NEP based Syllabus

For

Bachelor of Vocation (B.Voc.(IT))

Syllabus for B. Voc. -Information Technology

2025 onwards

B.Voc.-IT SYLLABUS (NEP)

Semester	Paper Type	Course Code	Title of the Paper	Credits
I	Core	BVOC-DSC1-141T	Fundamentals of Digital Computing.	4 (3+1)
		BVOC-DSE1-142T	Introduction to C programming.	4 (3+1)
	Common	BVOC-MDC1-131T	Fundamentals of Computer	3
		BVOC-SEC1-131T:	Office Automation & Advance Excel.	3(2+1)
		AEC1:	**AEC1:** Assamese/Alt. English	4
		VAC1:	**VAC1:** Environment Studies	2
II	Core	BVOC-DSC2-241T	Object Oriented Programming using C++.	4 (3 +1)
		BVOC-DSE2-242T	Database Management System.	4 (3+1)
	Common	BOV-MDC2-231T	Web Technologies.	3 (2+1)
		BVOC-SEC2-232T	E-Commerce & Technology.	3(2+1)
		AEC2:		4
		VAC2:		2
III	Core	BVOC-DSC3-341T	Data Structure and Algorithm.	4 (3+1)
		BVOC-DSC4-342T	Mathematics for Computer Science	2
		BVOC-DSE3-343T	Computer Network	2
	Common	BVOC-MDC3-331T	Advanced Web Programming	3
		BVOC-SEC3-331T	Computer Graphics and Animation.	3 (2+1)
IV	Core	BVOC-DSC4-441T	Python Programming.	4 (3+1)
		BVOC-DSC4-442T	Operating System	2
		BVOC-DSE4-443T	Design and Analysis of Computer Algorithms.	2
			Internship / Industrial Training (Summer vacation at the end of IV semester activity)	4
V	Core	BVOC-DSC5-541T	System Administrator using Linux.	4 (3+1)
	Elective 1		Data Mining	2
	Elective 2 BVOC-DSC5-543T		Internet of Things	2
		BVOC-DSE5-542T	Software Engineering	2
		Mini Project		4
VI	Core	BVOC-DSC6-641T	Fundamentals of Data Science.	4 (3+1)
	Elective 3		Cyber Security	2
	Elective 4 BVOC-DSC6-643T		Artificial Intelligence	2
		BVOC-DSE6-642T	Cloud Computing.	2
		Major Project		4

<u>**Detailed Syllabus of 1st Semester**</u>
Name of the Paper: Fundamentals of Digital Computing
Paper Code: BVOC-DSC-141T
Credit: 4
Total Marks: 100

UNIT I: **15 hours**

Data and Information: Features of Digital Systems, Number Systems: Decimal, Binary, Octal, Hexadecimal & their inter conversions, Representation of Data: Signed Magnitude, one's complement & two's complement, Binary Arithmetic, Fixed point representation and Floating-point representation of numbers. Codes: BCD, XS-3, Gray code, hamming code, alphanumeric codes (ASCII, EBCDIC, UNICODE), Error detecting and error correcting codes.

UNIT II: **15 hours**
        Boolean Algebra: Basic gates (AND, OR, NOT gates), Universal gates (NAND and NOR gates), other gates (XOR, XNOR gates). Boolean identities, De Morgan Laws. Karnaugh maps: SOP and POS forms, Quine McClusky method.

UNIT III: **10 hours**
        Combinational Circuits: Half adder, full adder, code converters, combinational circuit design, Multiplexers and demultiplexers, encoders, decoders, Combinational design using mux and demux.

UNIT IV: **5 hours**
        Sequential Circuit Design: Flip flops (RS, Clocked RS, D, JK, JK Master Slave, T, Counters, Shift registers and their types, Counters: Synchronous and Asynchronous counters.

UNIT V: **8 hours**
        Computers: Basic Organization, Memory: ROM, RAM, PROM, EPROM, EEPROM, Secondary Memory: Hard Disk & optical Disk, Cache Memory, I/O devices.

UNIT VI: **7 hours**
        Operating Systems: Types (real Time, Single User / Single Tasking, Single user / Multi-tasking, Multi user / Multi-tasking), GUI based OS. Overview of Desktop Operating Systems-Windows and LINUX.

Practical: - 3 Lectures per week
List of Practical

1. Installation of Windows.
2. Disk defragmentation using system tool.
3. Disk defragmentation using system tool.
4. Working practice on windows operating system and Linux operating system: creating file, folder. Copying, moving, deleting file, folder.
5. User Account creation and its feature on Windows Operating System and Changing resolution, color, appearances, and Changing System Date and Time.
6. Assembly and disassembly of printer, installing a printer, taking test page, and using printer under Windows/Linux.
7. Installation of application software's – Office Automation, Anti-Virus.
8. Demonstrate the usage of Word and Power point in Windows and Linux
9. Configure Internet connection, Email Account creation, reading, writing and sending emails with attachment.
10. Study of Linux Commands with all switches: ls, mkdir, cd, rmdir, wc, cat, mv, chmod, date, time, grep, tty, who, whoami, finger, pwd, man, cal, echo, ping, ifconfig, tar, telnet.

Text Books:

1) Modern Digital Electronics by R. P. Jain, 3rd Edition, McGraw Hill
2) Digital Design and Computer Organisation by Dr. N. S. Gill and J. B. Dixit,
3) University Science Press
4) Linux Commands by Bryan Pfaffaenberger BPB Publications
5) UNIX by Sumitabha Das, TMH

References:

1) Digital Principles and Applications by Malvino and Leach, McGrawHill
2) Introduction to Computers by Peter Norton, McGraw Hill

Term Work for BVOC-DSC-100T:
1) Assignments: Should contain at least 2 assignments covering the Syllabus.
2) Class Tests: One. Also Known as Unit Test or In-Semester Examinations
3) Tutorial: Minimum Three tutorials covering the syllabus

Course Description and Objectives: The course aims to teach a student the fundamental components used in a Digital Computer and its functioning.

Course Outcomes: The student will be able to:

CO1: Identify the logic gates and their functionality.
CO2: Perform number conversions from one system to another system.
CO3: Design basic electronic circuits (combinational circuits).
CO4: Perform a comparative analysis of the components of different memory units.
CO5: Perform number conversions.

Name of the Paper: Fundamentals of C Programming

Paper Code: BVOC-GE-142T

Credit: 4 (3+1)

Total Marks: 100

UNIT-I: <div align="right">**7 hours**</div>

History and importance of C, Basic structure of C program, executing a C program, Art of Programming through Algorithms and Flowcharts, Basics of C programming, C Token, Keywords and identifiers, Variables, Constants, Data types, Declaration of Variables, Assigning Values to Variables, Defining Symbolic, reading a Character, Writing a Character, Formatted Input, Formatted Output.

UNIT-II: <div align="right">**10 hours**</div>

Operators and Expressions: Introduction, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operator, Bitwise Operators, Special Operators, Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic Operators, Type Conversions in Expressions, Operator Precedence and Associativity.

UNIT-III: <div align="right">**10 hours**</div>

Decision Making and Branching: Introduction, Decision Making with IF Statement, Simple IF Statement, the IF-ELSE Statement, Nesting of IF-ELSE Statements, The ELSE IF Ladder, The Switch statement, The ? : Operator, The goto statement. Decision Making and Looping: Introduction, The while Statement, The do statement, The for statement, Jumps in LOOPS.

UNIT-IV: <div align="right">**13 hours**</div>

User-defined Functions: Need for functions, Elements of User-defined Functions, Definition of Functions, Return Values and their Types, Function Calls, Function Declaration, Category of Functions, No Arguments and no Return Values, Arguments but no Return values, Arguments with Return Values, No Arguments but Returns a Value, Passing Arrays to Functions, Recursion, The Scope, Visibility and Lifetime of variables.

Pointers: Introduction, Declaring Pointer Variables, Initialization of Pointer variables, accessing a Variable through its Pointer, Pointer Expressions, Pointer Increments and Scale Factor.

Structures: Introduction, Defining a structure, declaring structure variables, accessing structure members, structure initialization, array of structures.

UNIT V: <div align="right">**5 hours**</div>

File Management in C: Introduction, Defining and opening a file, closing a file, Input/output and Error Handling on Files.

Course Outcomes: Upon successful completion of this course, student will be able to

Unit I: Describe the fundamentals of C programming Language.
Unit II: Apply appropriate Control structures to solve problems.
Unit III: Describe the concept of Arrays and Strings.
Unit IV: Write User defined functions and apply concept of recursion to
              Solve problems.
 Unit V: Describe the concept of Pointers and Structures.
Unit VI: Implement functions towards performing operations on Files.

Textbooks:

E. Balaguruswamy, "Programming in ANSI C", 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.

Reference Books:

1. Programming in C Second Edition by Ravichandran D, New Age International.
2. Pradip Dey, Manas Ghosh, "Programming in C", 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6.

3. Kernighan B.W and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, 2015, Pearson Education India, ISBN: 978-93-3254-944-9.
4. Yashavant P. Kanetkar, "Let Us C", 16th Edition, 2019, BPB Publications, ISBN: 978- 93- 8728-449-4.
5. Jacqueline A Jones and Keith Harrow, "Problem Solving with C", Pearson Education. ISBN: 978-93-325-3800-9.
6. Dr. Guruprasad Nagraj, "C Programming for Problem Solving", Himalaya Publishing House. ISBN-978-93-5299-361-1.

Web Resources :

1. http://elearning.vtu.ac.in/econtent/courses/video/BS/14CPL16.html
2. https://nptel.ac.in/courses/106/105/106105171/

Practical :(B) Programming Skills using C Laboratory.
List of Practical-   **30 Hours**

1. Write a C program to print your name, date of birth, and mobile number.
2. Write a C program that accepts two integers from the user and calculates the sum of the two integers.
3. Write a C program that accepts two item's weight and number of purchases (floating point values) and calculates their average value.
4. Write a C program that accepts an employee's ID, total worked hours in a month and the amount he received per hour. Print the ID and salary (with two decimal places) of the employee for a particular month.
   Test Data:
   Input the Employees ID(Max. 10 chars): 0342
   Input the working hrs: 8
   Salary amount/hr: 15000
5. Write a C program that accepts three integers and finds the maximum of three.
6. Write a C program to calculate a bike's average consumption from the given total distance (integer value) travelled (in km) and spent fuel (in litters, float number – 2 decimal points).
   Test Data :
   Input total distance in km: 350
   Input total fuel spent in liters: 5
7. Write a C program that prints all even numbers between 1 and 50 (inclusive).
8. Write a program in C to read n number of values in an array and display them in reverse order.
9. Write a program in C for a 2D array of size 3x3 and print the matrix.
10. Write a program in C for adding two matrices of the same size.
11. Write a program in C to demonstrate how to handle pointers in a program.
12. Write a program in C to add two numbers using pointers.
13. Write a program in C to add numbers using call by reference.
14. Develop a program to solve simple computational problems using arithmetic expressions and the use of each operator leading to the simulation of a commercial calculator
15. Develop a program to compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages?
16. Develop a program to find the reverse of a positive integer and check for palindrome or not Display appropriate messages?
17. Develop a program to find the square root of a given number N and execute for all possible Inputs with appropriate messages. Note: Don't use library function sqrt(n).
18. Implement structures to read, write, and compute average marks and the students scoring above and below the average marks for a class of N students
19. Develop a program using pointers to compute the sum and standard deviation of all elements stored in an array of n real numbers.
20. Implement Recursive functions for binary to Decimal Conversion
21. Write a function to implement string operations such as compare, concatenate, string length. Convince the parameters passing techniques
22. Develop a program to introduce 2D Array manipulation and implement Matrix multiplication and ensure the rules of multiplication are checked

23. An Electricity board charges the following rates for the use of electricity: for the first 200 units 80 paise per unit: for the next 100 units 90 paise per unit: beyond 300 units Rs 1 per unit. All users are changed a minimum of Rs. 100 as meter charge. If the total amount is more than Rs 400, then an additional surcharge of 15% of total amount is charged. Write a program to read the name of the user, number of units consumed and print out the charges.
24. Write a program in C to create and store information in a text file.
25. Write a program in C to read an existing file.

<u>**Detailed Syllabus of 1ˢᵗ Semester**</u>
Name of the Paper: Office Automation & Advance Excel
Paper Code: BVOC-MDC-131T
Credit: 3
Total Marks: 75

Objectives:
1. MS Word is to enable you, the user, to create and edit documents.
2. To develop formulae to simplify calculations
3. To create future Excel spreadsheets with ease and comfort
Course Outcomes: By learning the course, the students will be able
   1. To perform documentation.
   2. To perform accounting operations.
   3. To perform presentation skills.

UNIT – I: **5 Hours**
Introduction to Computer, Definition of Computer, Characteristics of Computers hardware, software, block diagram of a personal computer – secondary memory. Memory: Meaning of bit, byte, word, KB, MB, GB; Semiconductor memory – definition and purpose of RAM, ROM, EPROM, EEPROM Floppy disks usage, sizes and capacities, organization of Floppy disk, Hard disk – Usage, capacities, organization of hard disks – CD ROM drive – usage, capacities and organization.
MS-Word: Introduction, basic operations of MS-word and printing.

UNIT-II: **5 Hours**
MS- Power Point: Introduction, basic operations of MS-Power point,create a new presentation using Blank presentation – Formatting text and applying designs and background of slide, create a new presentation using Templates – Apply Custom animation, Slide Transition.

UNIT-III: **5 Hours**
Basic and Advanced MS-Excel
MS-Excel : Introduction, features of MS Excel 2007, excel worksheet, features of spreadsheets, Selecting, Adding and Renaming Worksheets, selecting cells and ranges, navigating the worksheet, data entry, find and replace data in a worksheet, modifying a worksheet: insert cells, rows, columns and delete cells, workbook protection.
Advanced MS-Excel: If statements, Text functions, Date and time, financial functions, Mathematical functions, Subtotals, charts and macros.

UNIT-IV: **5 Hours**
Advanced worksheet functions: Names, using names, conditional & logical functions, and, or, not.
Manage lists using Excel: Sorting data, adding subtotals to a list, filtering a list, list statistics, pivot tables, managing pivot tables.

UNIT-V: **5 Hours**
MS- Access, Tables and Query: Introduction, Tables: Creating table – Field size – Caption – Default value – Validation rule – Validation text required – Allow zero length – Indexed Unicode – Compression – Decimal places.
Query: Creating query in design view – creating query by using wizard.
Forms: Label- Text boxes – Option group – Toggle button – Option button – Check box – Combo box – List box – Command button – Create forms by using wizard. Reports: Creation of report.

Unit-VI: **5 Hours**
OpenOffice-Calc - Introduction – Introduction to Spreadsheets, Overview of a Worksheet, Creating Worksheet & Workbooks, Organizing files, Managing files & workbooks, Functions & Formulas, Working with Multiple sheets, Creating Charts & Printing Charts – Operating with MS Excel documents, which are already created and saved in MS Excel.

Practical: (B) Office Automation & Advance Excel   **30 Hours**
Word:
1. Creating a document – Copying and moving text – Formatting the document (Font, Paragraph, Bullets & Numbering, Page Setup)
2. Inserting Page breaks – Page Numbers – Pictures – Application of Header & Footer.
3. Creating Tables – Entering Text – Formatting table – Using Formulas
4. Mail Merge – Letter – label – Envelope

Excel:

1. Basic fundamental of VLOOKUP and HLOOKUP with example.
2. Printing worksheets, Translate worksheet, Email workbooks, Workbook security (protect worksheet, protect workbook.
3. Working with Data tables, Pivot tables and its uses.
4. Working with Basic shortcuts in MS-Excel.
5. Conditional Formatting and IF Conditions & Charts.
6. Auto Formats
7. Charts & Graphs
8. Pivot Table & Pivot Chart
9. Data Forms
10. Analysing Data
11. Data
    a) Subtotal
    b) Sorting Data
    c) Filtering Data
    d) Data Validation
    e) Goal Seek
12. Formatting worksheets.
13. Conditional formatting .
14. Macros.
15. Securing & Protecting Spreadsheets.
16. Proofing and Printing.
17. Create profit and prepare a column chart in MS-EXCEL using the data.

Month	Net Sales	Actual Cost	Profit
Jan. 10	22000	18000	
Feb. 10	245005	9555	
Mar. 10	32450	24850	

   Perform following operations:-
   a. Find the profit
   b. Give a chart title "Profit Report"
   c. Take the printout.

PowerPoint:

1. Create title text
a) Start from a blank slide.
b) Select the text box tool and add a text box. Enter appropriate text. Choose font style and size.
c) Resize text box by pulling side, top and/or corner handles to stretch across the top of the slide.
2. Create background blended fill
a) From the Format menu, click Background to create a background fill.
b) In the Background window, click the drop-down arrow and select Fill Effects.
c) In the Fill Effects window, click Onecolor.
d) Click the drop-down arrow to choose a color.
e) Under Shading styles, choose Horizontal (the default). You may want to click the other variations to see previews of the effects.
f) Under Variants, click the dark-top-to-light bottom variant. Click OK.
g) In the Background window again, click Apply. You may click Preview to see what the effect will look like on a full slide. If you want this blend to apply to all slides in the set, click Apply to All.
3. Prepare the following slides with the information given below:
   • Select the slide of your choice and write about yourself.
   • Write about your family members name with relation.
   • Using Title Content and text slide insert the picture of your favourite hero with the list of their
      movies.
   • Finally run the slide continuously until ESC key is not pressed.

4. Select the 10 slides of your choice. Apply the following settings and write the steps you have perform in each options.
a) Insert page number in each slide
b) Timer should be displayed during execution.
c) Change the background color of each slide.
d) Set the interval time for each slide to be displayed.
e) Use Flash bulb animation in your presentation.
f) Select a Color Schemes of your choice.
g) Insert Chart in one of your slide.
h) Insert a table in your presentation.

Text Books:

1. Sanjay Saxena "Ms Office 2007 In A Nutshell ", Vikas Publishing,2016
2. Thomas J Quirk, "Excel 2007 for Business Statistics", Springer, 2012

Reference Books:

1. S Jain,"MS-Office 2007 Training Guide", BPB Publications,2010
2. John Walkenbach, "Excel 2007 Bible ", John Wiley & Sons ,2007
3. Greg Harvey,"Excel 2007 For Dummies", John Wiley & Sons,2006
   Vikas Gupta, Comdex Computer Course Kit (XP Edition), Dreamtech publisher, NewDelhi, 2005.

<u>**Detailed Syllabus of 1st Semester**</u>
Name of the Paper: Computer Oriented Numerical and Statistical Methods
Paper Code: BVOC-SEC1-132T
Credit: 3
Total Marks: 75

Learning Outcome: On successful completion of this course, the student should be able to:
  a.   learn the properties of Floating Point, Numbers and their accuracy, approximations and errors
  b.   Learn various probability methods, Interpolation methods etc.
  c.   To solve basic problems in probability and statistics

UNIT – I: Introduction to Computer Arithmetic   **5 Hours**
Representation of numbers: Fixed Point and Floating point representations, Normalized Floating Representation, Floating Point Arithmetic, Properties of Floating Point, Numbers and their accuracy, Approximations and errors. Errors: truncation error, rounded off error, absolute error, relative error, percentage error and error propagation.

UNIT – II: **Algebraic and Transcendental Equations**   **5 Hours**
Introduction to linear and nonlinear equations, measures of accuracy, Properties of polynomial equations, Initial approximation to a root, Solution of algebraic/transcendental equations: Bisection Method, Iteration method, Method of false position, Newton-Raphson method, Rate of convergence of Iterative methods, Solution of simultaneous linear equations by using Gauss elimination method

UNIT – III: Interpolation   **5 Hours**
Polynomial Interpolation, Finite Differences, Newton's Forward Difference Interpolation, Newton's Backward Difference Interpolation, Newton's Divided Difference Interpolation

UNIT – IV: **Descriptive Statistics**   **5 Hours**
Types of Data, Attributes and Variables, Construction of Frequency, Cumulative frequency, Graphical Representation of Frequency distribution: Histogram, Frequency Polygon, Frequency Curve and Cumulative Frequency Curves (Ogive curves), Diagrammatic Representations: Simple bar, Subdivided bar, Pie Diagrams.

UNIT-V: **Measure of central tendency**   **5 Hours**
Measure of central tendency-Mean, Median and Mode. Measure of variation-Range, Inter quartile range, Standard Deviation and Variance

UNIT-VI: Measure of central tendency   **5 Hours**

Sample Space, events, random variables, Discrete probability, Conditional Probability and Bayes theorem, Linear Regression and Correlation, Probability Distribution Functions-Binomial, Random and Poisson

b) Lab Content: **30 Hours**

Practical / Lab work to be performed using C/C++/Java programming Language:
  a.   Apply the Bi-section method for approximation of root for a given polynomial equation.
  b.   Apply the False Position method for approximation of root for a given polynomial equation
  c.   Implement Newton Raphson method for approximation of root for a given polynomial equation.
  d.   Implement Gauss elimination method to solve simultaneous linear equations
  e.   Develop programs to implement Newton's Forward Difference Interpolation
  f.   Develop programs to implement Newton's Backward Difference Interpolation
  g.   Develop programs to implement Newton's Divided Difference Interpolation
  h.   Develop program to apply Taylor's series for e raise to the power x
  i.   Implement Euler's method for solving a differential equation
  j.   Implement Runge-Kutta method of 1st, 2nd & 4th order for solving a differential equation
  k.   Write programs to find Mean, Median and Mode for a given set of data

TEXT BOOKS:

a) Rajaraman, V, "Computer Oriented Numerical Methods", 3rd edition, Prentice Hall
b) Balaguruswami, E., "Computer Oriented Statistical and Numerical Methods", Macmillan Publishers India Limited

Detailed Syllabus of 2nd Semester
Name of the Paper: Object Oriented Programming using C++
Paper Code: BVOC-DSC-241T
Credit: 4(3+1)
Total Marks: 100

Course Outcomes:

CO1: Outline the C++ programming fundamentals and the concepts of Object-Oriented programming like object and class, Encapsulation, inheritance and polymorphism.

CO2: Classify the control structures, types of constructors, inheritance and different type conversion mechanisms.

CO3: Analyze the importance of object oriented programming features like polymorphism, reusability, generic programming, data abstraction and the usage of exception handling.

CO4: Determine the use of object oriented features such as classes, inheritance and templates to develop C++ programs for complex problems.

CO5: Create a program in C++ by implementing the concepts of object-oriented programming.

Unit-I: 10 Hours

Object Oriented Methodology: Introduction, Advantages and Disadvantages of Procedure Oriented Languages, what is Object Oriented? What is Object Oriented Development? Object Oriented Themes, Benefits and Application of OOPS. Principles of OOPS: OOPS Paradigm, Basic Concepts of OOPS: Objects, Classes, Data Abstraction and Data Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Message Passing.

Unit-II: 10 Hours

Classes and Objects: Simple classes (Class specification, class members accessing), Defining member functions, passing object as an argument, Returning object from functions, friend classes, Pointer to object, Array of pointer to object. Constructors and Destructors: Introduction, Default Constructor, Parameterized Constructor and examples, Destructors.

Unit-III: 10 Hours

Polymorphism: Concept of function overloading, overloaded operators, overloading unary and binary operators, overloading comparison operator, overloading arithmetic assignment operator, Data Conversion between objects and basic types, Virtual Functions: Introduction and need, Pure Virtual Functions, Static Functions, this Pointer, abstract classes, virtual destructors.

Unit-IV: 10 Hours

Program development using Inheritance: Introduction, understanding inheritance, Advantages provided by inheritance, choosing the access specifier, Derived class declaration, derived class constructors, class hierarchies, multiple inheritance, multilevel inheritance, containership, hybrid inheritance. Exception Handling: Introduction, Exception Handling Mechanism, Concept of throw& catch with example.

Unit-V: 5 Hours

Templates: Introduction, Function Template and examples, Class Template and examples. Working with Files: Introduction, File Operations, Various File Modes, File Pointer and their Manipulation.

Text Books:

1. E. Balaguruswamy, (2013), ―Object Oriented Programming using C++, 6th Edition, Tata McGraw Hill.
2. Timothy Budd, 2012-Object Oriented Analysis and Design, 3rd Edition, TMH.

Reference Books:

1. Bjarne Stroustrup, ―The C++ Programming Language, Fourth Edition, Pearson Education.
2. 2 Hilbert Schildt, (2009), ―C++ - The Complete Reference, 4th Edition, Tata McGrawHill.
3. K R Venugopal, RajkumarBuyya, T Ravishankar - Mastering C++, 2 ndEdition , Tata McGraw Hill 2011.

Practical: (B) Programming Skills using C++ Laboratory
List of Practical: To be implemented using object oriented language: **30 Hours**

1. Classes and methods

a. Design an employee class for reading and displaying the employee information, the getInfo() and displayInfo() methods will be used repectively. Where getInfo() will be private method

b. Design the class student containing getData() and displayData() as two of its methods which will be used for reading and displaying the student information respectively.WheregetData() will be private method.

c. Design the class Demo which will contain the following methods: readNo(), factorial() for calculating the factorial of a number, reverseNo() will reverse the given number, isPalindrome() will check the given number is palindrome, isArmstrong() which will calculate the given number is armStrong or not.WherereadNo() will be private method.

d. Write a program to demonstrate function definition outside class and accessing class members in function definition.

2. Using friend functions.

a.   Write a friend function for adding the two complex numbers, using a single class

b.   Write a friend function for adding the two different distances and display its
     sum, using two classes.

c.   Write a friend function for adding the two matrix from two different classes and
     display its sum.

3. Constructors and method overloading.

a. Design a class Complex for adding the two complex numbers and also show the use of
     constructor.

 b. Design a class Geometry containing the methods area() and volume() and also overload the
     area() function .

c. Design a class StaticDemo to show the implementation of static variable and static function.

4. Operator Overloading

a. Overload the operator unary(-) for demonstrating operator overloading.

b. Overload the operator + for adding the timings of two clocks, And also pass objects as an argument.

c. Overload the + for concatenating the two strings. For e.g "Py" + "thon" = Python

5. Inheritance

a. Design a class for single level inheritance using public and private type derivation.

b. Design a class for multiple inheritance.

c. Implement the hierarchical inheritance

6. Virtual functions and abstract classes

a. Implement the concept of method overriding.

b. Show the use of virtual function

c. Show the implementation of abstract class.

7. String handling

a. String operations for string length, string concatenation

b. String operations for string reverse, string comparison,

 c. Console formatting functions.

8. Exception handling

a. Show the implementation of exception handling

b. Show the implementation for exception handling for strings

 c. Show the implementation of exception handling for using the pointers.

9. File handling

a. Design a class FileDemo open a file in read mode and display the total number of words and lines in the file.

b. Design a class to handle multiple files and file operations

c. Design a editor for appending and editing the files

10. Templates

a. Show the implementation for the following

b. Show the implementation of template class library for swap function.

c. Design the template class library for sorting ascending to descending and vice-versa.

Detailed Syllabus of 2nd Semester
Name of the Paper: Database Management System.
Paper Code: BVOC-GE2-242T
Credit: 4 (3+1)
Total Marks: 100

Unit-I: 15 Hours
Introduction to Databases and Transactions What is database system, purpose of database system, view of data, relational databases, database architecture, transaction management Data Models The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction. Database Design, ER Diagram and Unified Modeling Language Database design and ER Model: overview, ER Model, Constraints, ER Diagrams, ERD Issues, weak entity sets, Codd's rules, Relational Schemas, Introduction to UML.

Unit-II: 15 Hours
Relational database model: Logical view of data, keys, integrity rules, Relational Database design: features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF). Relational Algebra and Calculus Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities.

Unit-III: 5 Hours
Constraints, Views and SQL Constraints, types of constrains, Integrity constraints, Views: Introduction to views, data independence, security, updates on views, Comparison between tables and views SQL: data definition, aggregate function, Null Values, nested sub queries, Joined relations. Triggers.

Unit-IV: 5 Hours
Transaction management and Concurrency Control Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management.

Unit-V: 5 Hours
PL-SQL: Beginning with PL / SQL, Identifiers and Keywords, Operators, Expressions, Sequences, Control Structures, Cursors and Transaction, Collections and composite data types, Procedures and Functions, Exceptions Handling, Packages, With Clause and Hierarchical Retrieval, Triggers.

Books and References:
1. Database System and Concepts A Silberschatz, H Korth, S Sudarshan   McGraw Hill Fifth Edition.
2. Database Systems Rob Coronel Cengage Learning Twelfth Edition
 3. Programming with PL/SQL for Beginners H. Dand, R. Patil and T. Sambare X – Team First 2011.
4. Introduction to Database System C.J.Date Pearson First 2003.
5. L/SQL Programming -Ivan Bayross–BPB, First Edition, 2010.

(B)Practical : DBMS LAB   **30 Hours**
List of Practical-
1.   SQL Statements – 1
      a. Writing Basic SQL SELECT Statements
      b. Restricting and Sorting Data
      c. Single-Row Functions
2. SQL Statements – 2
       a. Displaying Data from Multiple Tables
       b. Aggregating Data Using Group Functions
       c. Subqueries
3. Manipulating Data
       a. Using INSERT statement
       b. Using DELETE statement
       c. Using UPDATE statement

4. Creating and Managing Tables
       a. Creating and Managing Tables
       b. Including Constraints
5. Creating and Managing other database objects
       a. Creating Views
       b. Other Database Objects
       c. Controlling User Access
6. Using SET operators, Date/Time Functions, GROUP BY clause (advanced features) and
    Advanced subqueries
       a. Using SET Operators
       b. Datetime Functions
       c. Enhancements to the GROUP BY Clause
       d. Advanced Subqueries
7. PL/SQL Basics
       a. Declaring Variables
       b. Writing Executable Statements
       c. Interacting with the Oracle Server
       d. Writing Control Structures.
8. Composite data types, cursors and exceptions.
       a. Working with Composite Data Types
       b. Writing Explicit Cursors
       c. Handling Exceptions
9. Procedures and Functions
       a. Creating Procedures
       b. Creating Functions
       c. Managing Subprograms
       d. Creating Packages
10. Creating Database Triggers.

Detailed Syllabus of 2nd Semester
Name of the Paper: Web Technologies.
Paper Code: BOV-MDC2-243T
Credit: 4 (3+1)
Total Marks: 100

Unit-I: 7 Hours

Internet and the World Wide Web: What is Internet? Introduction to internet and its applications, E-mail, telnet, FTP, e-commerce, video conferencing, e-business. Internet service providers, domain name server, internet address, World Wide Web (WWW): World Wide Web and its evolution, uniform resource locator (URL), browsers – internet explorer, Netscape navigator, opera, Firefox, chrome, Mozilla. search engine, web saver – apache, IIS, proxy server, HTTP protocol HTML5: Introduction, Why HTML5? Formatting text by using tags, using lists and backgrounds, Creating hyperlinks and anchors. Style sheets, CSS formatting text using style sheets, formatting paragraphs using style sheets.

Unit-II: 8 Hours

HTML5 Page layout and navigation: Creating navigational aids: planning site organization, creating text based navigation bar, creating graphics based navigation bar, creating graphical navigation bar, creating image map, redirecting to another URL, creating division based layouts: HTML5 semantic tags, creating divisions, creating HTML5 semantic layout, positioning and formatting divisions. HTML5 Tables, Forms and Media: Creating tables: creating simple table, specifying the size of the table, specifying the width of the column, merging table cells, using tables for page layout, formatting tables: applying table borders, applying background and foreground fills, changing cell padding, spacing and alignment, creating user forms: creating basic form, using check boxes and option buttons, creating lists, additional input types in HTML5, Incorporating sound and video: audio and video in HTML5, HTML multimedia basics, embedding video clips, incorporating audio on web page.

Unit-III: 15 Hours

Java Script: Introduction, Client-Side JavaScript, Server-Side JavaScript, JavaScript Objects, JavaScript Security, Operators: Assignment Operators, Comparison Operators, Arithmetic Operators, % (Modulus), ++(Increment), --(Decrement), -(Unary Negation), Logical Operators, Short-Circuit Evaluation, String Operators, Special Operators, ?: (Conditional operator), , (Comma operator), delete, new, this, void Statements: Break, comment, continue, delete, do...while, export, for, for...in, function, if...else, import, labelled, return, switch, var, while, with,Core JavaScript (Properties and Methods of Each) : Array, Boolean, Date, Function, Math, Number, Object, String, regExp Document and its associated objects: document, Link, Area, Anchor, Image, Applet, Layer Events and Event Handlers : General Information about Events, Defining Event Handlers, event, onAbort, onBlur, onChange, onClick, onDblClick, onDragDrop, onError, onFocus, onKeyDown, onKeyPress, onKeyUp, onLoad, onMouseDown, onMouseMove, onMouseOut, onMouseOver, onMouseUp, onMove, onReset, onResize, onSelect, onSubmit, onUnload.

Unit-IV: 10 Hours

PHP: Why PHP and MySQL? Server-side scripting, PHP syntax and variables, comments, types, control structures, branching, looping, termination, functions, passing information with PHP, GET, POST, formatting form variables, superglobal arrays, strings and string functions, regular expressions, arrays, number handling, basic PHP errors/problems.

Unit-V: 5 Hours

Advanced PHP and MySQL : PHP/MySQL Functions, Integrating web forms and databases, Displaying queries in tables, Building Forms from queries, String and Regular Expressions, Sessions, Cookies and HTTP, E-Mail.

Books and References:
1. Web Design The Complete Reference Thomas Powell Tata McGraw Hill –
2. HTML5 Step by Step FaitheWempen Microsoft Press 2011
3. PHP 5.1 for Beginners Ivan BayrossSharanam Shah, SPD 2013
4. PHP Project for Beginners SharanamShah, Vaishali Shah SPD 2015
5. PHP 6 and MySQL Bible Steve Suehring, Tim Converse, Joyce Park Wiley 2009
6. Head First HTML 5 programming Eric Freeman O'Reilly 2013
7. JavaScript 2.0: The Complete Reference Thomas Powell and Fritz Schneider Tata McGraw Hill 2nd.

Practical :(B) Web Designing Practical using PHP.

List of Practical:-

1. Use of Basic Tags

a. Design a web page using different text formatting tags.

b. Design a web page with links to different pages and allow navigation between web pages.

c. Design a web page demonstrating all Style sheet types

2. Image maps, Tables, Forms and Media

a. Design a web page with Imagemaps.

b. Design a web page demonstrating different semantics

c. Design a web page with different tables. Design a webpages using table so that the content appears well placed.

d. Design a web page with a form that uses all types of controls.

e. Design a web page embedding with multimedia features.

3. Java Script

a. Using JavaScript design, a web page that prints factorial/Fibonacci series/any given series.

b. Design a form and validate all the controls placed on the form using Java Script.

c. Write a JavaScript program to display all the prime numbers between 1 and 100.

a. Write a JavaScript program to accept a number from the user and display the sum of its digits.

d. Write a program in JavaScript to accept a sentence from the user and display the number of words in it. (Do not use split () function).

e. Write a java script program to design simple calculator.

4. Control and looping statements and Java Script references

a. Design a web page demonstrating different conditional statements.

b. Design a web page demonstrating different looping statements.

c. Design a web page demonstrating different Core JavaScript references (Array, Boolean, Date, Function, Math, Number, Object, String, regExp).

5. Basic PHP I

 a. Write a PHP Program to accept a number from the user and print it factorial.

b. Write a PHP program to accept a number from the user and print whether it is prime or not.

6. Basic PHP II

a. Write a PHP code to find the greater of 2 numbers. Accept the no. from the user.

b. Write a PHP program to display the following Binary Pyramid:

```
     1
   0   1
   1 0 1
   0 1 0 1
```

7. String Functions and arrays

a. Write a PHP program to demonstrate different string functions.

b. Write a PHP program to create one dimensional array.

 8. PHP and Database

a. Write a PHP code to create: • Create a database College • Create a table Department (Dname, Dno, Number_Of_faculty)

b. Write a PHP program to create a database named "College". Create a table named "Student" with following fields (sno, sname, percentage). Insert 3 records of your choice. Display the names of the students whose percentage is between 35 to 75 in a tabular format.

c. Design a PHP page for authenticating a user.

9. Email

a. Write a program to send email with attachment.

10. Sessions and Cookies

a. Write a program to demonstrate use of sessions and cookies.

Detailed Syllabus of 2nd Semester
Name of the Paper: E-commerce & Technology
Paper Code: BVOC-SEC2-231T
Credit: 3
Total Marks: 75

Course Outcomes: On the successful completion of the course, student will be able to:
CO1: Understand the basic concept of E- Commerce and its applications
CO2: To gain the knowledge on EDI
CO3: Analyse security and the web
CO4: To gain knowledge on consumer aspects in E-Commerce
CO5: Apply various digital payment methods

Unit I: E-Commerce   6 Hours
E-Commerce-Framework-Classification of electronic commerce -Anatomy of E-Commerce Applications- Components of the I way-Network Access Equipment-Internet Terminology.

Unit-II: ELECTRONIC DATA INTERCHANGE   15 hours
Electronic Data Interchange- Benefits-EDI Legal, Security & privacy issues- EDI software implementation- Value added networks-Internal Information Systems-Work flow atomization and Coordination-Customization and Internal Commerce.

Unit-III: NETWORK SECURITY AND FIREWALLS   12 Hours
Network security and firewalls- Client Server Network Security- Emerging client server security threats- Firewalls and network security- Data and message security- Encrypted documents and electronic mail- Hypertext publishing- Technology behind the web- Security and the web.

Unit-IV: CONSUMER ORIENTED ELECTRONIC 15 hours COMMERCE   9 Hours
Consumer Oriented Electronic Commerce: Consumer Oriented Applications-Mercantile Process Models-Mercantile Models From the Consumers Perspective- Mercantile Models from the Merchants Perspective.

Unit V: ELECTRONIC PAYMENT SYSTEMS   3 Hours
Electronic Payment Systems-Types-Digital Token Based Electronic Payment System-Smart Cards & Credit Card Electronic Payment Systems -Risk -Designing electronic payment system.

Text Book(s):
1.   Ravi Kalakota &Andrew b.Whinston , "Frontiers of Electronic Commerce", Dorling
        Kindersley (India) Pvt.Ltd-2006.
2.   Bharat Bhasker , "Electronic Commerce", Tata Mc Graw Hill Publishing Co Ltd,New
        Delhi2006.

Reference Books:
1.   Daniel Minoli, Emma Minoli "Web Commerce Technology Handbook", Tata McGraw Hill
         Publishing, New Delhi.
2.   Dr.C.S.Rayudu,"E-Commerce &E-Business",Himalaya Publishing House, New Delhi, 2004.

Detailed Syllabus of 3rd Semester
Name of the Paper: Data Structure and Algorithm.
Paper Code: BVOC-DSC3-341T
Credit: 4 (3+1)
Total Marks: 100

Unit -I: 10 Hours

Introduction: Data and Information, Data Structure, Classification of Data Structures, Primitive Data Types, Abstract Data Types, Data structure vs. File Organization, Operations on Data Structure, Algorithm, Importance of Algorithm Analysis, Complexity of an Algorithm, Asymptotic Analysis and Notations, Big O Notation, Big Omega Notation, Big Theta Notation, Rate of Growth and Big O Notation. Array: Introduction, One Dimensional Array, Memory Representation of One Dimensional Array, Traversing, Insertion, Deletion, Searching, Sorting, Merging of Arrays, Multidimensional Arrays, Memory Representation of Two Dimensional Arrays, General Multi-Dimensional Arrays, Sparse Arrays, Sparse Matrix, Memory Representation of Special kind of Matrices, Advantages and Limitations of Arrays.

Unit-II: 10 Hours

Linked List: Linked List, One-way Linked List, Traversal of Linked List, Searching, Memory Allocation and De-allocation, Insertion in Linked List, Deletion from Linked List, Copying a List into Other List, Merging Two Linked Lists, Splitting a List into Two Lists, Reversing One way linked List, Circular Linked List, Applications of Circular Linked List, Two way Linked List, Traversing a Two way Linked List, Searching in a Two way linked List, Insertion of an element in Two way Linked List, Deleting a node from Two way Linked List, Header Linked List, Applications of the Linked list, Representation of Polynomials, Storage of Sparse Arrays, Implementing other Data Structures.

Unit-III: **10** Hours

Stack: Introduction, Operations on the Stack Memory Representation of Stack, Array Representation of Stack, Applications of Stack, Evaluation of Arithmetic Expression, Matching Parenthesis, infix and postfix operations, Recursion. Queue: Introduction, Queue, Operations on the Queue, Memory Representation of Queue, Array representation of queue, Linked List Representation of Queue, Circular Queue, Some special kinds of queues, Deque, Priority Queue, Application of Priority Queue, Applications of Queues.

Unit-IV: **10** Hours

Sorting and Searching Techniques Bubble, Selection, Insertion, Merge Sort. Searching: Sequential, Binary, Indexed Sequential Searches, Binary Search. Tree: Tree, Binary Tree, Properties of Binary Tree, Memory Representation of Binary Tree, Operations Performed on Binary Tree, Reconstruction of Binary Tree from its Traversals, Huffman Algorithm, Binary Search Tree, Operations on Binary Search Tree, Heap, Memory Representation of Heap, Operation on Heap, Heap Sort. Advanced Tree Structures: Red Black Tree, Operations Performed on Red Black Tree, AVL Tree, Operations performed on AVL Tree, 2- 3 Tree, B-Tree.

Unit-V: 5 Hours

Hashing Techniques Hash function, Address calculation techniques, Common hashing functions Collision resolution, Linear probing, Quadratic, Double hashing, Bucket hashing, Deletion and rehashing Graph: Introduction, Graph, Graph Terminology, Memory Representation of Graph, Adjacency Matrix Representation of Graph, Adjacency List or Linked Representation of Graph, Operations Performed on Graph, Graph Traversal, Applications of the Graph, Reachability, Shortest Path Problems, Spanning Trees.

Books and References:
1. A Simplified Approach to Data Structures LalitGoyal, Vishal Goyal, Pawan Kumar SPD 1st 2014
 2. An Introduction to Data Structure with Applications Jean – Paul Tremblay and Paul Sorenson Tata MacGraw Hill 2nd 2007
3. Data Structure and Algorithm Maria Rukadikar SPD 1st 2017
4. Schaum's Outlines Data structure Seymour Lipschutz Tata McGraw Hill 2nd 2005
 5. Data structure – A Pseudocode Approach with C AM Tanenbaum, Y Langsam and MJ Augustein Prentice Hall India 2nd 2006
6. Data structure and Algorithm Analysis in C Weiss, Mark Allen Addison Wesley 1st 2006.

PRACTICAL: Data Structure and Algorithm.   30 Hours
1. Write a c program to implement bubble sort.
2. Write a c program to implement selection sort.
 3. Write a c program to represent a queue as an array.
4. Write a c program to find sum of sort the element using Bubble sort.
5. Write a c program to implement stack with push and pop operations. Also check for overflow and underflow.
6. Write a c program to sort the element of a two dimensional matrix column wise and display the entered matrix and sorted matrix.
7. Write a c program to sort the element of 2-d matrix row wise and display sorted matrices.

Detailed Syllabus of 3rd Semester
Name of the Paper: Mathematics for Computer Science
Paper Code: BVOC-DSC4-342T
Credit: 2
Total Marks: 50

Unit I: 6 Hours
Introduction: Variables, The Language of Sets, The Language of Relations and Function Set Theory: Definitions and the Element Method of Proof, Properties of Sets, Disproofs, Algebraic Proofs, Boolean Algebras, Russell's Paradox and the Halting Problem. The Logic of Compound Statements: Logical Form and Logical Equivalence, Conditional Statements, Valid and Invalid Arguments.

Unit II: 6 Hours
Quantified Statements: Predicates and Quantified Statements, Statements with Multiple Quantifiers, Arguments with Quantified Statements Elementary Number Theory and Methods of Proof: Introduction to Direct Proofs, Rational Numbers, Divisibility, Division into Cases and the Quotient-Remainder Theorem, Floor and Ceiling, Indirect Argument: Contradiction and Contraposition, Two Classical Theorems, Applications in algorithms.

Unit III: 6 Hours
Sequences, Mathematical Induction, and Recursion: Sequences, Mathematical Induction, Strong Mathematical Induction and the Well Ordering Principle for the Integers, Correctness of algorithms, defining sequences recursively, solving recurrence relations by iteration, Second order linear homogenous recurrence relations with constant coefficients. general recursive definitions and structural induction. Functions: Functions Defined on General Sets, One-to-One and Onto, Inverse Functions, Composition of Functions, Cardinality with Applications to Computability.

Unit-IV: 6 Hours
Relations: Relations on Sets, Reflexivity, Symmetry, and Transitivity, Equivalence Relations, Partial Order Relations Graphs and Trees: Definitions and Basic Properties, Trails, Paths, and Circuits, Matrix Representations of Graphs, Isomorphism's of Graphs, Trees, Rooted Trees, Isomorphism's of Graphs, Spanning trees and shortest paths.

Unit V: 6 Hours
Counting and Probability: Introduction, Possibility Trees and the Multiplication Rule, Possibility Trees and the Multiplication Rule, Counting Elements of Disjoint Sets: The Addition Rule, The Pigeonhole Principle, Counting Subsets of a Set: Combinations, r Combinations with Repetition Allowed, Probability Axioms and Expected Value, Conditional Probability, Bayes' Formula, and Independent Events.

Books and References:
1. Publisher Edition Year Discrete Mathematics with Applications Sussana S. Epp Cengage Learning
2. Discrete Mathematics, Schaum's Outlines Series 4th 2010 2007 Seymour Lipschutz, Marc Lipson
3. Discrete Mathematics and its Applications Tata MCGraw Hill Kenneth H. Rosen Tata MCGraw Hill
4. Discrete mathematical structures B Kolman RC Busby, S Ross
5. Discrete structures Liu PHI Tata MCGraw Hill

Detailed Syllabus of 3rd Semester
Name of the Paper: Computer Network.
Paper Code: BVOC-GE3-342T
Credit: 2
Total Marks: 50

Unit-I: 6 Hours

Introduction: Data communications, networks, network types, Internet history, standards and administration. Network Models: Protocol layering, TCP/IP protocol suite, The OSI model. Introduction to Physical layer: Data and signals, periodic analog signals, digital signals, transmission impairment, data rate limits, performance. Digital and Analog transmission: Digital-to-digital conversion, analog-to-digital conversion, transmission modes, digital-to-analog conversion, analog-to-analog conversion.

Unit-II: 6 Hours

Bandwidth Utilization: Multiplexing and Spectrum Spreading: Multiplexing, Spread Spectrum Transmission media: Guided Media, Unguided Media Switching: Introduction, circuit switched networks, packet switching, structure of a switch. Introduction to the Data Link Layer: Link layer addressing, Data Link Layer Design Issues, Error detection and correction, block coding, cyclic codes, checksum, forward error correction, error correcting codes, error detecting codes.

Unit-III: **6** Hours

Data Link Control: DLC services, data link layer protocols, HDLC, Point-to-point protocol. Media Access Control: Random access, controlled access, channelization, Wired LANs – Ethernet Protocol, standard ethernet, fast ethernet, gigabit ethernet, 10 gigabit ethernet, Wireless LANs: Introduction, IEEE 802.11 project, Bluetooth, WiMAX, Cellular telephony, Satellite networks. Connecting devices and Virtual LANs.

Unit-IV: 6 Hours

Introduction to the Network Layer: Network layer services, packet switching, network layer performance, IPv4 addressing, forwarding of IP packets, Internet Protocol, ICMPv4, Mobile IP Unicast Routing: Introduction, routing algorithms, unicast routing protocols. Next generation IP: IPv6 addressing, IPv6 protocol, ICMPv6 protocol, transition from IPv4 to IPv6.

Unit-V: 6 Hours

Introduction to the Transport Layer: Introduction, Transport layer protocols (Simple protocol, Stop-and-wait protocol, Go-Back-n protocol, Selective repeat protocol, Bidirectional protocols), Transport layer services, User datagram protocol, Transmission control protocol, Standard Client0Server Protocols: World wide-web and HTTP, FTP, Electronic mail, Telnet, Secured Shell, Domain name system.

Books and References:
1. Data Communication and Networking Behrouz A. Forouzan Tata McGraw Hill Fifth Edition 2013
 2. TCP/IP Protocol Suite Behrouz A. Forouzan Tata McGraw Hill Fourth Edition 2010
3. Computer Networks Andrew Tanenbaum Pearson Fifth 2013

Name of the Paper: Advanced Web Programming

Paper Code: BVOC-MDC3-343T

Credit: 4 (3+1)
Total Marks: 100

Unit-I: Advanced HTML   (6 Lectures)
Review of basic HTML tags and their usage. Working with forms – validation using HTML5 attributes. HTML5 Semantic Elements – header, nav, section, article, aside, footer. Applying proper semantic markup for improved SEO. Multimedia integration. Embedding images with different attributes. Adding video and audio. Meta information and Document Structure – metadata, viewport settings.

Unit-II: Advanced Design with CSS   (12 Lectures)
Review of CSS. CSS Selectors. Specificity and the cascade. Psudo-classes and pseudo-elements.CSS Box sizing. Gradient and Transparent backgrounds. CSS Typography – Line height and letter spacing. Web-safe fonts. CSS Layout. Display property – inline, block, inline-block, none. Positioning – static, relative, absolute, fixed. Floats and clear property. Box alignment – flexbox and grid layout.Responsive Web Design – Media queries and breakpoints. Fluid layouts. Brief concept of CSS preprocessors – Sass, Less. Brief concept of CSS frameworks – Bootstrap, Tailwind.

Unit-III: Advanced JavaScript   (12 Lectures)
Review of JavaScript concepts. Functions in JavaScript. Lexical Environment. Arrays and Array manipulation in JavaScript.. JavaScript Events and Event Handling – Event propagation and event delegation. Implementing interactivity with user actions. Introduction to JavaScript APIs. Callback functions and event loop. Promise chain. Asynchronous function with async/wait. DOM manipulation and event handling with jQuery. Overview of AJAX. Brief concept of XMLHttpRequest object.

Unit-IV: Server-Side Scripting using PHP   (10 Lectures)
Review of PHP as a server-side scripting language. Handling forms and user input with PHP. Interacting with databases and performing CRUD operations using PHP and MySQL. User authentication using PHP. Implementing user registration and login functionality. Session management and Token based authentication. Overview of Cookies and their use in Web applications. Working with cookies in PHP – setting, reading, deleting. Concept of Cross-site scripting (XSS).

UNIT-V: Advanced Concepts of Web Programming   (5 Lectures)
Overview of web hosting – shared hosting, VPS, dedicated hosting, cloud hosting. Overview of Server-Side Includes (SSI). Brief concepts of Web APIs and data integration. Concept of JavaScript frameworks – React.js and Node.js. Version Control Systems. Brief overview of Continuous Integration and Deployment. Overview of Web security and SSL/TLS. Web analytics and monitoring.

b) **List of Practical** (This is a suggestive list only. Questions need not be restricted to this list.)

1. Create a semantic HTML structure for a blog post, including headings, paragraphs, images, and nested elements.
2. Develop an HTML5 video player with custom controls, including play, pause, volume control, and full-screen functionality.
3. Create a responsive HTML layout using CSS Grid or Flexbox that adapts to different screen sizes and orientations.
4. Develop a responsive navigation menu that collapses into a hamburger menu for mobile devices, utilizing media queries and CSS transitions.
5. Implement a CSS animation or transition to create a smooth fade-in effect for an element on page load.
6. Design a CSS grid layout that displays a multi-column card-based UI, where each card has a consistent height but variable width. Each card should display an image, title, and description.
7. Develop a CSS-only tooltip that appears when hovering over an element, with customizable styles and positioning.
8. Design a CSS drop-down menu with multiple levels of nested submenus, allowing users to navigate through the menu hierarchy.
9. Create a CSS layout that implements a sticky header, where the header remains fixed at the top of the page while the content scrolls.
10. Build a responsive landing page using HTML5, including a hero section, feature sections, and a contact form.

11. Implement a CSS grid-based layout for a product catalog, showcasing multiple products with consistent spacing and alignment.

12. Implement a custom dropdown menu using HTML, CSS, and JavaScript, with options that can be selected and displayed.

13. Build a form validation mechanism using HTML5 form validation attributes and JavaScript, ensuring that required fields are filled out correctly. Use CSS to design the form and the validation messages.

14. Develop a slideshow or carousel using JavaScript and the DOM API, with next/previous controls and automatic playback.

15. Implement a dynamic table that allows users to add or remove rows, with the ability to edit and delete individual cells.

16. Develop a live search functionality that filters and displays search results from the content of the web page in real-time as the user types, using JavaScript and DOM manipulation.

17. Use a callback function to perform an asynchronous AJAX request and update the content of a specific HTML element with the response.

18. Implement a callback-based timer that executes a specific function after a certain period of time has elapsed.

19. Create a simple asynchronous form submission process using AJAX, displaying a loading spinner while waiting for the response.

20. Develop a weather application that uses an asynchronous API call to fetch weather data based on user input, displaying the results on the page.

21. Implement a user registration form in PHP, which securely stores user credentials in a database and performs validation checks for email uniqueness and password strength.

22. Create a login page in PHP that verifies user credentials against the stored data in the database and redirects authenticated users to a secure dashboard.

23. Develop a Password reset functionality in PHP, allowing users to request a password reset link via email and securely update their password.

24. Implement a user profile page in PHP, which displays and allows users to edit their personal information such as name, email, and profile picture.

25. Create a session-based shopping cart system in PHP, allowing users to add products, update quantities, and remove items, while maintaining cart information across different pages.

26. Develop an access control system in PHP, where certain pages or features are restricted to logged-in users only and unauthorized users are redirected to a login page.

27. Implement user roles and permissions in PHP, allowing administrators to assign different levels of access to users based on their roles (e.g., admin, moderator, user).

28. Create a "Remember Me" functionality in PHP, using cookies to remember and automatically log in returning users for a certain period of time.

29. Develop a logout mechanism in PHP that destroys the user session and redirects users to a logout confirmation page or the login page.

30. Implement account activation via email in PHP, where new users receive an activation link to verify their email address and activate their account.

Text Books:

1) K. H. Rosen: DiscreteMathematicsanditsapplication,5thedition,TataMcGraw Hill.

Chapter 1(1.1-1.5), Chapter 3(3.1-3.4,3.6), Chapter 4(4.1-4.3,4.5), Chapter

6(6.1,6.2,6.4-6.6) Chapter7(7.1-7.6), Chapter8(8.1-8.5,8.7,8.8)

2. *C. L. Liu: Elements of Discrete Mathematics*, 2nd edition, TMH2000.

Chapter11(11.1–11.10 except 11.7), Chapter12(12.1–12.8)

3.*B. Kalman : Discrete Mathematical Structure*,3rd edition, Chapter11(11.1,11.2)

Reference Books:

1. Ralph. P. Grimmaldi, "Discrete and Combinatorial Mathematics - An Introduction", Fourth edition, Perarson Education, Asia, Delhi, 2002.

2. Hopgaff and Ullman, Introduction to Automata Theory, "Languages and Computation", Pearson Edition, Asia, Delhi.

3. Doerr Alar and Levasseur Kenneth, Applied discrete structures for Computer Science", Gal Gotia publications Pvt. Ltd. (2002).

Detailed Syllabus of 3rd Semester
Name of the Paper: Computer Graphics and Animation.
Paper Code: BVOC-SEC3-331T
Credit: 3(2+1)
Total Marks: 75

Unit-I: **5 Hours**
Introduction to Computer Graphics: Overview of Computer Graphics, Computer Graphics Application and Software, Description of some graphics devices, Input Devices for Operator Interaction, Active and Passive Graphics Devices, Display Technologies, Storage Tube Graphics Displays, Calligraphic Refresh Graphics Displays, Raster Refresh (Raster-Scan) Graphics Displays, Cathode Ray Tube Basics, Color CRT Raster Scan Basics, Video Basics, The Video Controller, Random-Scan Display Processor, LCD displays. Scan conversion – Digital Differential Analyzer (DDA) algorithm, Bresenhams' Line drawing algorithm. Bresenhams' method of Circle drawing, Midpoint Circle Algorithm, Midpoint Ellipse Algorithm, Mid-point criteria, Problems of Aliasing, end-point ordering and clipping lines, Scan Converting Circles, Clipping Lines algorithms– Cyrus-Beck, Cohen-Sutherland and Liang-Barsky, Clipping Polygons, problem with multiple components.

Unit –II: **5 Hours**
Transformations and Matrices, Transformation Conventions, 2D Transformations, Homogeneous Coordinates and Matrix Representation of 2D Transformations, Translations and Homogeneous Coordinates, Rotation, Reflection, Scaling, Combined Transformation, Transformation of Points, Transformation of The Unit Square, Solid Body Transformations, Rotation About an Arbitrary Point, Reflection through an Arbitrary Line, A Geometric Interpretation of Homogeneous Coordinates, The Window-to-Viewport Transformations.

Unit-III: **5 Hours**
Viewing in 3D Stages in 3D viewing, Canonical View Volume (CVV), Specifying an Arbitrary 3D View, Examples of 3D Viewing, The Mathematics of Planar Geometric Projections, Combined transformation matrices for projections and viewing, Coordinate Systems and matrices, camera model and viewing pyramid. Light: Radiometry, Transport, Equation, Photometry Color: Colorimetry, Color Spaces, Chromatic Adaptation, Color Appearance.

Unit-IV: **5 Hours**
Visible-Surface Determination: Techniques for efficient Visible-Surface Algorithms, Categories of algorithms, Back face removal, The z-Buffer Algorithm, Scan-line method, Painter's algorithms (depth sorting), Area sub-division method, BSP trees, Visible-Surface Ray Tracing, comparison of the methods.
Computer Animation: Principles of Animation, Key framing, Deformations, Character Animation, Physics-Based Animation, Procedural Techniques, Groups of Objects.

Unit-V: **5 Hours**
Image Manipulation and Storage: What is an Image? Digital image file formats, Image compression standard – JPEG, Image Processing - Digital image enhancement, contrast stretching, Histogram Equalization, smoothing and median Filtering.

Books and References:
1. Computer Graphics - Principles and Practice J. D. Foley, A. Van Dam, S. K. Feiner and J. F. Hughes Pearson 2nd.
2. Steve Marschner, Peter Shirley Fundamentals of Computer Graphics CRC press 4th 2016
3. Computer Graphics Hearn, Baker Pearson 2nd.
4. Principles of Interactive Computer Graphics William M. Newman and Robert F. Sproull TMH 2nd
5. Mathematical Elements for CG D. F. Rogers, J. A. Adams TMH 2nd.

PRACTICAL: Solve the following: **30 Hours**
a. Study and enlist the basic functions used for graphics in C / C++ / Python language. Give an
   example for each of them.
b. Draw a co-ordinate axis at the centre of the screen.
2. Solve the following:
a. Divide your screen into four region, draw circle, rectangle, ellipse and half ellipse in each region
   with appropriate message.
 b. Draw a simple hut on the screen.
3. Draw the following basic shapes in the centre of the screen:
         i. Circle ii. Rectangle   iii. Square   iv. Concentric Circles v. Ellipse   vi. Line
4. Solve the following:
 a. Develop the program for DDA Line drawing algorithm.
b. Develop the program for Bresenham's Line drawing algorithm.
5. Solve the following:
a. Develop the program for the mid-point circle drawing algorithm.
b. Develop the program for the mid-point ellipse drawing algorithm.
6. Solve the following:
 a. Write a program to implement 2D scaling.
 b. Write a program to perform 2D translation
7. Solve the following:
 a. Perform 2D Rotation on a given object.
b. Program to create a house like figure and perform the following operations.
i. Scaling about the origin followed by translation.
ii. Scaling with reference to an arbitrary point.
iii. Reflect about the line y = mx + c.
8. Solve the following:
 a. Write a program to implement Cohen-Sutherland clipping.
 b. Write a program to implement Liang - Barsky Line Clipping Algorithm
9. Solve the following:
 a. Write a program to fill a circle using Flood Fill Algorithm.
 b. Write a program to fill a circle using Boundary Fill Algorithm.
 10. Solve the following:
a. Develop a simple text screen saver using graphics functions.
b. Perform smiling face animation using graphic functions.
c. Draw the moving car on the screen.

Detailed Syllabus of 4th Semester

Name of the Paper: Python Programming.

Paper Code: BVOC-DSC4-441T

Credit: 4 (3+1)

Total Marks: 100

Course Outcomes: (for students: To know what they are going to learn)

CO1: Develop and execute simple Python programs

CO2: Write simple Python programs using conditionals and looping for solving problems

CO3: Decompose a Python program into functions

CO4: Represent compound data using Python lists, tuples, dictionaries etc.

CO5: Read and write data from/to files in Python programs

Unit-I: 7 Hours

Introduction: The essence of computational problem solving – Limits of computational problem solving-Computer algorithms-Computer Hardware, Computer Software-The process of computational problem solving-Python programming language - Literals - Variables and Identifiers - Operators - Expressions and Data types, Input / output.

Unit-II: 15 Hours

Control Structures: Boolean Expressions - Selection Control - If Statement Indentation in Python- Multi-Way Selection -- Iterative Control- While Statement- Infinite loops- Definite vs. Indefinite Loops- Boolean Flag. String, List and Dictionary, Manipulations Building blocks of python programs, Understanding and using ranges. .

Unit-III: 10 Hours

Functions: Program Routines- Defining Functions- More on Functions: Calling Value-Returning Functions- Calling Non-Value-Returning Functions- Parameter Passing - Keyword Arguments in Python - Default Arguments in Python-Variable Scope. Recursion: Recursive Functions.

Unit-IV: 5 Hours

Objects and their use: Software Objects - Turtle Graphics – Turtle attributes Modular Design: Modules - Top-Down Design - Python Modules - Text Files: Opening, reading and writing text files – Exception Handling.

Unit-V: 8 Hours

Dictionaries and Sets: Dictionary type in Python - Set Data type. Object Oriented Programming using Python: Encapsulation - Inheritance – Polymorphism. Python packages: Simple programs using the built-in functions of packages matplotlib, NumPy, pandas etc.

Books and References:

1. Think Python Allen Downey O'Reilly 1st 2012.
2. An Introduction to Computer Science using Python 3 Jason Montojo, Jennifer Campbell, Paul Gries SPD 1st 2014.
3. Python GUI Programming Cookbook Burkhard A. Meier Packt 2015.
4. Introduction to Problem Solving with Python E. Balagurusamy TMH 1st 2016.
5. Murach's Python programming Joel Murach, Michael Urban SPD 1st 2017.
6. Object-oriented Programming in Python Michael H. Goldwasser, David Letscher Pearson Prentice Hall 1st 2008 7.Exploring Python Budd TMH 1st 2016.

7. John Zelle, "Python Programming: An Introduction to Computer Science", Second edition, Course Technology Cengage Learning Publications, 2013, ISBN 978- 1590282410
8. Michel Dawson, "Python Programming for Absolute Beginers" , Third Edition, Course Technology Cengage Learning Publications, 2013, ISBN 978-143545500

Web resources 1.
        https://onlinecourses.swayam2.ac.in/cec22_cs20/preview

Practical: (B) Python Programming Practical   **30 Hours**

Course Outcomes: (for students: To know what they are going to learn)
CO1: To understand the problem solving approaches
CO2: To learn the basic programming constructs in Python
CO3: To practice various computing strategies for Python-based solutions to real world problems.
CO4: To use Python data structures - lists, tuples, and dictionaries.
CO5: To do input/output with files in Python.

List of Programs:
1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. Write a Python program to construct the following pattern, using a nested loop
```
*
**
***
****
*****
******
```
3. Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the five subjects are to be input by user. Assign grades according to the following criteria: Grade A: Percentage >=80 Grade B: Percentage >=70 and 80 Grade C: Percentage >=60 and =40 and < 40.
4. Program, to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
5. Write a Python script that prints prime numbers less than 20.
6. Program to find factorial of the given number using recursive function.
7. Write a Python program to count the number of even and odd numbers from array of N numbers.
8. Write a Python class to reverse a string word by word.
9. Given a tuple and a list as input, write a program to count the occurrences of all items of the list in the tuple. (Input: tuple = ('a', 'a', 'c', 'b', 'd'), list = ['a', 'b'], Output: 3)
11. Create a Savings Account class that behaves just like a Bank Account, but also has an
12. interest rate and a method that increases the balance by the appropriate amount of interest (Hint: use Inheritance).
11. Read a file content and copy only the contents at odd lines into a new file.
12. Create a Turtle graphics window with specific size.
13. Write a Python program for Towers of Hanoi using recursion
14. Create a menu driven Python program with a dictionary for words and their meanings.
15. Devise a Python program to implement the Hangman Game.

Detailed Syllabus of 4th Semester
Name of the Paper: Operating System.
Paper Code: BVOC-GE4-442T

Credit: 2
Total Marks: 50

Course Outcomes:
CO1: Outline the fundamental concepts of an OS and their respective functionality.
CO2: Illustrate the importance of open source operating system commands.
CO3: Identify and stimulate management activities of operating system.
CO4: Analyze the various services provided by the operating system.
CO5: Interpret different problems related to Process, Scheduling, Deadlock, memory and Files.

Unit I: 6 Hours
Introduction: Definition of Operating System - OS Structures: OS Services - System Calls - Virtual Machines - Process Management: Process Concept - Process Scheduling - Operation on Processes - Co-operating Processes - Inter-process Communication.

Unit-II: 6 Hours
CPU Scheduling: Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Process Synchronization: The Critical Section Problem – Semaphores – Classical Problems of Synchronization – Critical Regions

Unit –III: 6 Hours
Deadlocks: System Model - Deadlock characterization – Methods for Handling Deadlocks Deadlock Prevention - Deadlock avoidance- Deadlock Detection - Recovery from Deadlock.

Unit-IV: 6 Hours
Storage management: Memory management - Swapping – Contiguous Memory allocation. Paging – Segmentation Segmentation with Paging –Virtual memory: Demand paging - Page replacement – Thrashing. Mass-Storage Structure: Disk Structure- Disk scheduling.

Unit V: 6 Hours
File-System Interface: File Concept-File Attributes-File Operations – Access Methods: Sequential Access – Direct Access –Directory Structure: Single-Level Directory- Two –Level Directory-Tree-Structured Directories- Introducing Shell Programming – Linux General Purpose Commands-Process Oriented Commands – Communication Oriented Commands.

Textbooks:
1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne (2012), Operating System Concepts, 9th edition, Wiley Student Edition.
2. B.Mohamed Ibrahim, (2005), Linux Practical Approach, Firewall Media

Reference Books:

1. Milan Milenkovic (2003), ―Operating System Concepts and Design‖, McGraw Hill.
2. Andrew S. Tanenbaum, (2001), ―Modern Operating Systems‖, 2nd Edition, Prentice Hall of India.
3. Deital and Deital (1990), ―Introduction to Operating System‖, Pearson Education.
4. William Stallings (1997), ―Operating Systems‖, Prentice Hall of India.

Web Resources :
1. http://www.tutorialspoint.com/operating_system/
2. http://www.reallylinux.com/docs/files.shtml
3. http://www.tutorialspoint.com/operating_system/os_linux.htm

Detailed Syllabus of 4th Semester
Name of the Paper: Design and Analysis of Computer Algorithms.
Paper Code: BVOC-GE4-443T

Credit: 2
Total Marks: 50

COURSE OUTCOMES: At the end of this course students will be able to:
CO1: Identify various Time and Space complexities of various algorithms
CO2: Understand Tree Traversal method and Greedy Algorithms
CO3: Apply Dynamic Programming concept to solve various problems
CO4: Apply Backtracking, Branch and Bound concept to solve various problems
CO5: Implement different performance analysis methods for non-deterministic algorithms.

UNIT – I: 6 Hours
 INTRODUCTION: Algorithm, pseudo code for expressing algorithms, performance analysis-space complexity, time complexity, asymptotic notation- big (O) notation, omega notation, theta notation and little (o) notation, recurrences, probabilistic analysis, disjoint set operations, union and find algorithms.

UNIT – II: 7 Hours
 DIVIDE AND CONQUER: General method, applications-analysis of binary search, quick sort, merge sort, AND OR Graphs. GREEDY METHOD: General method, Applications-job sequencing with deadlines, Fractional knapsack problem, minimum cost spanning trees, Single source shortest path problem.

UNIT – III: 9 Hours
 GRAPHS (Algorithm and Analysis): Breadth first search and traversal, Depth first search and traversal, Spanning trees, connected components and bi-connected components, Articulation points. DYNAMIC PROGRAMMING: General method, applications - optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

UNIT – IV: 5 Hours
 BACKTRACKING: General method, Applications- n-queen problem, Sum of subsets problem, Graph coloring and Hamiltonian cycles. BRANCH AND BOUND: General method, applications - travelling sales person problem, 0/1 knapsack problem- LC branch and bound solution, FIFO branch and bound solution.

UNIT – V: **3** Hours
 NP-HARD AND NP-COMPLETE PROBLEMS: Basic concepts, non-deterministic algorithms, NP-hard and NP-complete classes, Cook's theorem.

TEXT BOOKS:
1. Ellis Horowitz, SatrajSahni, Rajasekharam (2007), Fundamentals of Computer Algorithms, 2nd edition, University Press, New Delhi.

REFERENCE BOOKS:
1. R. C. T. Lee, S. S. Tseng, R.C. Chang and T. Tsai (2006), Introduction to Design and Analysis of Algorithms A strategic approach, McGraw Hill, India.
2. Allen Weiss (2009), Data structures and Algorithm Analysis in C++, 2nd edition, Pearson education, New Delhi.
3. Aho, Ullman, Hopcroft (2009), Design and Analysis of algorithms, 2nd edition, Pearson education, New Delhi.

Name of the Paper: System Administrator using Linux.
.   **Paper Code:** BVOC-DSC5-541T
Credit: 4 (3+1)
Total Marks: 100

Unit-I: 10 Hours
Introduction to Red Hat Enterprise Linux: Linux, Open Source and Red Hat, Origins of Linux, Distributions, Duties of Linux System Administrator. Command Line: Working with the Bash Shell, Getting the Best of Bash, Useful Bash Key Sequences, Working with Bash History, Performing Basic File System Management Tasks, Working with Directories, Piping and Redirection, Finding Files System Administration Tasks: Performing Job Management Tasks, System and Process Monitoring and Management, Managing Processes with ps, Sending Signals to Processes with the kill Command, using top to Show Current System Activity, Managing Process Niceness, Scheduling Jobs, Mounting Devices, Working with Links, Creating Backups, Managing Printers, Setting Up System Logging, Setting Up R sys log, Common Log Files, Setting Up Log rotate Managing Software: Understanding RPM, Understanding Meta Package Handlers, Creating Your Own Repositories, Managing Repositories, Installing Software with Yum, Querying Software, Extracting Files from RPM Packages.

Unit-II: 10 Hours
Configuring and Managing Storage: Understanding Partitions and Logical Volumes, Creating Partitions, Creating File Systems, File Systems Overview, Creating File Systems, Changing File System Properties, Checking the File System Integrity, Mounting File Systems Automatically Through fstab, Working with Logical Volumes, Creating Logical Volumes, Resizing Logical Volumes, Working with Snapshots, Replacing Failing Storage Devices, Creating Swap Space, Working with Encrypted Volumes.
Working with Users, Groups, and Permissions: Managing Users and Groups, Commands for User Management, Managing Passwords, Modifying and Deleting User Accounts, Configuration Files, Creating Groups, Using Graphical Tools for User, and Group Management, Using External Authentication Sources, the Authentication Process, sssd, nsswitch, Pluggable Authentication Modules, Managing Permissions, the Role of Ownership, Basic Permissions: Read, Write, and Execute, Advanced Permissions, Working with Access Control Lists, Setting Default Permissions with unmask, Working with Attributes.

Unit-III: **10** Hours
Securing Server with iptables: Understanding Firewalls, Setting Up a Firewall with system-config-firewall, Allowing Services, Trusted Interfaces, Masquerading, Configuration Files, Setting Up a Firewall with iptables, Tables, Chains, and Rules, Composition of Rule, Configuration Example, Advanced iptables Configuration, Configuring Logging, The Limit Module, Configuring NAT.
Configuring Server for File Sharing: What is NFS? Advantages and Disadvantages of NFS, Configuring NFS4, Setting Up NFSv4, Mounting an NFS Share, Making NFS Mounts Persistent, Configuring Automount, Configuring Samba, Setting Up a Samba File Server, Samba Advanced Authentication Options, Accessing Samba Shares, Offering FTP Services.

Unit-IV: 8 Hours
Configuring DNS and DHCP: Introduction to DNS, The DNS Hierarchy, DNS Server Types, The DNS Lookup Process, DNS Zone Types, Setting Up a DNS Server, Setting Up a Cache-Only Name Server, Setting Up a Primary Name Server, Setting Up a Secondary Name Server, Understanding DHCP, Setting Up a DHCP Server Setting Up a Mail Server: Using the Message Transfer Agent, the Mail Delivery Agent, the Mail User Agent, Setting Up Postfix as an SMTP Server, Working with Mutt, Basic Configuration, Internet Configuration, Configuring Dovecot for POP and IMAP.

Unit-V: 7 Hours
Introducing Bash Shell Scripting: Introduction, Elements of a Good Shell Script, Executing the Script, Working with Variables and Input, Understanding Variables, Variables, Subshells, and Sourcing, Working with Script Arguments, Asking for Input, Using Command Substitution, Substitution Operators, Changing Variable Content with Pattern Matching, Performing Calculations, Using Control Structures, Using if...then...else, Using case, Using while, Using until, Using for, Configuring booting with GRUB.

Books and References:

1. Red Hat Enterprise Linux 6 Administration Sander van Vugt John Wiley and Sons 2013.
2. Red hat Linux Networking and System Administration Terry Collings and Kurt Wall Wiley 3rd.
3. Linux Administration: A Beginner's Guide Wale Soyinka TMH Fifth Edition.

LAB: Practical Classes of Linux   **30 Hours**

1. Graphical User Interface and Command Line Interface and Processes
   a) Exploring the Graphical Desktop
   b) The Command Line Interface
   c) Managing Processes
2. Storage Devices and Links, Backup
   a) Working with Storage Devices and Links
   b) Making a Backup

3. Working with Users, Groups, and Permissions.
4. Configuring Server for File Sharing
   a) Configuring NFS Server and Client
   b) Configuring Samba c Configuring FTP

5. Shell Scripts and High-Availability Clustering
   a) Writing Shell Scripts
   b) Configuring Booting with GRUB
   c) Configuring High Availability Clustering

6. Setting Up an Installation Server
   a Configuring Network Server as an Installation Server
   b Setting Up a TFTP and DHCP Server for PXE Boot

Name of the Paper: Data Mining.

Paper Code: BVOC-DSC5-543T

Credit: 2

Total Marks: 50

Course Outcomes:

CO1: Outline the fundamentals and the principles of Data Mining

CO2: Apply suitable different preprocessing for data mining

CO3: Classify data-mining techniques based on the different applications

CO4: Analyze the various data mining algorithms with respect to functionality

CO5: Recommend appropriate data models for data mining techniques to solve real world problems

UNIT I: 6 Hours

Introduction: Data Mining – Kinds of Data and Patterns to be Mined – Technologies used –Kinds of Applications are Targeted - Major Issues Data objects and Attribute types – Basic statistical Descriptions of Data- Data Preprocessing : Data Cleaning – Data Integration - Data Reduction - Data Transformation.

UNIT II: 6 Hours

Association Rules Mining: Introduction – Frequent Itemset Mining Methods: Apriori Algorithm-Generating Association Rules from Frequent Itemsets-Improving the efficiency of Apriori-A Pattern – Growth Approach for mining Frequent Itemsets-Pattern Evaluation Methods.

UNIT III: 6 Hours

Classification: Introduction –Basic concepts – Logistic regression - Decision tree induction–Bayesian classification, Rule–based classification-Model Evaluation and selection.

UNIT IV: 6 Hours

Cluster Analysis: Introduction-Requirements for Cluster Analysis - Partitioning Methods: The K-Means method - Hierarchical Method: Agglomerative method - Density based methods: DBSCAN-Evaluation of Clustering: Determining the Number of Clusters – Measuring Clustering Quality.

UNIT V: 6 Hours

Outlier Detection: Outliers and Outlier Analysis – Outlier Detection Methods - Data Visualization: Pixel-oriented visualization – Geometric Projection visualization technique- Icon-based-Hierarchical visualization-Visualizing complex data and relations.

Textbooks :

1. Jiawei Han, Micheline Kamber, Jian Pei, ―Data Mining concepts and techniques‖, 3rd Edition, Elsevier publication, 2012.

Reference Books:

1. Ian H. Witten and Eibe Frank, (2005), ―Data Mining: Practical Machine Learning Tools and Techniques (Second Edition), Morgan Kaufmann.
2. Arun K Pujari, ―Data Mining Techniques, 10 impression, University Press, 2008.
3. Daniel T. Larose , Chantal D. Larose, "Data mining and Predictive analytics," Second Ed., Wiley Publication, 2015.
4. G.K. Gupta, ―Introduction to Data mining with case studies, 2nd Edition, PHI Private limited, New Delhi, 2011.

DATA MINING LAB:

1. Understanding the data
2. Visualization Techniques
3. Data Preprocessing
4. Handling Missing Values
5. Data Reduction-Principal Component Analysis
6. Data Normalization-Min-Max, Z-score, Decimal Scaling

7. Association Rule Mining-Apriori Algorithm
8. Classification
9. Logistic Regression
10. Decision Tree
11. Naive Bayesian
12. Clustering
13. K-Means Clustering
14. DBSCAN
15. Agglomerative

Name of the Paper: Internet Of things.

. **Paper Code:** BVOC-DSC5-543T

Credit: 2

Total Marks: 50

Course Outcomes: On completion of this course, students will

CO1: Work with big data tools and its analysis techniques.

CO2: Analyze data by utilizing clustering and classification algorithms.

CO3: Learn and apply different mining algorithms and recommendation systems for large volumes of data.

CO4: Perform analytics on data streams.

CO5: Learn NoSQL databases and management.

Unit I: 6 Hours

IoT & Web Technology, The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics.

Unit II: 6 Hours

M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

Unit III: 6 Hours

IoT Architecture -State of the Art – Introduction, State of the art, Architecture. Reference Model-Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture-Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

UNIT IV: 6 Hours

IoT Applications for Value Creations Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and GasIndustry, Opinions on IoT Application and Value for Industry, Home Management.

UNIT V: 6 Hours

Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security.

Text Book:
1. Vijay Madisetti and Arshdeep Bahga, ―Internet of Things: (A Hands-on Approach), Universities Press (INDIA) Private Limited 2014, 1st Edition.

Reference Books:

1. Michael Miller, ―The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World, kindle version.
2. Francis daCosta, ―Rethinking the Internet of Things: A Scalable Approach to Connecting Everything, Apress Publications 2013, 1st Edition,.
3. WaltenegusDargie, ChristianPoellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice
4. CunoPfister, ―Getting Started with the Internet of Things, O‟Reilly Media 2011

Detailed Syllabus of 5th Semester
Name of the Paper: Software Engineering

.

Paper Code: BVOC-GE5-542T

Credit: 4

Total Marks: 100

Course Outcomes:
CO1: Define the basic terminologies involved in the entire software developmental life cycle
CO2: Identify suitable models, techniques and tools for the development of a software product
CO3: Apply software engineering perspective through requirements analysis, software design and Construction, verification, and validation to develop solutions to modern problems.
CO4: Compare and contrast different process, cost, quality models and testing techniques
CO5: Estimate the project cost using suitable cost estimation models, rate the software risks and evaluate management strategies for effective software development.

Unit-I: 12 Hours
Introduction to Software Engineering: Definition - The changing nature of software - Software Myths - Terminologies - Role of Management in Software Development - Software Life Cycle Models: The Waterfall Model - Increment Process Model - Evolutionary Process Model - The Unified Process.

Unit-II: 12 Hours
Software Requirements Analysis and Specifications: Requirements Engineering - Type of Requirements - Feasibility Studies - Requirements Elicitation - Requirements Analysis - Requirements Documentation - Requirements Validation.

Unit-III: 12 Hours
Software Project Planning: Size Estimation - Cost Estimation - The Constructive Cost Model (COCOMO) - COCOMO II - The Putnam Resource Allocation Model - Software Risk Management - Software Design: Definition - Modularity - Strategy of Design - Function Oriented Design.

Unit-IV: 12 Hours
Software Testing: A Strategic Approach to Software Testing - Terminologies - Functional Testing - Structural Testing - Levels of Testing - Validation Testing - Testing Tools.

Unit-V: 12 Hours
Software Reliability: Basic Concepts - Software Quality - McCall Software Quality Model - Boehm Software Quality Model - Capability Maturity Model - Software Maintenance: Definition - Process - Models - Configuration Management -Documentation.

Textbooks:
K.K Agarwal, Yogesh Singh (2009), ―Software Engineering, 3 rd Edition, New Age International Publishers

Reference Books:
 1. Roger S. Pressman, ―Software Engineering – A Practioners Approach, 5 th Edition, Tata McGraw Hill Publication.
2. PanajJalote (2005), ―An Integrated Approach to Software Engineering, 3 rd Edition, Narosa Publication.
3. Thomas T. Baker, ―Writing Software Documentation – A task oriented approach, Second Edition, Pearson Education, 2004.
4. Rajib Mall, ―Fundamentals of Software Engineering, Second Edition, Prentice Hall.

SOFTWARE ENGINEERING LAB:

List of Exercises:
Do the following 8 exercises for any project projects (Eg. Student Portal, Online exam registration)
1) Development of problem statement.
2) Preparation of Software Requirement Specification Document.
3) Preparation of Software Configuration Management and Risk Management related documents.
4) Draw the entity relationship diagram
5) Draw the data flow diagrams at level 0 and level 1
6) Draw use case diagram
7) Draw activity diagram of all use cases.
8) Performing the Design by using any Design phase CASE tools.
9) Develop test cases for unit testing and integration testing.
10) Develop test cases for various white box and black box testing techniques.

Name of the Paper: Fundamentals of Data Science.
Paper Code: BVOC-DSC6-641T
Credit: 4
Total Marks: 100

Course Outcome:
At the end of the course the student will be able to:
CO1: Explain and programme Data Science, Big Data and fitting model.
CO2: Explore Data Analysis, Data Science Process and R programs for the algorithms.
CO3: Analyse the feature selection algorithms and Recommendation system.
CO4: Design Map Reduce Solutions.

Unit –I: Introduction to Data Science   15 Hours

Definition and scope of data science, Role of Data science in business and management, overview of data lifecycle and data-drive decision-making.

Unit-II: Data Collection and Pre-processing   15 Hours

Data sources and types, Data acquisition and cleaning, Data transformation and feature engineering,

Unit-III: Python Basics   7 Hours

Python basic data types, Lists, Slicing, If statements, loops, Dictionaries, Tuples, Functions, Array, Selection by position & Labels, Pandas, Numpy, Sci-Kit Learn, Matplot library.

Unit-IV: Importing Data   3 Hours

Reading CSV files, saving in Python data, loading python objects, writing data to CSV file.

Unit-V: **Manipulating Data**   5 Hours

Selecting rows/observations, Rounding Number, Selecting columns/fields, Merging Data, Data aggregation, Data mining Techniques.

Unit-VI: **Statistics Basics**   8 Hours

Population vs Sample,Central Tendency, Mean, Median, Mode, Skewness, Normal Distribution, Probability basics, Standard Deviation, data deviation & Distribution, variance, Distance matrix, Outlier analysis, Missing value treatment, Correlation, Standard Error,Regression Equation and Terminologies, Formula for Coefficients.

Unit-VI: 7 Hours
The basic knowledge of machine learning and its three main types: supervised, unsupervised, and reinforcement learning among other essential topics.

PRACTICAL: Fundamentals of Data Science LAB
1. Python: Operations on Numpy Arrays.
2. Python: Operations on Pandas.
3. Sorting and Searching in NumPy Array.
4. Data Visualization in Python.
5. Create a DataFrame with Pandas.
6. Extract and Read Data With Pandas.

7. Linear Functions and Plotting linear functions in python.
8. Write programs to parse text files, CSV, HTML, XML and JSON documents and extract relevant data. After retrieving data check any anomalies in the data, missing values etc.
9. Write programs for reading and writing binary files
10. Write programs for searching, splitting, and replacing strings based on pattern matching using regular expressions.
11. Write programs to create numpy arrays of different shapes and from different sources, reshape and slice arrays, add array indexes, and apply arithmetic, logic, and aggregation functions to some or all array elements.
12. Functions to some or all array elements 7. Write programs to use the pandas data structures: Frames and series as storage containers and for a variety of data-wrangling operations, such as:
    • Single-level and hierarchical indexing
    • Handling missing data
    • Arithmetic and Boolean operations on entire columns and tables
    • Database-type operations (such as merging and aggregation).
    • Plotting individual columns and whole tables
    • Reading data from files and writing data to files

Detailed Syllabus of 6th Semester
Name of the Paper: Cyber Security.
Paper Code: BVOC-GE6-643T
Credit: 2
Total Marks: 50

Unit I: 6 Hours

Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security

Unit II: 6 Hours

Classification of cyber crimes, Common cyber crimes- cyber crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Cybercriminals modus-operandi , Reporting of cyber crimes, Remedial and mitigation measures, Legal perspective of cyber crime, IT Act 2000 and its amendments, Cyber crime and offences, Organisations dealing with Cyber crime and Cyber security in India, Case studies.

UNIT-III: 6 Hours

Introduction to Social networks. Types of Social media, Social media platforms, Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media, Case studies.

UNIT IV: 6 Hours

Definition of E- Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorised banking transactions. Relevant provisions of Payament Settlement Act,2007.

UNIT V: 6 Hours

End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third party software, Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus, Management of host firewall and Anti-virus, Wi-Fi security, Configuration of basic security policy and permissions.

Books and References:
1. Cyber Law Simplified Vivek Sood TMH Education 2001
2. Cybersecurity Law Jeff Kosseff Wiley 2017

Detailed Syllabus of 6th Semester
Name of the Paper: Artificial Intelligence.
Paper Code: BVOC-GE6-643T
Credit: 2
Total Marks: 50

Course Outcomes: After completion this course, student will

CO1: Understand the various concepts of AI Techniques.

CO2: Understand various Search Algorithm in AI.

CO3: Understand probabilistic reasoning and models in AI.

CO4: Understand Markov Decision Process.

CO5: Understand various type of Reinforcement learning Techniques.

Unit I: 6 Hours

Introduction: Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree.

Unit II: 6 Hours

Search Algorithms: Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A* algorithm, Game Search.

UNIT-III: 6 Hours

Probabilistic Reasoning: Probability, conditional probability, Bayes Rule, Bayesian Networks-representation, construction and inference, temporal model, hidden Markov model.

UNIT IV: 6 Hours

Markov Decision process: MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs.

UNIT V: 6 Hours

Reinforcement Learning: Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning.

Text Book:

1. Stuart Russell and Peter Norvig, ―Artificial Intelligence: A Modern Approach, 3rd Edition, Prentice Hall. Elaine Rich and Kevin Knight, ―Artificial Intelligence, Tata McGraw Hill.

Reference Books :

1. Trivedi, M.C., ―A Classical Approach to Artifical Intelligence, Khanna Publishing House, Delhi.

2. Saroj Kaushik, ―Artificial Intelligence, Cengage Learning India, 2011

3. David Poole and Alan Mackworth, ―Artificial Intelligence: Foundations for Computational Agents, Cambridge University Press 2010

Name of the Paper: Cloud Computing.
.   **Paper Code:** BVOC-GE6-642T
Credit: 2
Total Marks: 50

COURSE OUTCOMES: Upon completion of this course, the students should be able to:

CO1: Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
CO2: Learn the key and enabling technologies that help in the development of cloud.
CO3: Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models.
CO4: Explain the core issues of cloud computing such as resource management and security.
CO5: Be able to install and use current cloud technologies.
CO6: Evaluate and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.

Unit-I: 6 Hours
        Introduction to Cloud Computing – Definition of Cloud – Evolution of Cloud Computing – Underlying Principles of Parallel and Distributed Computing – Cloud Characteristics – Elasticity in Cloud – On-demand Provisioning.

Unit-II: 6 Hours
        Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish Subscribe Model – Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU – Memory – I/O Devices –Virtualization Support and Disaster Recovery.

Unit-III: 6 Hours
        Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds – laaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.

Unit-IV: 6 Hours
        Inter Cloud Resource Management – Resource Provisioning and Resource Provisioning Methods – Global Exchange of Cloud Resources – Security Overview – Cloud Security Challenges – Software-as-a-Service Security – Security Governance – Virtual Machine Security – IAM – Security Standards.

Unit-V: 6 Hours
        Hadoop – MapReduce – Virtual Box — Google App Engine – Programming Environment for Google App Engine — Open Stack –Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.

TEXT BOOKS:
 1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From parallel processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
 2. Raj Kamal, "Internet of Things: Architecture and Design Principles", McGraw-Hill Education Pvt. Ltd., 2018.

REFERENCE BOOKS:

1. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2013.

2. Rittinghouse, John W., and James F. Ransome, ―Cloud Computing: Implementation, Management and Security, CRC Press, 2017.

3. Marco Schwatrz, "Internet of Things with Arduino Cookbook", Packt Publications, 2016.

4. RajkumarBuyya, Christian Vecchiola. S.ThamaraiSelvi, "Mastering Cloud Computing", McGraw Hill Education, 2013.

5. Nick Antonopoulos and Lee Gillam, "Cloud Computing: Principles, Systems and Applications", Second Edition, Springer, 2017.

Extensive Reading:

1.https://azure.microsoft.com/en-in/overview/what-is-cloud-computing/
2.https://aws.amazon.com/iot/
3.http://postscapes.com/projects
4.https://cloud.google.com/solutions/iot
7.https://swayam.gov.in/nd1_noc20_cs20