web Users: Learning about users – Traffic Analysis – Analysing user content – Click-Path analysis – Segmentation | 10 |
| **Unit-III**<br><br>**GOOGLE ANALYTICS:** Different analytical tools - Key features and capabilities of Google analytics- How Google analytics works - Implementing Google analytics - Getting up and running with Google analytics -Navigating Google analytics – Using Google analytics reports - Google metrics - Using visitor data to drive website improvement- Focusing on key performance indicators Integrating Google analytics with third-Party applications | 12 |

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|---|---|
| **Unit-IV** <br><br> **OVERVIEW OF QUALITATIVE ANALYSIS:** Lab Usability Testing Heuristic Evaluations- Site Visits- Surveys (Questionnaires) - Testing and Experimentation: A/B Testing and Multivariate Testing-Competitive Intelligence - Analysis Search Analytics: Performing Internal Site Search Analytics, Search Engine Optimization (SEO) and Pay per Click (PPC)- Website Optimization against KPIs- Content optimization- Funnel/Goal optimization - Text Analytics: Natural Language Processing (NLP)- Supervised Machine Learning (ML) Algorithms-API and Web data scarping using R and Python | 12 |

**Text Books:**

1  Beasley M, (2013), Practical web analytics for user experience: How analytics can help you understand your users. Newnes, 1st edition, Morgan Kaufmann.
2  Sponder M, (2013), Social media analytics: Effective tools for building, interpreting, and using metrics, 1st edition, McGraw Hill Professional.
3  Clifton B, (2012), Advanced Web Metrics with Google Analytics, 3rd edition, John Wiley & Sons.

**Web resources:**

[1] **https://analytics.google.com/analytics/web/**
[2] **https://www.optimizely.com/optimization-glossary/web-analytics/**
[3]**https://www.tutorialspoint.com/web_analytics/web_analytics_introduction.htm**

**Course Code: BVDW607-21**
**Course Name: Web Analytics Laboratory**

| | |
|---|---|
| **Program**: B. Voc. (Data &Web Analytics) | **L**: 0 **T**: 0 **P**: 4 |
| **Branch**: Computer Applications | **Credits**: 2 |
| **Semester**: 6th | **Contact hours:** 2 hours per week |
| **Theory/Practical:** Practical | **Percentage of numerical/design problems:** 80% |
| **Internal max. marks:** 30 | **Duration of End Semester Exam (ESE):** 3hrs |
| **External max. marks:** 20 | **Elective status:** |
| **Total marks:** 50 | |

**Detailed list of Tasks:**

1. Working concept of web analytics.
2. Evaluation with Intermediate metrics, custom metrics, calculated metrics.

3. Collection of web data and other internet data with the help of
web analytics.
4. Delivering reports based on collected data.
5. Implement the concept of web analytics ecosystem.
6. Creation of segmentation in web analytics.
7. Visualization, acquisition and conversions of web analytics data.
8. Performing site search analytics.
9. Analyse the web analytic reports and visualizations.
10. Performing visual web analytics.