

Department of Computer Science
Bachelor of Science (B.Sc.) 2023-24

Name of University : Mohanlal Sukhadia University, Udaipur
Name of Faculty : Science
Name of Discipline/Subject : Computer Science

Level	Semester	Course Type	Course Code	Title	Delivery Type			Total Hours	Credit	Total	Internal Ass	EoS Exam	M. M.	Remarks
					L	T	P							
5	I	DCC	BCS5000T	Computer fundamental and problem-solving using C	L	T	-	60	4	6	20	80	100	---
			BCS5000P	Computer fundamental & problem-solving using C Lab	-	-	P	60	2		20	80	100	
		AEC		AECC-I	L			30	2	2	20	80	100	
	II	DCC	BCS5001T	Data Structure	L	T	-	60	4	6	20	80	100	---
			BCS5001P	Data Structure Lab	-	-	P	60	2		20	80	100	
		AEC		AECC-II	L			30	2	2	20	80	100	
Exit with Certificate in Science (After 4 more credits in SEC)														
6	III	DCC	BCS6002T	C++ Programming	L	T	-	60	4	6	20	80	100	---
			BCS6002P	C++ Programming Lab	-	-	P	60	2		20	80	100	
		SEC		Communicative English	L	T	-	30	2	2	20	80	100	
	IV	DCC	BCS6003T	Operating System	L	T	-	60	4	6	20	80	100	---
			BCS6003P	Operating System Lab	-	-	P	60	2		20	80	100	
		SEC	SES633XT	0. Computer Networks 1. IT Fundamentals 2. E-Commerce	L		-	30	2	2	20	80	100	*

Exit with Diploma in Science														
7	V	DSE	BCS710XT	0. Database Management Systems 1. Java Programming 2. PHP programming 3. Cloud Computing	L	T	-	60	4	4	20	80	100	---
			BCS710XP	0. Database Management Systems Lab 1. Java Programming Lab 2. PHP programming Lab 3. Cloud Computing Lab	-	-	P	60	2	2	20	80	100	---
		SEC	SES733YT	3. Digital Electronics 4. IoT : Internet of things 5. Multimedia and Web Design	L		-	30	2	2	20	80	100	*
	VI	DSE	BCS710YT	4. Web Designing 5. Python Programming 6. Data mining and warehousing	L	T	-	60	4	6	20	80	100	---
			BCS710YP	4. Web Designing Lab 5. Python Programming Lab 6. Data Mining and Warehousing Lab	-	-	P	60	2		20	80	100	
		SEC	SES733ZT	6. Python Fundamentals 7. Data Analysis using MS Office 8. PC Packages	-	-	P	30	2	2	20	80	100	*
			Exit with Graduation Degree in Science (B.Sc.)											
		<ul style="list-style-type: none"> May be opted from other core courses 												

Semester I

Course Code:	BCS5000T
Title of the course:	Computer Fundamental and problem-solving using C
Level of the Course:	NHEQF Level 4.5
Credit of the Course:	4
Type of the Course:	Discipline Centric Compulsory (DCC) Computer Science
Total Lectures	60(40+20), 40 lectures for content delivery and 20 hours on diagnostic, formative assessment, class activity and problem solving.
Prerequisites:	None

Objectives of the Course:

In this course, the students will learn about:

1. To understand the various steps in Program development.
2. To understand the basic concepts in C Programming Language.
3. To learn how to write modular and readable C Programs
4. To learn to write programs (using structured programming approach) in C to solve problems.

Course Outcomes:

1. Demonstrate the basic knowledge of computer hardware and software.
2. To formulate simple algorithms for arithmetic and logical problems.
3. To translate the algorithms to programs (in C language).
4. To test and execute the programs and correct syntax and logical errors.
5. Ability to apply solving and logical skills to programming in C language

Syllabus

Unit I

Computer and Data: Introduction – Data, Computer, Computer Systems, Computing Environments (Personal Computing Environment, Time sharing Environment, Client Server Computing Environment , Distributed Computing), Classification of computers(Workstations, Mainframe, Super computers, client and server), Computer languages, Computer Numbering System, Programming Errors, Memory, Input and Output devices, Operating systems- Definition, Examples.

(12 Lecture Hours)

Unit II

Algorithm: Definition and properties of algorithms, flow charts symbols, Types of flow chart. Programming in C: structure of C programs, compilation and execution of C programs, keywords, data types , constants, and variables, expressions. Operators, Associativity and precedence of C operators. Input/ output statements, C preprocessor

(12 Lecture Hours)

Unit III

Control statements: if-else, switch.

Loops: for, while, do-while .Nested loops and combined loops, Break, Continue and goto.

(12 Lecture Hours)

Unit IV

Functions: built-in and user-defined functions, function declaration , Advantages of user defined functions, Parameter passing- call by value & call by reference, recursive functions.

Array: Creating of one dimensional array, initialization , Accessing elements of 1 D array. Two dimensional array ,initialization , Accessing elements of 2D array.

Strings: String Concepts, Declaring and initializing strings, String Input / Output Functions, String Manipulation Functions.

(12 Lecture Hours)

Unit V

Pointers: pointer variable and its importance, pointer arithmetic, array of pointers, function of pointers, structure of pointers, dynamic memory allocation functions.

Structures and Union : Declaration of structures, initialization and accessing structure members. Function and structures , Array of structure, unions, enumeration.

File: Input/Output – Create, Open, Read, Write, Delete, Close.

(12 Lecture Hours)

Suggested Books

1. V .Rajaraman : Fundamentals of Computers, Prentice Hall India Learning Private Limited
2. Programming with C :- Schaum's outline Series , McGraw Hill Education
3. 5. Alexis Leon : Fundamentals Of Information Technology , VIKAS PUBLISHING; Second edition (1 January 2009)
4. E. Balagurusamy : COMPUTING FUNDAMENTALS AND C PROGRAMMING , McGraw Hill Education; Second edition

Suggested E-resources:

1. https://books.google.co.in/books?id=2Nw4iTppBEC&pg=PA31&source=gbs_toc_r&cad=3#v=onepage&q&f=false
2. https://books.google.co.in/books?id=2Nw4iTppBEC&pg=PA49&source=gbs_toc_r&cad=3#v=onepage&q&f=false
3. <https://www.codesansar.com/computer-basics/program-design.html>
4. https://books.google.co.in/books?id=2Nw4iTppBEC&pg=PA12&source=gbs_toc_r&cad=3#v=onepage&q&f=false
5. <https://www.codesansar.com/computer-basics/program-documentation.htm>
6. <https://www.geeksforgeeks.org/int-1-sign-bit-31-data-bits-keyword-in-c/>
7. <https://www.geeksforgeeks.org/c-arrays/?ref=leftbar-rightbar>

Semester I

Course Code:	BCS5000P
Title of the course:	Computer Fundamental and problem solving using C Lab
Level of the Course:	NHEQF Level 4.5
Credit of the Course:	2
Type of the Course:	Discipline Centric Compulsory (DCC) for B.Sc Computer Science
Delivery Type of the Course:	60 Practical
Prerequisites:	None

Objectives of the Course:

- 1) Programming basics and the fundamentals of C
- 2) Data types in C
- 3) Mathematical and logical operations
- 4) Using if statement and loops
- 5) Arranging data in arrays
- 6) File management and dynamic memory allocation

Course Learning Outcomes:

1. Control the sequence of the program and give logical outputs
2. Implement strings in C program
3. Store different data types
4. Manage I/O operations in C program
5. Apply code reusability with functions and pointers
6. Understand the basics of file handling mechanisms

List of sample practical programs:

1. Programs based on C operators – Arithmetic, Relational , Conditional , sizeof , Logical , Bitwise, Increment /Decrement Operators
2. Programs based on to calculate the lvalue of the given Formulas. For Exp.
 - Compute area and circumference of a circle.
 - Compute surface area and volume of a sphere.
 - Compute sum of digit of 4 digit numbers.
 - Compute simple and compound interest.
 - Compute find distance between two points.
3. Programs based on Conversion formula. For exp.
 - Fahrenheit to Celsius conversion.
 - Convert seconds to hours, minutes and seconds.
 - Convert centimeter to meter , inches.
4. Program based on selective structure.
 - Using simple if .. else statements
 - Using Nested if .. else statements.

- Using else .. if ladder.
 - Using Switch statements.
- 5. Program based on Repetitive structure.
 - Using while Loop.
 - Using do .. while loop.
 - Using for loop.
 - Using combined loop.
 - Using nested loops
- 6. Programs using break and continue statements within loop.
- 7. Programs Using 1D Array. For Exp.
 - Program create read and write 1D Array.
 - Linear search in 1D Array.
 - Find largest and Smallest from 1D Array.
 - Sorting the 1D Array.
- 8. Menu driven Programs Using 2D Array. For Exp.
 - Program to create read and print $m * n$ matrix.
 - Program add ,subtract & multiply two matrices.
 - Program to add row and column total.
 - To change diagonal of square matrix.
- 9. Programs using string handling function.
- 10. Programs using functions.
 - Using function and array.
 - Using recursive function.
 - Using call by value and call by reference.
 - Using function with arguments no return values.
 - Using function with arguments with return values.
- 11. Program using Pointers.
 - Using pointer arithmetic.
 - Using pointer and 1D array.
 - Using pointer and functions.
- 12. Programs using structure.
 - Create and print the structure of book, football team, date etc.
 - Program using structure and function.
 - Program using array of structure.
- 13. Program using C preprocessor.
- 14. Program based on files.
 - Using File management commands Example:-
 - Write to a text file
 - Read from a text file
 - Read name and marks of n number of students and store them in a file.
 - Create file, If the file previously exists, add the information to the file.
 - To copy contents of a file from one to another

Suggested E-Resources:

Online virtual lab

Scheme of EoSE :

(i) Exercise(s):45 (ii) Viva Voce: 20 (iii) Evaluation of record book: 15

Semester II

Course Code:	BCS5001T
Title of the course:	Data structure
Level of the Course:	NHEQF Level 4.5
Credit of the Course:	4
Type of the Course:	Discipline Centric Compulsory (DCC) for B.Sc Computer Science
Total Lectures	60(40+20), 40 lectures for content delivery and 20 hours on diagnostic, formative assessment, class activity and problem solving.

Prerequisites:

Prior knowledge of topics like:

Variables ,Functions, loops, Input and output, Conditionals (if/then/else)

Objectives of the Course:

1. To store and organize a large set of data in computer memory
2. Reusability of data efficiently as well as logically or mathematically.

Course Learning Outcomes:

1. Learn the basic types for data structure, implementation and application.
2. Know the strength and weakness of different data structures.
3. Use the appropriate data structure in context of solution of given problem.
4. Develop programming skills which require to solve given problem.

Syllabus

Unit I

Fundamental: Introduction to Data structures, data type, abstract data type, Storage management.

Notation of an algorithm -Complexity measures (time and space), ordering notation. Linear Structure: Arrays, queue, operations on queue, implementation of queue, Circular queue, stack, operation on stack, implementation of stack as an array, polish expressions, Sparse matrices.

(12 Lecture Hours)

Unit II

Linked Structure : List representation, operations on linked list - get node and free node operation, implementing the list operation, inserting, deleting, searching, find Maximum and minimum , circular linked list, doubly linked list.

(12 Lecture Hours)

Unit III

Tree Structure : Binary search tree, inserting, deleting and searching, maximum and minimum into binary search tree, tree traversals.

(12 Lecture Hours)

Unit IV

Graph Structure : Graph representation - Adjacency matrix, adjacency list, adjacency multilist representation, Graph traversals - Breadth first search, Depth first search, Prim's and Kruskal's algorithm, Dijkstra's Shortest Path Algorithm.

(12 Lecture Hours)

Unit V

Searching: sequential searching, binary searching, hashing.

Sorting : bubble sort, selection sort, quick sort, , shell sort, merge sort, and insertion sort .

(12 Lecture Hours)

Books:

1. Horowitz E Sartaj Sahni, Fundamentals of Data Structure, Galgotia Publication Private Limited., Delhi.
2. Data Structure Using C & C++, Tannenbaum, PHI
3. DATA STRUCTURE , LIPSCHUTZ, Tata Mcgraw Hill Education Private Limited

Suggested E-resources:-

1. <https://www.geeksforgeeks.org/data-structures/>
2. https://www.google.co.in/books/edition/Data_Structures_Algorithms_using_C/fCIEEAAAQBAJ?hl=en&gbpv=1&dq=data+structures&printsec=frontcover
3. https://www.google.co.in/books/edition/Introduction_to_Data_Structures_in_C/HHfP4M_SW6AC?hl=en&gbpv=1&dq=data+structures&printsec=frontcover

Semester II

Course Code	: BCS5001P
Title of the course	: Data Structure Lab
Level of the Course	: NHEQF Level 4.5
Credit of the Course	: 2
Type of the Course	: Discipline Centric Compulsory (DCC) Computer Science
Delivery Type of the Course	: 60 Practical
Prerequisites:	The prerequisites are the knowledge of programming languages, basic mathematics, organizing, and problem-solving ability.

Objectives of the Course:

1. The course is designed to develop skills to design and analyze simple linear and non linear data structures.
2. Data structure stores and organizes a large set of data in computer memory. It ensures the reusability of data efficiently later. Data can be stored logically or mathematically.

Course Learning Outcomes:

1. To develop skills to design and analyze simple linear and non linear data structures
2. To identify and apply the suitable data structure for the given real world problem.
3. Enables them to gain knowledge in practical applications of data structures.

List of sample practical programs:

1. Array Operations (Addition, Subtraction and Multiplication)
2. Matrix Operations (Addition, Subtraction and Multiplication)
3. Queue implementation using arrays
4. Circular Queue
5. Stack implementation using arrays
6. Sparse matrices
7. The linked list operation, inserting, deleting, searching, find Maximum and minimum
8. The doubly linked list operation, inserting, deleting, searching, find Maximum and minimum
9. Circular Linked List
10. Binary search tree, inserting, deleting & searching, maximum & minimum in binary search tree, tree traversals.
11. Breadth first search
12. Depth first search
13. Linear search in a list
14. Binary search in a list
15. Bubble sort algorithm
16. Insertion sort algorithm
17. Quick sort algorithm
18. Selection sort algorithm
19. Shell sort
20. Merge sort

Suggested E-Resources:
Online virtual lab

Scheme of EoSE :

(i) Exercise(s):45 (ii) Viva Voce: 20 (iii) Evaluation of record book: 15

Semester III

Course Code:	BCS6002T
Title of the course:	C++ Programming
Level of the Course	NHEQF Level 5
Credit of the Course:	4
Type of course:	Discipline Centric Compulsory (DCC) Course For B.Sc..
Total Lectures	60(40+20), 40 lectures for content delivery and 20 hours on diagnostic, formative assessment, class activity and problem solving.

Prerequisites:

1. The prerequisite to learning C++ is the basic functionality of computer programs.
2. Must have knowledge about C Programming.

Objectives of the Course:

1. Understand tokens, expressions, and control structures.
2. Explain arrays and strings and create programs using them.
3. Describe and use constructors and destructors.
4. Understand and employ file management.

Course Learning Outcomes:

1. Describe OOPs concepts
2. Use functions and pointers in C++ program
3. Understand tokens, expressions, and control structures
4. Explain arrays and strings and create programs using them
5. Describe and use constructors and destructors
6. Understand and employ file management
7. Demonstrate how to control errors with exception handling

Syllabus

Unit I

Different paradigms for problem solving, need for OOP, differences between OOP and procedure oriented programming, abstraction, overview of OOP principles- encapsulation, inheritance and data binding polymorphism, abstraction.

Beginning with C++ : What is C++, Applications of C++ , Structure of C++ Program , C++ character set, Tokens , C++ Data types, Variables, A simple C++ Program. Comparing C with C++.

(12 Lecture Hours)

Unit II

Expressions and control structures : Operators in C++, Scope resolution operator, Member dereferencing operators, Memory Management operators, set manipulators, Expressions and implicit conversions.

Classes : Need for classes, Class definition, Class structure , Class objects, referencing Class members , scope of class and its members.

Functions in C++ : Function prototyping, Inline function, Constant member function ,Default arguments , function overloading, friend function, static class member, operator overloading (unary, binary operators).

(12 Lecture Hours)

Unit III

Classes and Objects : Array of objects , Arrays within class , Object as function arguments, function returning objects , Nesting of member function , Nesting of classes , Private member function.

Memory Allocation : Memory allocation of objects, Static data members, Static member functions, pointers to members , New and delete Operator ,This Pointer.

(12 Lecture Hours)

Unit IV

Constructor : Need for Constructors, Declaration and Definition , Default Constructors, Parameterized Constructors , copy Constructors, Order of constructor invocation , Dynamic initialization of Objects, Constructor overloading, Dynamic Constructors , Constructor with Default arguments , Constructing two - Dimensional Arrays , Special characteristics of Constructors.

Destructors : Need for Destructors , Declaration and Definition , Characteristics of Destructors

(12 Lecture Hours)

Unit IV

Inheritance : Need for Inheritance , Different forms of inheritance , Derived and base classes : single Inheritance , Multiple Inheritance , Multi-level Inheritance , Hierarchical Inheritance and hybrid Classes. Visibility Modes ,Inheritance and Access control , Virtual Base Classes , Abstract Classes, Constructors in Multiple Inheritance.

Polymorphism: static and dynamic bindings, base and derived class virtual functions, dynamic binding through virtual functions, virtual function call mechanism, pure virtual functions, abstract classes, implications of polymorphic use of classes, virtual destructors.

(12 Lecture Hours)

Books

1. Object- Oriented Programming with C++ by E. Balaguruswamy McGraw Hill .
2. C++: The Complete Reference, Herbert Schildt,McGraw Hill .
3. Let Us C++ , Yashwant Kanetkar, Bpb Publisher.
4. C/ C++ C Programming Concepts Black Book, Dasgupta, Chakrabarti, Dreamtech Press

Suggested E-resources.

1. <https://www.bitdegree.org/learn/sql-commands-list>
2. <https://www.programiz.com/cpp-programming>
3. <https://isocpp.org/>
4. <https://www.youtube.com/watch?v=yGB9jhsEsr8>
5. <https://learn.microsoft.com/en-us/cpp/cpp/?view=msvc-170>

Semester III

Course Code:	BCS6002P
Title of the course:	C++ Programming Lab
Level of the Course	NHEQF Level 5
Credit of the Course:	2
Type of course:	Discipline Centric Compulsory (DCC) Course For B.Sc.
Discipline/Subject.	
Delivery Type of the Course:	60 Practical

Prerequisites:

1. The prerequisite to learning C++ is the basic functionality of computer programs.
2. Must have knowledge about C Programming.

Objectives of the Course:

1. Understand tokens, expressions, and control structures.
2. Explain arrays and strings and create programs using them.
3. Describe and use constructors and destructors.
4. Understand and employ file management.

Course Learning Outcomes:

1. Creating simple programs using classes and objects in C++.
2. Implement Object Oriented Programming Concepts in C++.
3. Develop applications using stream I/O and file I/O.
4. Implement simple graphical user interfaces.
5. Implement Object Oriented Programs using templates and exceptional handling concepts.

List of Sample Programs

1. Write a C++ program to print details name, roll number in a single and two lines.
2. Write a C++ program to print your personal details name, surname (single character), total marks, gender(M/F), result(P/F) by taking input from the user.
3. Write a C++ program to convert centigrade into Fahrenheit. Formula: $C=(F-32)/1.8$
4. Write a C++ program that prompts the user to enter two integer values in int variables

13. val1, val2 and find largest, sum, difference, product and ratio of these values.
5. Write a C++ program to print the accepted number and its reverse number.
6. Write a C++ program to read a number between 1 and 100 and the program asks
14. questions to figure out what the number is (e.g. "Is the number you are thinking of less
15. than 50?"). Your program should be able to identify the number after asking no more
16. than seven questions. Hint: use the < and <= operators and the if-else statement.
7. Write a C++ program to find all the prime numbers between 1 and 100.
8. Write a C++ program that writes out the Fibonacci series. Find the largest Fibonacci number that fits in an int.
9. Write C++ Program using Function Overloading without class and objects.
10. Write C++ Program using Function Overloading using class.
11. Write C++ Program using Default arguments.
12. Write C++ Program using Friend function.
13. Write C++ Program using Inline Function.

14. Write C++ Program using Array of objects.
15. Write C++ Program using Array within class.
16. Write C++ Program using Objects as an Function arguments.
17. Write C++ Program using Function returning objects.
18. Write C++ Program using Nesting of Member Function.
19. Write C++ Program using Nesting of class.
20. Write C++ Program using Static data members.
21. Write C++ Program using Static Member Function.
22. Write C++ Program using New and delete operator.
23. Write C++ Program using Three types of Constructor.
24. Write C++ Program using Order of invocation of constructor and destructor.
25. Write C++ Program using CALL BY REFERENCE.
26. Write C++ Program using Single Inheritance.
27. Write C++ Program to create class hierarchy in which base class have multiple derived classes.
28. Write C++ Program to create class hierarchy in which derived class have multiple base classes.
29. Write C++ Program illustrating the use of abstract classes.
30. Write C++ Program illustrating the use of constructors in derived classes.
31. Write C++ Program using virtual base class.
32. Write C++ Program using pointers to derived classes.
33. Write C++ Program using virtual functions.
34. Write C++ Program using pure virtual functions.

Books

1. Object- Oriented Programming with C++ by E. Balaguruswamy
2. C++: The Complete Reference, Herbert Schildt, McGraw Hill .
3. Let Us C++ , Yashwant Kanetkar, Bpb Publisher.
4. C/ C++ C Programming Concepts Black Book, Dasgupta, Chakrabarti, Dreamtech Press

Suggested E-resources.

1. <https://www.programiz.com/cpp-programming/examples>
2. <https://codescracker.com/cpp/program/cpp-programming-examples.htm>
3. <https://www.studymite.com/cpp/examples>
4. <https://www.javatpoint.com/cpp-programs>
5. Online virtual lab

Scheme of EoSE :

- (i) Exercise(s):45 (ii) Viva Voce: 20 (iii) Evaluation of record book: 15

Semester III

Communicative English (As per the syllabus proposed by university)

Semester IV

Course Code:	BCS6003T
Title of the course:	Operating System
Level of the Course:	NHEQF Level 5
Credit of the Course:	4
Type of the Course:	Discipline Centric Compulsory (DCC) Course for Computer Science
Total Lectures	60(40+20), 40 lectures for content delivery and 20 hours on diagnostic, formative assessment, class activity and problem solving.
Prerequisites:	Knowledge of data structure, programming language & computer architecture.

Objectives of the Course:

1. To understand the concepts of operating systems and their services.
2. To familiarize the operations performed by the operating system as a resource manager.
3. To impart various scheduling policies of the operating system
4. To teach the different file systems, memory management techniques and input/output management.

Course Learning Outcomes:

1. The student will be able to learn following outcomes from the course:
2. Understand the role of the operating system with its function and services.
3. Compare Various Algorithms used for CPU Scheduling, Memory management and Disk Scheduling
4. Helps students to understand various concepts related to Deadlock and solve problems.

Syllabus

Unit I

OPERATING SYSTEM: Introduction, Functions of operating system, Mainframe systems, desktop systems, multiprocessor systems, distributed systems, clustered systems, real-time systems, handheld systems. Types of operating system

OPERATING SYSTEMS STRUCTURES: Operating system services and systems calls, system programs, operating system structure, operating systems generations, virtual machines
(12 Lecture Hours)

Unit II

PROCESS MANAGEMENT: Process concepts, process state, operations on processes, process control block, cooperating processes. Inter process communication, multithreaded programming

CPU Scheduling: Basic concepts, scheduling criteria, scheduling algorithms, algorithm evaluation.

(12 Lecture Hours)

Unit III

PROCESS SYNCHRONIZATION: Process synchronization, critical section problem, semaphores, classical problems of synchronization.

Deadlocks: Deadlock characterization, methods for handling deadlocks. Deadlock prevention, avoidance and detection. Recovery from deadlocks banker's algorithm.

(12 Lecture Hours)

Unit IV

MEMORY MANAGEMENT: Swapping, contiguous memory allocation, paging, segmentation, segmentation with paging.

VIRTUAL MEMORY: Demand paging, page-replacement algorithms, allocation of frames, thrashing

(12 Lecture Hours)

Unit V

FILE SYSTEM: Concept, access methods, directory structure, file system mounting, file protection and sharing

I/O SYSTEM: Overview of mass storage structure, disk structure, disk scheduling algorithms.

(12 Lecture Hours)

Books:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne (2006), Operating System Principles, 7th edition, Wiley India Private Limited, New Delhi.
2. Stallings (2006), Operating Systems, Internals and Design Principles, 5th edition, Pearson Education, India.
3. Andrew S. Tanenbaum (2007), Modern Operating Systems, 2nd edition, Prentice Hall of India, India.
3. Deitel&Deitel (2008), Operating systems, 3rd edition, Pearson Education, India.
5. Operating Systems: A Concept-based Approach, Dhananjay M. Dhamdhare, Tata McGraw-Hill Education.

Suggested E Resources:

1. <https://ocw.mit.edu/courses/6-828-operating-system-engineering-fall-2012/pages/lecture-notes-and-readings/>
2. https://onlinecourses.nptel.ac.in/noc19_cs50/preview
3. https://youtu.be/Dj2hN_pFA8w
4. <https://www.youtube.com/watch?v=Ij71sDmmKpc&pp=ygUQb3BlcmF0aW5nIHN5c3RlbQ%3D%3D>
5. <https://www.youtube.com/watch?v=bkSWJJZNgf8&list=PLxCzCOWd7aiGz9donHRrE9I3Mwn6XdP8>

Semester IV

Course Code:	BCS6003P
Title of the course:	Operating System Lab
Level of the Course:	NHEQF Level 5
Credit of the Course:	4
Type of the Course:	Discipline Centric Compulsory (DCC) Course for Computer Science
Delivery Type of the Course:	Practical,

Prerequisites:

1. Knowledge of C language and
2. Knowledge of data structure

Objectives of the Course:

1. To understand Unix operating system commands
2. To gain knowledge of various editors available
3. To understand shell programming.
4. Students will understand the Modern Operating System and their principles.

Course Learning Outcomes:

1. After completion of operating system lab students will learn:
2. The student will learn the introduction of the Unix operating system.
3. The student will get an understanding of basic commands of Unix.
4. The student will get friendly with the editors like vi, emacs
5. The student will learn to implement Shell programming on Unix operating system

Operating System Lab

1. Introduction to Unix, kernel and shell
2. Introduction to Unix editors such as vi, ed, ex and EMACS.
3. Illustrate basic Unix commands Syntax using unix editors
4. Illustrate Unix file and directories commands unix editors
5. Illustrate File manipulation Commands using unix editors
6. Illustrate Unix network commands using unix editors
7. Write a shell programme to display simple messages.
8. Write a shell program to implement the use of "echo" command with options.
9. Write a shell program to implement single and multi-line comments.
10. Write a shell program to implement use of while and for loop.
11. Write a shell program to get input from the user.
12. Write a shell program to implement if condition and if with AND/ OR logic.
13. Write a shell program to implement else if statement.
14. Write a shell program to implement a case statement.
15. Write a shell program to implement to get arguments from the command line.
16. Write a shell program to implement string variables.
17. Write a shell program to get substring from string.

18. Write a shell program to add, subtract, multiply and divide two numbers.
19. Write a shell program to create functions.
20. Write a shell program to create a directory.
21. Write a shell program to read file.
22. Write a shell program to delete file.
23. Write a shell program to append file.
24. Write shell programme to check if file exists
25. Write a shell program to get the current date.

Books:

1. Abraham Silberschatz Peter B. Galvin and Greg Gagne, Operating System Concepts, Wiley 8th Edition, 2008.
2. Garry. J. Nutt, Operating Systems: A Modern Perspective, Addison-Wesley
3. Andrew S. Tanenbaum and Herbert Bros, Modern Operating Systems (4th Edition), Pearson
4. Russ Cox, Frans Kaashoek, Robert Morris , xv6: a simple, Unix-like teaching operating system",Revision 8
5. Sumitabha Das , UNIX Concepts and Applications, Tata McGraw-Hill

Suggested E Resources :

1. The UNIX Operating System, AT&T Archives, at YouTube
2. The UNIX Time-Sharing System, Dennis M. Ritchie and Ken L. Thompson, Bell System Technical Journal 57(6)
3. A Narrative History of BSD, Kirk McKusick, at YouTube
4. <https://linuxhint.com>

Scheme of EoSE :

- (i) Exercise(s):45 (ii) Viva Voce: 20 (iii) Evaluation of record book: 15

Semester IV

Course Code:	SES6330T
Title of the course:	Computer Networks
Level of the Course:	NHEQF Level 5
Credit of the Course:	2
Type of the Course:	Skill Enhancement Course (SEC)
Total Lectures	30 lectures for content delivery
Prerequisites:	None

Objectives of the Course:

This course is designed with the following objectives:

1. To build an understanding of the fundamental concepts of different layers in computer networks.
2. To familiarize the student with the basic protocols and standards in the field of computer networking by enumerating the layers of the OSI model and TCP/IP.
3. To allow the student to gain expertise in different coding schemes and transmission protocols, preparing the student for entry advanced courses in computer networking.
4. To understand and build the skills of subnetting and routing mechanisms at network layer.
5. To familiarize with the basic protocols at transport layer and how they can be used to assist in network design and implementation.
6. To allow the student to understand the different applications in application layer and their functions within a network.

Course Learning Outcomes:

1. By the end of this course, students should be able to:
2. Understand the fundamental concepts of different layers in networking.
3. Identify different components and their respective roles in a computer communication system.
4. Apply the knowledge, concepts and terms related to data communication and networking. Solve problems in networking by referring to problems solving steps through relevant information by choosing suitable techniques.
5. Acquaint them with networking techniques, configuring networking devices and understand their functionality.
6. Know the strategies for securing network applications.
7. Appreciate the usefulness and importance of computer communication in today's life and society.

Syllabus

UNIT-I

Introductory Concepts: Network hardware, Network software, types of network, topologies, Internetworking and networking devices: Switch/ Hub, Bridge, Router, Gateways and firewalls. Protocols and standards, OSI model, TCP model, TCP/IP model.

(6 Lecture Hours)

UNIT-II

Physical Layer: Digital and analog Signals, Transmission media: guided transmission media, wireless transmission, Limitations of Data Rate, Digital Data Transmission, Performance Measures, Line Coding, Digital Modulation, Media and Digital Transmission System.

(6 Lecture Hours)

UNIT-III

Data Link Layer: Error Detection and Correction, Types of Errors, Two dimensional parity check, Detection versus correction. Protocols: Stop and wait, Go-back-N ARQ, Selective Repeat ARQ, Sliding window, Piggy backing, Pure ALOHA, Slotted ALOHA.

(6 Lecture Hours)

UNIT-IV

Network Layer: Design issues, Routing algorithms: IPV4, IPV6, Address mapping: ARQ, RARQ, Congestion control, Unicast, Multicast, Broadcast routing protocols, Quality of Service, Internetworking.

(6 Lecture Hours)

UNIT-V

Transport Layer: Transport service, Elements of transport protocols, User Datagram Protocol, Transmission Control Protocol, Leaky Bucket and Token Bucket algorithm.

Application Layer: WWW, DNS, MIME, Electronic mail, FTP, HTTP, SMTP.

(6 Lecture Hours)

Books:

1. Data and Computer Communication- William Stallings, PHI
2. Computer Networks- A. S. Tanenbaum, Pearson Education
3. Data Communications and Networking- Behrouz A Forouzan, Mcgraw Higher Ed
4. Computer Networking: A Top-Down Approach- James F. Kurose, Keith W. Ross, Pearson Education

Suggested E-resources:

1. <https://ocw.mit.edu/courses/6-829-computer-networks-fall-2002/>
2. <https://www.cse.iitk.ac.in/users/dheeraj/cs425/>
3. https://cse.iitkgp.ac.in/~sandipc/courses/cs31006/slides/Intro_Networks.pdf
4. <https://www.youtube.com/watch?v=1msEo8PIcbw&pp=ygURY29tcHV0ZXIgbmV0d29yayA%3D>
5. <https://www.youtube.com/watch?v=VwN91x5i25g&list=PLBlnK6fEyqRgMCUA-G0XRw78UA8qnv6jEx>

Semester IV

Course Code:	SES6331T
Title of the course:	IT Fundamentals
Level of the Course:	NHEQF Level 5
Credit of the Course:	2
Type of the Course:	Skill Enhancement Course (SEC)
Total Lectures	30 lectures for content delivery
Prerequisites	: General computer operating

Objectives of the Course:

1. To know the basics of computer fundamentals
2. Familiarize with the working principles of a computer
3. Learn the basic concept of data representation
4. Familiar with the various devices and interfaces
5. Understand the fundamentals of system architecture
6. To analyze the problem and developing algorithms and flow charts.
7. Familiarize the emerging trends in computer files

Course Learning Outcomes:

Understand the fundamentals of computers and basics

Syllabus

Unit 1

Introduction to Computers , number systems decimal, binary, hexadecimal, Memory Hierarchy, Secondary Storage Devices, Overview Of I/O Devices, Input Devices, Output Devices

(6 Lecture Hours)

Unit II

Operating Systems, Functions of An Operating System, Programming Languages, Introduction to Software Engineering, System Tools And Utility Programs

(6 Lecture Hours)

Unit III

File Structure, Database Structured Implementation, Object Oriented Database, ER Models, Relational Data Model, Structured Query Language

(6 Lecture Hours)

Unit IV

Networks, Guided Transmission Media, Unguided Transmission Media, Internet And Applications, Online Education, Internet Utilities, Use of Computers In Education And Research

(6 Lecture Hours)

Unit V

Artificial Intelligence, Data Analysis ,Heterogeneous Data & Storage, E-Library, Google Scholar

(6 Lecture Hours)

Suggested Books

1. P. K.Sinha, P. Sinha, Fundamentals of Computers, BPB Publishers, 2007
2. Goel, Computer Fundamentals, Pearson Education, 2010.

E-Resources:

1. https://onlinecourses.swayam.ac.in/cec21_cs06/preview

Semester IV

Course Code:	SES6332T
Title of the course:	E-Commerce
Level of the Course:	NHEQF Level 5
Credit of the Course:	2
Type of the Course:	Skill Enhancement Course (SEC)
Total Lectures	30 lectures for content delivery

Prerequisites : General computer operating

Objectives of the Course:

1. To develop an understanding of Web-based Commerce
2. To equip students to assess-commerce requirements of a business
3. To enable students to develop - business plans and e-commerce applications

Course Learning Outcomes:

1. Describe the basics of e-commerce.
2. Explain the design principles of e-commerce websites.
3. Explain the different models of e-commerce.
4. Describe the different electronic payment systems.
5. Explain the security issues, security mechanism and threats to e-commerce applications.

Syllabus

Unit I

Introduction to Electronic Commerce Meaning, Nature and scope of e-commerce, History of e-commerce, Business applications of e-commerce, E-Commerce Models:- (B2B,B2C,C2C,B2G),Advantages and Disadvantages of e-commerce, Applications of M-Commerce . E-Commerce Web-sites Websites as marketplace, Role of website in B2C e-commerce, Website design principles, Alternative methods of customer communication such as e-mail, Email etiquette and e-mail security

(6 Lecture Hours)

Unit II

Online Marketing Online marketing and advertising, Push and pull approaches, Web counters, Web advertisements, Content marketing, Need of Digital Marketing for an e-commerce Business, Search Engine Optimization(SEO),Search Engine Marketing(SEM),Social Media Marketing(SMM), Web Analytics

Applications of E-commerce Applications of e-commerce to Supply chain management Applications of e-commerce to Customer Relationship Management, Product and service digitization, Remote servicing

(6 Lecture Hours)

Unit III

Business to Consumer E-Commerce Applications Cataloguing, Order planning and order generation, Cost estimation and pricing, Order receipt and accounting, Order selection and prioritization, Order scheduling, Order fulfilling, Order delivery, Order billing, Post sales service

(6 Lecture Hours)

Unit IV

Business to Business E-Commerce Need and Models of B2B e-commerce, Using public and private computer networks for B2B trading; EDI and paperless trading, Characteristic features of EDI service arrangement, EDI architecture and standards, Reasons for slow acceptability of EDI, Value Added Networks

(6 Lecture Hours)

Unit V

Electronic Payment System Types of payment systems, credit cards, debit cards, mobile all interelectronic Fund Transfer(EFT),Operational credit and legal risk of e-payment, Risk management options for e-payment systems. Security Issues in E-Commerce Risks of e-commerce, Types and sources of threats to e-commerce; Protecting electronic commerce assets and intellectual property, Firewalls ,Client server network security, Security Protocols–SSL,SET,S-HTTP ,Data and message security, Security tools, Digital identity and electronic signature, Encryption and concept of public and private key infrastructure; Risk management approach to ecommerce security

(6 Lecture Hours)

Books:

1. Agarwala,Kales N.,Amity All Deeksha Agarwala,
2. Business on the Net: An Introduction to the Whats and Hows of E Commerce, Macmillan India Ltd, 2000
3. Diwan, Pragand Sunil Sharma, Electronic Commerce- A Manager's Guide to E Business, Vanity Books International, Delhi.
4. Fitzgerald, Business Data Communication Network, McGraw-Hill, 1998.
5. Kalakota, Ravi and Andrew. Whinston, Frontiers of Electronic Commerce, Addison Wesley, 1999.

Suggested E-resources:-

<https://nptel.ac.in/content/storage2/courses/106108103/pdf/PPTs/mod13.pdf>

Semester V

Course Code:	BCS7100T
Title of the course:	Database Management System
Level of the Course	NHEQF Level 5.5
Credit of the Course:	4
Type of course:	Discipline Specific Elective (DSE) Course for B.Sc.
Total Lectures	60(40+20), 40 lectures for content delivery and 20 hours on diagnostic, formative assessment, class activity and problem solving.

Prerequisites:

1. Fundamental computer knowledge concepts of computer architecture, storage and hardware.
2. Knowledge of data structures and algorithms and programming .

Objectives of the Course:

The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.

Course Learning Outcomes:

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

1. understand basic Entity-Relationship model from a realistic problem specification.
2. Describes the conceptual schema of a database.
3. Describes the physical schema of a database.
4. have strong foundation knowledge and comprehend the basic concepts of Database which will be a prerequisite for Software developing.
5. Uses formal design techniques to produce a database schema.
6. Applies normalization techniques.
7. Prepares logical construction.
8. Designs and applies database from the logical schema model.
9. Manages a designed database.
10. Arranges database using Relational algebra.
11. Organizes database using SQL.
12. Discusses the relative merits of the relational environment.
13. Applies the changes in environment to database.

Syllabus

Unit I

Introduction : Database system applications, What is database System, database systems versus file systems, views of data, database languages, database users , database system structure, Data Dictionary. Advantages of DBMS.

ER Model : entities, mapping constrains, keys, E-R diagram, reduction E-R diagrams to tables, specialization, generalization, aggregation, design of an E-R database scheme.

(12 Lecture Hours)

Unit II

Database Architecture and Modelling: DBMS Architecture (Internal, Conceptual and External), Data Independence .

Database Models: Hierarchical ,Network and Relational , Role of DBA.

(12 Lecture Hours)

Unit III

Relational Model : The catalog, base tables and views. Relational Data Objects, Domains, relations, kinds of relations, relations and predicates, relational databases. Relational Data Integrity - Candidate keys and related matters: Candidate keys, Primary and alternate keys. Foreign keys, foreign key rules, nulls. Concept of Super keys , unique key and nulls.

(12 Lecture Hours)

Unit IV

The SQL Language: Data definition, retrieval and update operations, Advantages of SQL, Types of SQL commands, SQL operators. Table expressions, conditional expressions, embedded SQL.

Views: Introduction, what are views for, data definition, data manipulation, SQL support.

(12 Lecture Hours)

Unit V

File and system structure : overall system structure, file organization, logical and physical file organization, sequential and random, hierarchical, inverted, nulllist, indexing and hashing, B-tree index files.

(12 Lecture Hours)

Books

1. Fundamentals of Database System, Shamkant B. Navathe, RamezElmasri, Pearson.
2. Korth, Database Systems Concepts, McGrawHill.
3. Date C.J., Database Systems, AddisonWesley.

Suggested E-resources.

1. <https://www.dataquest.io/blog/sql-commands/>
2. <https://www.youtube.com/watch?v=AA7i2GcTGwU>
3. <https://www.youtube.com/watch?v=AFY3z4FwRg0>
4. <https://www.youtube.com/watch?v=AFY3z4FwRg0>
5. <https://www.bitdegree.org/learn/sql-commands-list>

Semester V

Course Code:	BCS7101T
Title of the course:	Java Programming
Level of the Course	NHEQF Level 5.5
Credit of the Course:	4
Type of course:	Discipline Specific Elective (DSE) Course For B.Sc.
Total Lectures	60(40+20), 40 lectures for content delivery and 20 hours on diagnostic, formative assessment, class activity and problem solving.

Prerequisites:

1. Knowledge of the C programming language is a prerequisite.
2. Knowledge of an object-oriented language C++ is helpful.

Objectives of the Course:

1. This course aims to strengthen the conceptual knowledge of Object Oriented Programming Language JAVA at core level and thus promote the necessary moral and ethical values among the computer science students, for the betterment of the society.
2. It lays the foundation for further learning of the subject Advance Java Programming Language which is useful for the design of desktop, web and mobile applications in Computer Science.
3. To introduce conceptual aspect of Applet and Abstract Window Tool Kit.

Course Learning Outcomes:

1. The solve problems using the Java programming language.
2. The students programming skills will be deepen by analyzing the real world problem
3. This course enables the students to learn the ethical, historical, environmental and technological aspects of Java Programming.
4. This course helps students to understand how and when to apply object-oriented principles such as abstraction, polymorphism, and inheritance, etc.

Syllabus

UNIT-I

Introduction to Java: Programming Language Paradigm, History of Java, Features of Java, Java and Internet. Java Virtual Machine (JVM), Bytecode, difference of Java with C and C++ Command Line Arguments, data types, type casting, variables and arrays, operators, control statements.

(12 Lecture Hours)

Unit-II

Object Oriented Programming: Objects & Classes: defining classes, Creating Objects, Constructors, static members, Accessing class members, Constructors, Overloading, this keyword, Garbage Collection.

Inheritance: Concept, Types of Inheritance, use of super, method overriding, final class, method and variable, abstract class, method and variables, Visibility methods, wrapper class, inner class.

(12 Lecture Hours)

Unit-III

Interface: Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables.

Packages: Java API packages, Naming Conventions, Creating User Defined Packages, Accessing a Package, Using a Package, Adding a Class to a Package, Hiding Classes.

(12 Lecture Hours)

Unit-IV

Exception Handling: Introduction to Exception, Exceptions & Errors, Types of Exception, Control Flow In Exceptions, Use of try, catch, finally, throw, throws, In-built and User Defined Exceptions, Checked and Un-Checked Exceptions.

Multi-Threaded Programming: Concept, Thread Life cycle, creating a single and multiple threads, thread priorities, synchronization.

(12 Lecture Hours)

UNIT-V

Applets: Applet basics, Applet life-cycle, the html applet tag, passing parameters.

Event Handling: Introduction to AWT programming, Layout and component managers, Event classes and event listener interfaces. Introduction to swings.

(12 Lecture Hours)

Books:

1. The complete reference Java 2, H. Schildt, Tata Mc-Graw Hill.
2. Programming with JAVA - A Primer, E. Balaguruswamy, McGraw-Hill
3. Head First Java: A Brain-Friendly Guide, Kathy Sierra, Bert Bates, "O'Reilly Media.
4. Thinking in Java, Bruce Eckel, Prentice Hall Professional
5. Learning Java: A Bestselling Hands-On Java Tutorial, Patrick Niemeyer, Daniel Leuck, "O'Reilly Media,
6. How to program in Java, Deitel and Dietel

Suggested E-resources:

1. <https://ocw.mit.edu/courses/6-092-introduction-to-programming-in-java-january-iap-2010/pages/lecture-notes/>
2. <https://math.hws.edu/javanotes/>
3. https://www.youtube.com/watch?v=hBh_CC5y8-s
4. <https://www.youtube.com/watch?v=BGTx91t8q50>
5. <https://www.youtube.com/watch?v=BGTx91t8q50>
6. <https://www.youtube.com/watch?v=eIrMbaQSU34>
7. <https://www.youtube.com/watch?v=UmnCZ7-9yDY>

Semester V

Course Code:	BCS7102T
Title of the course:	PHP Programming
Level of the Course	NHEQF Level 5.5
Credit of the Course:	4
Type of course:	Discipline Specific Elective (DSE) Course For B.Sc.
Discipline/Subject.	
Total Lectures	60(40+20), 40 lectures for content delivery and 20 hours on diagnostic, formative assessment, class activity and problem solving.

Prerequisites:

1. One must have a basic understanding of computer programming, Internet, database, HTML/XHTML and MySQL will be very helpful.
2. It is designed for those who are unaware of the PHP concepts but have a basic understanding of computer programming.

Objectives of the Course:

1. Analyze the basic structure of a PHP web application and be able to install and maintain the web server, compile, and run a simple web application.
2. Learn how databases work and how to design one, as well as how to use PHPMyAdmin to work with MySQL.

Course Learning Outcomes:

1. List the major elements of the PHP & MySQL work and explain why PHP is good for web development
2. Learn how to take a static website and run from a database using PHP and MySQL.
3. Analyze the basic structure of a PHP web application and be able to install and maintain the web server, compile, and run a simple web application.
4. Learn how databases work and how to design one, as well as how to use PHP MyAdmin to work with MySQL.
5. Learn different ways of connecting to MySQL through PHP, and how to create tables, enter data, select data, change data, and delete data. Connect to SQL Server and other data sources.

Syllabus

Unit I

Introduction to PHP : Evaluation of PHP, Basic Syntax, Defining variable and constant, PHP Data type, Operator and Expression, Basic HTML Syntax and tags.

Decisions and loop : Making Decisions, Mixing Decisions and looping with Html.

(12 Lecture Hours)

Unit II

Function : What is a function, Define a function, Call by value and Call by reference, Recursive function, String Creating and accessing, String Searching & Replacing String, Formatting String, String Related Library function

Array : PHP Array, Accessing array, Looping with associative array using each () and foreach().

(12 Lecture Hours)

Unit III

Handling Html Form with PHP : Capturing Form, Data Dealing with Multi-value filed and Generating File uploaded form, redirecting a form after submission.

Working with file and Directories : Understanding file & directory, Opening and closing a file, Coping, renaming and deleting a file, working with directories, Creating and deleting folder, File Uploading & Downloading.

(12 Lecture Hours)

Unit IV

Database Connectivity with MySql : Introduction to RDBMS, Connection with MySql Database, Performing basic database operation(DML) (Insert, Delete, Update, Select), Setting query parameter, Executing query- Join (Cross joins, Inner joins, Outer Joins, Self joins.)

(12 Lecture Hours)

Unit V

Session and Cookie : Introduction to Session Control, Session Functionality, What is a Cookie, Setting Cookies with PHP. Using Cookies with Sessions, Deleting Cookies, Registering Session variables, Destroying the variables and Session.

Exception Handling :Understanding Exception and error, Try, catch, throw. Error tracking and debugging.

(12 Lecture Hours)

Books

1. The Joy of PHP Programming :A Beginner's guide –by Alan Forbes.
2. PHP For Web by Larry Ullman.
3. Head First PHP & MySQL: A Brain-Friendly Guide.

Suggested E-resources.

1. <https://www.codecademy.com/learn/paths/PHP-skill>
2. <https://www.netsolutions.com/insights/what-is-PHP/#:~:text=PHP%20is%20a%20server%2Dside,in%20the%20web%20development%20world.>
3. <https://www.youtube.com/watch?v=hx38tnlYGIA>
4. <https://www.knowledgehut.com/blog/programming/web-development-using-PHP-mysql>

Semester V

Course Code:	BCS7103T
Title of the course:	Cloud Computing
Level of the Course	NHEQF Level 5.5
Credit of the Course:	4
Type of course:	Discipline Specific Elective (DSE) Course For B.Sc.
Discipline/Subject.	
Total Lectures	60(40+20), 40 lectures for content delivery and 20 hours on diagnostic, formative assessment, class activity and problem solving.

Objectives of the Course:

1. To provide students with the fundamentals and essentials of Cloud Computing.
2. To provide students a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios.
3. To enable students exploring some important cloud computing driven commercial systems and applications.
4. To expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research.

Course Learning Outcomes:

1. Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about.
2. Characteristics, advantages and challenges brought about by the various models and services in cloud computing.
3. Apply the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost.
4. Identify resource management fundamentals, i.e. resource abstraction, sharing and sandboxing and outline their role in managing infrastructure in cloud computing.
5. Analyze various cloud programming models and apply them to solve problems on the cloud.

Syllabus

UNIT I

Introduction Cloud Computing: Definition, Types of Clouds, Layer & Services models, Deployment models, Cloud Computing Architecture & infrastructure: Cloud Reference Model, Virtualization: Definition, Types of virtualizations (Compute, Network, Storage), Types of Hypervisor

(12 Lecture Hours)

UNIT II

Cloud Platforms in Industry: Major vendors and their offerings, Introduction to Microsoft Azure, Amazon web services (EC2, S3, Etc.), Google AppEngine. Integration of Private and Public Clouds Cloud applications: Protein structure prediction, Data Analysis, Satellite Image Processing, CRM and ERP, Social networking. Cloud Application- Scientific Application, Business Application.

(12 Lecture Hours)

UNIT III

Advance Topic in Cloud Computing: Cloud Security, Risks and Approaches of Migration into Cloud. Federated Cloud/ Intercloud, Third Party Cloud Services, Business Continuity and Disaster Recovery, Service Level Agreement (SLA), Dynamic resource provisioning and management, Server consolidation and placement policies, Energy efficiency in data centers, Elastic Load Balancing and Auto Scaling.

(12 Lecture Hours)

UNIT IV

Storage Network Design: Architecture of storage, analysis and planning. Storage network design considerations; NAS and FC SANs, hybrid storage networking technologies (iSCSI, FCIP, FCoE), design for storage virtualization in cloud computing, host system design considerations. Techniques for Big data processing (Google GFS, BigTable, and Map-Reduce Hadoop Distributed File System (HDFS), HIVE).

(12 Lecture Hours)

UNIT V

Consensus in Cloud Computing: Issues in consensus, Consensus in synchronous and asynchronous system, Byzantine Agreement: Agreement, Faults, Tolerance, Measuring Reliability and Performance, SLIs, SLOs, SLAs, TLAs, Byzantine failure, Byzantine Generals Problem, Failures & Recovery Approaches in Distributed Systems, Check pointing.

(12 Lecture Hours)

Books

1. Distributed and Cloud Computing, Kai Hawang, Geoffrey C. Fox, Jack J. Dongarra/Elsevier
2. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
3. Cloud Computing, Kumar Saurabh, Wiley Pub
4. Cloud Security, Krutz, Vines, Wiley Pub
5. Cloud Computing- A Practical Approach, Veltje, TMH

E-Resources:

1. https://onlinecourses.nptel.ac.in/noc21_cs14/preview
2. https://www.youtube.com/watch?v=HhStJ7FDBpc&ab_channel=5MinutesEngineering
3. https://www.cs.cmu.edu/~msakr/15619-s16/15319_15619_s16_Syllabus.pdf

Semester V

Course Code:	BCS7100P
Title of the course:	Database Management System Lab
Level of the Course	NHEQF Level 5.5
Credit of the Course:	2
Type of course:	Discipline Specific Elective (DSE) Course For B.Sc. Discipline/Subject.
Total Lectures	60 Practical
Prerequisites:	None

Objectives of the Course:

1. Knowledge of Databases. In addition to basic computer skills, a critical prerequisite to working with SQL is a knowledge of databases.
2. Microsoft Excel. Students commonly learn Microsoft Excel, a spreadsheet application, before SQL. ...
3. Knowledge of Basic Programming.
4. The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.

Course Learning Outcomes:

1. SQL will help to easily get the information from data at high efficiency.
2. With the help of SQL queries, to create, modify and drop objects within a relational database, can view update events, monitor table, and database activity, identify specific data at time intervals and retrieve the information based on the requirement.
3. Enhance the knowledge of the processes of Database Development and Administration using SQL and PL/SQL.
4. Enhance Programming and Software Engineering skills and techniques using SQL and PL/SQL.
5. Preparation of background materials and documentation needed for Technical.
6. Retrieve and store information in a relational database using SQL in a multi-user, web based environment.

List of sample practical programs:

1. SQL Queries Practical based on DDL Commands i. Create, alter, drop.
2. SQL Queries Practical based on DML Commands.
 - a. Select, update, delete, Insert.
3. SQL Queries Practical based on DCL Commands.
 - a. Grant, Revoke
4. SQL Queries Practical based on Boolean and comparisons operator related
 - a. Commands.(<, >, ==, <=, >=, <>,)
5. SQL Queries Practical based on Arithmetic and Aggregate Functions.
 - a. Max, Min, Avg, Sum, Count, +, -, *, /
6. SQL Queries Practical based on Nested sub queries, set membership, set
7. comparisons, set cardinality. (IN-> All, any, Not In)
8. SQL Queries Practical based on selective data from multiple Tables.
 - a. Joins : inner Join, left Outer Join, right Outer Join, equi Join.

9. SQL Queries Practical on Create views. (Create, Drop, alter, Update, delete)
10. SQL Queries Practical in Create Index.(Create, Drop)
11. SQL Queries Practical on Logical operators. (AND,OR,NOT)
12. SQL Queries Practical on Condition Clauses.(Where, Order by, Group by, Having)
13. Adding Constraint and removing like Foreign key, Primary key ,default , null values
14. SQL Queries Practical based on Arithmetic Function.
15. SQL Queries Practical based on Character Function.
16. SQL Queries Practical based on Date Function.
17. Prepare SQL queries that use SELECT, FROM, WHERE, IN, BETWEEN, LIKE, EXISTS.
18. Describe and demonstrate issues surrounding transaction processing including: use of COMMIT and ROLLBACK, locking processes.

Books

1. Fundamentals of Database System, Shamkant B. Navathe, RamezElmasri, Pearson.
2. Korth, Database Systems Concepts, McGrawHill.
3. Date C.J., Database Systems, AddisonWesley.

Suggested E-resources.

1. <https://www.dataquest.io/blog/sql-commands/>
2. <https://bytescout.com/blog/20-important-sql-queries.html>
3. <https://www.youtube.com/watch?v=AFY3z4FwRg0>
4. <https://www.youtube.com/watch?v=AFY3z4FwRg0>
5. <https://www.bitdegree.org/learn/sql-commands-list>
6. Online virtual lab

Scheme of EoSE :

- | | | | | | |
|-----|----------------|------|---------------|-------|-------------------------------|
| (i) | Exercise(s):45 | (ii) | Viva Voce: 20 | (iii) | Evaluation of record book: 15 |
|-----|----------------|------|---------------|-------|-------------------------------|

Semester V

Course Code:	BCS7101P
Title of the course:	Java Programming Lab
Level of the Course	NHEQF Level 5.5
Credit of the Course:	2
Type of course:	Discipline Specific Elective (DSE) Course For B.Sc.
Discipline/Subject.	
Total Lectures	60 Practical
Prerequisites:	None

Prerequisites:

1. Knowledge of the C programming language is a prerequisite.
2. Knowledge of an object-oriented language C++ is helpful

Objectives of the Course:

1. This course aims to strengthen the conceptual and practical aspect of Object Oriented Programming Language JAVA at core level.
2. This course helps students to understand how and when to apply object-oriented principles such as abstraction, polymorphism, and inheritance, etc.
3. This course aims to provide practical exposure to package, multithreading and exception handling.
4. This course act as a prerequisite for Advance Java Programming Language.
5. This course introduce programming with Applet and Abstract Window Tool Kit.

Course Learning Outcomes:

1. The student will be able to learn the basics of programming with a modern programming language, Java.
2. The student will be able to read and make elementary modifications to Java programs that solve real-world problems.
3. The student gets an understanding of how to install and use a good Java development environment.
4. The student learn how to produce robust programs in Java using : Variables, Expressions, Looping , Branching , Exceptions , Methods / Subroutines / Functions , Classes, Interfaces and Inheritance , Graphical User Interfaces , Identify and fix defects and common security issues in code..

Java Programming Lab

1. Write a java program to print a simple message.
2. Write a java program using Command line arguments.
3. Write a java program to get input from the user.
4. Write a java program to find the number of arguments provided at runtime.
5. Write java program to depict data type of the variable
6. Write a java program to implement type casting.
7. Write a java program to demonstrate the working of Java operators.
8. Write a java program to elaborate various control statements in Java.
9. Write a java program to add and multiply matrices.
10. Write a java program to find the factorial of a given number using Recursion.
11. Write a java program to create a class, constructor and access it using objects.

12. Write a java program for Method overloading and Constructor overloading.
13. Write a java program to demonstrate various types of inheritance.
14. Write a java program using “super” and “this” keywords.
15. Write a java program to demonstrate use of the “final” keyword.
16. Write a java program to design a class using abstract methods and classes.
17. Write a java program presenting the concept of inner class and visibility methods.
18. Write a java program to implement Interface and use “extends” keyword.
19. Write a java program to create a package that accesses the member of the external class as well as same package.
20. Write a java program that imports the user define package and access the Member variable of classes that Contained by Package.
21. Write a java program to handle the Exception using try, catch and finally block.
22. Write java program that Implement the Nested try and catch statements with throw keyword
23. Write an applet program that displays a simple message.
24. Write a program for passing parameters using Applet.
25. Write a java program to implement various event classes and event listeners.

Suggested Books:

1. The complete reference Java 2, H. Schildt, Tata Mc-Graw Hill.
2. Programming with JAVA - A Primer, E. Balaguruswamy, McGraw-Hill
3. Head First Java: A Brain-Friendly Guide, Kathy Sierra, Bert Bates, "O'Reilly Media.
4. Thinking in Java, Bruce Eckel, Prentice Hall Professional
5. Learning Java: A Bestselling Hands-On Java Tutorial, Patrick Niemeyer, Daniel Leuck, "O'Reilly Media,
6. How to program in Java, Deitel and Dietel

Suggested E-resources:

1. <https://ocw.mit.edu/courses/6-092-introduction-to-programming-in-java-january-iap2010/pages/lecture-notes/>
2. <https://math.hws.edu/javanotes/>
3. https://www.youtube.com/watch?v=hBh_CC5y8-s
4. <https://www.youtube.com/watch?v=BGTx91t8q50>
5. <https://www.youtube.com/watch?v=BGTx91t8q50>
6. <https://www.youtube.com/watch?v=eIrMbAQSU34>
7. <https://www.youtube.com/watch?v=UmnCZ7-9yDY>

Scheme of EoSE :

- (i) Exercise(s):45 (ii) Viva Voce: 20 (iii) Evaluation of record book: 15

Semester V

Course Code:	BCS7102P
Title of the course:	PHP Programming Lab
Level of the Course	NHEQF Level 5.5
Credit of the Course:	2
Type of course:	Discipline Specific Elective (DSE) Course For B.Sc.
Total Lectures	60 Practical

Prerequisites:

1. One must have a basic understanding of computer programming, Internet, database, HTML/XHTML and MySQL will be very helpful.
2. It is designed for those who are unaware of the PHP concepts but have a basic understanding of computer programming.

Objectives of the Course:

1. Analyze the basic structure of a PHP web application and be able to install and maintain the web server, compile, and run a simple web application.
2. Learn how databases work and how to design one, as well as how to use PHP MyAdmin to work with MySQL.

Course Learning Outcomes:

1. Upon successful completion of the course, participants should be able to:
2. List the major elements of the PHP & MySQL work and explain why PHP is good for web development
3. Learn how to take a static website and run from a database using PHP and MySQL.
4. Analyze the basic structure of a PHP web application and be able to install and maintain the web server, compile, and run a simple web application.
5. Learn how databases work and how to design one, as well as how to use PHP MyAdmin to work with MySQL.
6. Learn different ways of connecting to MySQL through PHP, and how to create tables, enter data, select data, change data, and delete data. Connect to SQL Server and other data sources.

List of sample practical programs:

1. Write a PHP program to print sum of digits.
2. Write a PHP program to print factorial of a number.
3. Write a PHP program to check armstrong number.
4. Write a PHP program to check palindrome number.
5. Write a PHP program to Array manipulation.
6. Create a PHP page for login page with sql connection.
7. Write a PHP program to Read from existing file.
8. Write a PHP program to Write a file
9. Write a PHP program to calculate Date and Time function .
10. Get name of the user from a form and show greeting text.
11. Write a PHP program to design Curriculum Vitae.
12. Write a PHP program hit counter using cookies.
13. Create a web page to advertise a product of the company using images and audio.

14. Write a PHP script for the following: Design a form to accept the details of 5 different items, such as item code, item name, units sold, rate. Display the bill in the tabular format. Use only 4 text boxes. (Hint : Use of explode function.)
15. Create a form to accept student information (name, class, address). Once the student information is accepted, accept marks in next form (Phy, Bio, Chem, Maths, Marathi, English) .Display the mark sheet for the student in the next form containing name, class, marks of the subject, total and percentage.
16. Create a form to accept customer information(name, address, ph-no).Once the customer information is accepted, accept product information in the next form(Product name, qty, rate). Display the bill for the customer in the next form. Bill should contain the customer information and the information of the products entered.
17. Create a web page for Travel agency.
18. Create a web page for software company websites.
19. Create a PHP page for login system using session.

Books

1. The Joy of PHP Programming :A Beginner's guide –by Alan Forbes.
2. PHP For Web by Larry Ullman.
3. Head First PHP & MySQL: A Brain-Friendly Guide.

Suggested E-resources.

1. <https://www.simplilearn.com/tutorials/PHP-tutorial/PHP-login-form>
2. <https://www.youtube.com/watch?v=aIsu9SPcGbU>
3. <https://PHPpot.com/PHP/user-registration-in-PHP-with-login-form-with-mysql-and-code-download/>
4. <https://www.netsolutions.com/insights/what-is-PHP/#:~:text=PHP%20is%20a%20server%2Dside,in%20the%20web%20development%20world.>
5. <https://www.youtube.com/watch?v=hx38tnlYGIA>
6. <https://www.knowledgehut.com/blog/programming/web-development-using-PHP-mysql>
7. <https://www.youtube.com/watch?v=JrtrFj-qFhI>
8. <https://www.youtube.com/watch?v=cNv8Gi1KjNY>

Scheme of EoSE :

- (i) Exercise(s):45 (ii) Viva Voce: 20 (iii) Evaluation of record book: 15

Semester V

Course Code	: BCS7103P
Title of the course	: Cloud Computing Lab
Level of the Course	: NHEQF Level 5.5
Credit of the Course	: 2
Type of course	: Discipline Specific Elective (DSE) Course For B.Sc.
Total Lectures	: 60 Practical

Objectives of the Course:

1. To learn and use version control systems
2. To develop web applications in cloud
3. To learn and work with virtual machine
4. To learn the design and development process involved in creating a cloud based application
5. To learn to implement and use parallel programming using Hadoop

Course Learning Outcomes:

1. Configure various virtualization tools such as Virtual Box, VMware workstation.
2. Design and deploy a web application in a PaaS environment.
3. Learn how to simulate a cloud environment to implement new schedulers.
4. Install and use a generic cloud environment that can be used as a private cloud.
5. Install and use Hadoop

List of sample practical programs:

1. Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows7 or 8.
2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
3. Install Google App Engine. Create hello world app and other simple web applications using python/java.
4. Use GAE launcher to launch the web applications.
5. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
6. Find a procedure to transfer the files from one virtual machine to another virtual machine.
7. Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
8. Install Hadoop single node cluster and run simple applications like word count

Suggested E-Resources:

Online virtual lab

Scheme of EoSE :

- (i) Exercise(s):45 (ii) Viva Voce: 20 (iii) Evaluation of record book: 15

Semester V

Course Code:	SES7333T
Title of the course:	Digital Electronics
Level of the Course:	NHEQF Level 5.5
Credit of the Course:	2
Type of the Course:	Skill Enhancement Course SEC
Total Lectures :	30 lectures for content delivery

Prerequisites: Basic understanding of diode, transistor operation. If this is not covered in 10+2 Board of the students then the same may be studied from Basic Electronics or Analog Electronic Circuits course.

Objectives of the Course:

1. The objective of this course is to provide the fundamental concepts associated with the digital logic and circuit design.
2. To introduce the basic concepts and laws involved in the Boolean algebra and logic families and digital circuits. To familiarize with the different number systems, logic gates, and combinational and sequential circuits utilized in the different digital circuits and systems.
3. The course will help in design and analysis of the digital circuit and system.

Course Learning Outcomes:

1. Have a thorough understanding of the fundamental concepts and techniques used in digital electronics.
2. To understand and examine the structure of various number systems and its application in digital design.
3. The ability to understand, analyze and design various combinational and sequential circuits.
4. Ability to identify basic requirements for a design application and propose a cost effective solution.
5. The ability to identify and prevent various hazards and timing problems in a digital design.
6. To develop skill to build, and troubleshoot digital circuits.

Syllabus

Unit I

Positional Number System : . Binary, decimal, octal and Hexadecimal number system. conversion from one base to another base. Representation of positive and negative integers, Real numbers, Characters. Digital codes : weighted binary code, Non weighted code, Gray code. Binary to Gray conversion, Gray to binary conversion. BCD code. Binary Arithmetic in 1's and 2's complement.

(6 Lecture Hours)

Unit II

Boolean Algebra : Binary valued quantities, Logical Operations, Basic postulates of Boolean Algebra, Principle of Duality , Basic theorems of Boolean algebra , De- Morgan's Theorem. Finding complements of Boolean expressions. Minterm and Maxterm of Boolean Function. Simplifications of SOP Boolean expressions using karnaugh map - 3 variables Boolean function, 4 variables Boolean Function.

(6 Lecture Hours)

Unit III

Basic Logic Gate, Universal Logic gate , Exclusive -OR, Equivalence OR gates. Combinational Circuits : Half Adder , Full Adder, Parallel Binary Adder, Subtractor, Comparator , Decoder , Encoder , Multiplexer , Demultiplexer.

(6 Lecture Hours)

Unit IV

Combinational versus Synchronous circuits.

Flip Flop : Edge Triggered versus Pulse Triggered Flip Flop, S-R , D , J-K , T edge triggered Flip flop. J-K Master slave Flip flop

(6 Lecture Hours)

Unit V

Shift Register: Shift Register Function , Serial and Parallel Shift registers , Bi-directional Shift registers.

Counters : Asynchronous and Synchronous counters, Up/Down Counters, Decade Counters.

(6 Lecture Hours)

Books:

1. Digital Fundamentals :-Thomas L. Floyd
2. Digital Logic and Computer Design :- Mano M.M.

Suggested E-resources:-

1. https://www.google.co.in/books/edition/Basic_Digital_Electronics/8eg8Hzol95gC?hl=en&gbpv=1&dq=positional+number+system+in+digital+electronics&pg=PA1&printsec=frontcover
2. https://www.google.co.in/books/edition/Digital_Electronics_with_Arduino/WrHcDwAAQBAJ?hl=en&gbpv=1&dq=Digital+codes++in+digital+electronics&printsec=frontcover
3. https://www.google.co.in/books/edition/An_Introduction_to_Logical_Design_of_Dig/Rms3AAAAIAAJ?hl=en&gbpv=1&dq=Boolean+Algebra++in+digital+electronics&printsec=frontcover
4. <https://www.electronicsforu.com/technology-trends/learn-electronics/flip-flop-rs-jk-t-d>
5. <https://www.geeksforgeeks.org/shift-registers-in-digital-logic/>
6. <https://www.geeksforgeeks.org/counters-in-digital-logic/>

Semester V

Course Code:	SES7334T
Title of the course:	IoT : Internet of Things
Level of the Course:	NHEQF Level 5.5
Credit of the Course:	2
Type of the Course:	Skill Enhancement Course SEC
Total Lectures :	30 lectures for content delivery

Prerequisites:

1. Must know how systems work.
2. To know about statistics that have to do with Machine Learning.
3. Simultaneous use of artificial intelligence
4. Need to know something about sensors.
5. Basic Knowledge of Networking protocols.

Objectives:

To obtain and analyze data from things that were previously disconnected from most data processing tools

Course Learning Outcomes:

1. Explain the definition and usage of the term “Internet of Things” in different contexts.
2. Understand the key components that make up an IoT system.
3. Differentiate between the levels of the IoT stack
4. Familiarity with the key technologies and protocols employed at each layer of the IoT stack.
5. Able to build IoT applications
6. Learn to integrate modern technologies such as sensors, communication, and computational processing.

Syllabus

UNIT I

Introduction to IoT: Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF-YANG- IoT Platforms Design Methodology
(6 Lecture Hours)

UNIT II

IoT Architecture M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture
(6 Lecture Hours)

UNIT III

IoT Protocols Protocol Standardization for IoT, Efforts, M2M and WSN Protocols, SCADA and RFID Protocols, Unified Data Standards, Protocols, IEEE 802.15.4, BACNet Protocol, Modbus– Zigbee Architecture, Network layer, 6LoWPAN - CoAP - Security

(6 Lecture Hours)

UNIT IV

Building IoT With Raspberry Pi & Arduino Building IOT with RASPBERRY PI- IoT Systems - Logical Design using Python, IoT Physical Devices & Endpoints - IoT Device - Building blocks - Raspberry Pi - Board - Linux on Raspberry Pi - Raspberry Pi Interfaces - Programming Raspberry Pi with Python - Other IoT Platforms - Arduino.

(6 Lecture Hours)

UNIT V

Case Studies and Real-World Applications Real world design constraints - Applications - Asset management, Industrial automation, smart grid, Commercial building automation, Smart cities - participatory sensing - Data Analytics for IoT, Software & Management Tools for IoT Cloud Storage Models & Communication APIs - Cloud for IoT - Amazon Web Services for IoT.

(6 Lecture Hours)

Books

1. Internet of Things, A hands-on approach Arshdeep Bahga, Vijay Madisetti, Universities Press,
2. Architecting the Internet of Things Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), Springer.
3. The Internet of Things in the Cloud: A Middleware Perspective Honbo Zhou, CRC Press.
4. The Internet of Things, Key applications and Protocols, Olivier Hersent, David Boswarthick, Omar Elloumi, Wiley.

Suggested E-resources:-

1. Coursera <https://www.coursera.org/specializations/iot>
2. NPTEL https://onlinecourses.nptel.ac.in/noc22_cs53/preview

Semester V

Course Code:	SES7335T
Title of the course:	Multimedia and Web Design
Level of the Course:	NHEQF Level 5.5
Credit of the Course:	2
Type of the Course:	Skill Enhancement Course SEC
Total Lectures :	30 lectures for content delivery
Prerequisites	: None

Objectives of the Course:

1. To introduce the basic concepts of Multimedia and Web Designing
2. To develop skills and competencies in image, video editing.
3. To acquire and develop skills to create web pages using HTML, CSS, Bootstrap and JavaScript

Course Learning Outcomes:

1. Create and edit images, audio and video
2. Build websites using the elements of HTML.
3. Build interactive and stylish websites using the client-side programming techniques with CSS and JavaScript.
4. Learn to validate client-side data.
5. Define the structure and contents of the website using different features of CSS and JavaScript

Unit I

Color Theory Color Basics, Color Systems, Color Wheel, Complementary Colors, After Images, Color Combinations, Color & Contrast, Proportion & Intensity, Contrast & dominance, Shades & Tints, Color Studies, Color Gamut, ICC profiles, Gamma Correction.

(6 Lecture Hours)

Unit II

Computer Graphics Difference between Raster and Vector Graphics , Raster graphics : resolution, image compression, file formats, manipulation, Geometrical transformations, Vector graphics – fundamentals, file formats, shapes, transforms and filters.

(6 Lecture Hours)

Unit III

Sound : Sound Design, Audio Codec & file formats, processing sound, compression
Video : Aspect Ratio Frame Size, Frame Rate, Regions, Video Codec & Formats, Processing.

(6 Lecture Hours)

Unit IV

HTML : Introduction to internet and web design. Basic concepts of web architecture. Introduction to hypertext mark-up language (html), creating web pages, lists, hyperlinks, tables, web forms, inserting images

Cascading style sheet (CSS) : Concept of CSS, creating style sheet, Importing style sheets, CSS properties, CSS styling (background, text format, controlling fonts), CSS rules, Style Types, CSS Selectors, working with block elements and objects, working with lists and tables, CSS id and class, box model.

(6 Lecture Hours)

Unit V

Basics of JavaScript : Document object model, data types and variables, functions, methods and events, controlling program flow, built-in objects and operators, validations

(6 Lecture Hours)

Books:

1. Nigel Chapman, Jenny Chapman; Digital Multimedia; Wiley India Edition, 2nd Edition
2. Roger Parker; One-Minute Designer; Hungry Minds Inc, U.S.; 2nd edition
3. Ranjan Parekh, "Principles of Multimedia", McGraw Hill Education; 2 edition
4. Tay Vaughan, "Multimedia Making It Work"; Mc Graw Hill, Eighth Edition.
5. Laura Lemay , Rafe Colburn , Jennifer Kyrnin, "Mastering HTML, CSS & JavaScript Web Publishing", BPB Publications
6. Alex Libby, Gaurav Gupta, Asoj Talesra , "Responsive Web Design with HTML5 and CSS3 Essentials", PACKT Publishing

Suggested E-resources:-

1. NPTEL
2. COURSERA

Semester VI

Course Code:	BCS7104T
Title of the course:	Web Designing
Level of the Course:	NHEQF 5.5
Credit of the Course:	4
Type of the Course:	DSE Course for B.Sc Computer Science
Total Lectures	60(40+20), 40 lectures for content delivery and 20 hours on diagnostic, formative assessment, class activity and problem solving.
Prerequisites:	None

Objectives of the Course:

The course aims to strengthen the conceptual knowledge of HTML learning lay the foundation for further learning of the CSS and JavaScript Programming to create interactive websites through the first course on HTML which is a needed for in web Designing.

Course Learning Outcomes:

1. The students would be able to understand basic Programming concepts associated with Web Designing and use basic terms for Programming purpose.
2. The students would be able to have strong foundation knowledge and comprehend the basic concepts of Programming which will be a prerequisite for many courses in Designing.
3. The students would be able to develop a keen sense of observation, inquiry, and capability for asking relevant/ appropriate questions related to the concepts of Designing.
4. The students would be able to develop basic programs using fundamental programming constructs like variables, conditional logic, looping, and functions.
5. The students would be able to build semantic HTML and CSS webpage, write basic scripts, use names, objects and methods.
6. The students would be able to add interactivity to a web page and they would be able to create dynamic Web Pages using JavaScript and HTML Forms.

Syllabus

Unit I

Introduction to Internet:-World wide web, Internet, Addressing, Browser, URL, Web Server, Website, Home Page, Domain Name, Basic Concepts. Softwares for Web Designing:- Notepad/Notepad++, Dreamweaver, Net Beans, Sea Monkey, Word Press , Sublime, Blue Griffon

(12 Lecture Hours)

Unit II

Introduction to HTML: HTML New Elements, Blocking Content on the Page, HTML Tags and Attributes, Basic Tags, Formatting Tags, Color Coding, Div and Span Tags for Grouping. Lists:- Unordered Lists, Ordered Lists, Images and Image Mapping.

Hyperlink:URL,URLEncoding,Table:<table>,<th>,<tr>,<td>,<caption>,<thead>,<tbody>,<tfoot>,<colgroup>,<col>, Attributes using Iframe as the target

Form :-< input>,<textarea>,<button>,<select>,<label>

Headers:-Title, Base, Link, Styles, Script, HTML Meta Tag, XHTML, HTML Deprecated Tags & Attributes

(12 Lecture Hours)

Unit III

Basic CSS: CSS Introduction, Features and Benefits of CSS, CSS Syntax, Padding, Border, Margin.

Color Background Cursor: Background image, background repeat, background position, CSS cursor.

Text Fonts:-color, background color, text decoration, text alignment, text indentation, text transform, white-space, letter-spacing, word-spacing, line-height, font-family, font-size, font-style, font-variant, font-height.

List Table:- list style type, list style position, list style image, CSS Tables (border, width & height, text-align, vertical-align, padding, color).

Box Model:-Borders & Outline, Margin & Padding, Height & Width, CSS Dimensions

Display Positioning:-CSS Visibility, CSS Display, CSS Scrollbars, CSS Positioning (Static, Fixed, Relative, Absolute), CSS Layers with Z-index.

(12 Lecture Hours)

Unit IV

JavaScript:- Nature of JavaScript, Script Writing Basics, Enhancing HTML Documents with JavaScript, Building Blocks, JavaScript Engines, Values, Variables and Operators, Basic Operations, Operator Precedence, JavaScript Types, Objects, Type Conversion, Static vs. Dynamic Type Checking.

JavaScript Conditionals:- Conditionals in JavaScript, Ternary Operators and Conditionals, Conditional Ladder & Switch statement.

JavaScript Arrays:- Declaring and Mutating Arrays, Array methods and Properties, Replication and Array Methods, Multi-dimensional Arrays.

(12 Lecture Hours)

Unit V

JavaScript Loops:- Loops in JavaScript, While and Do/While Loop, For Loop, Break and Continue in Loops, Iterating Arrays, Iterating Objects

JavaScript Functions and Scope:-Functions in JavaScript, Nested Functions in JavaScript, Arrow Functions in JavaScript, Functions as an Argument, Function as returned object, Scope in JavaScript, Lexical Scope, Module Scope, Methods of adding interactivity to Web Page, Creating Dynamic Web Pages.

Java Scripting the Forms:- Basic Script Construction, Talking to Form Objects, Organizing Objects and Scripts, Field-Level Validation, Check required fields like validating Zip code, Automated Formatting, Automatic Calculation, Calculate Expiration date etc.

(12 Lecture Hours)

Books

1. Jon Duckett, HTML and CSS: Design and Build Websites, Wiley
2. Jon Duckett, JavaScript and JQuery: Interactive Front-End Web Development, Wiley

3. Jennifer Niederst Robbins, Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript and Web Graphics, O'reilly
4. Steven M. Schafer, HTML, XHTML, and CSS Bible, Wiley
5. Felke-Morris, Basics of Web Design: HTML5 & CSS3, 5th Edition, Pearson Education, 2019
6. Thomas A Powell, The Complete Reference to HTML
7. Lee Anne Philips, Using HTML, PHI
8. Dt Editorial Services, HTML 5 Black Book- Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP and JQuery, Dream Tech Press Publication

Suggested E-resources.

1. <https://www.w3schools.com/>
2. <https://spoken-tutorial.org>
3. <http://www.nematrian.com/Pages/HTML/CSSJSCombined.pdf> (PDF: 514 Pages)
4. https://www.daoudisamir.com/references/vs_ebooks/html5_css3.pdf (PDF: 681 Pages)
5. <https://www.classcentral.com/course/html-css-javascript-for-web-developers-4270> (HTML, CSS, and JavaScript for Web Developers)

Semester VI

Course Code:	BCS7105T.
Title of the course:	Python Programming
Level of the Course:	NHEQF Level 5.5
Credit of the Course:	4
Type of the Course:	(DSE) Course for Computer Science
Total Lectures	60(40+20), 40 lectures for content delivery and 20 hours on diagnostic, formative assessment, class activity and problem solving.

Prerequisites:

1. Python Code 083 courses of Central Board of Secondary Education or equivalent.
2. Python Class XI courses of Central Board of Secondary Education or equivalent.

Objectives of the Course:

The course aims to strengthen the conceptual knowledge of Python learning at School level and lay foundation for further learning of the Programming through first course on Python which is a prerequisite for higher courses in Programming.

Course Learning Outcomes:

1. The students would be able to understand basic Programming concepts associated with Python and use basic terms for Programming purpose.
2. The students would be able to have strong foundation knowledge and comprehend the basic concepts of Programming which will be a prerequisite for many courses in Computer and allied subjects.
3. The students would be able to develop a keen sense of observation, inquiry, and capability for asking relevant/ appropriate questions related to the concepts of Programming.
4. The students would be able to apply knowledge of Programming in solving Problems based on the syllabus and identify relevant assumptions or implications.
5. The students would be able to develop basic programs using fundamental programming constructs like variables, conditional logic, looping, and functions.
6. The students would be able to work with user input to create fun and interactive programs.

Syllabus

Unit I

Introduction to Python:-

Introduction to Features and Applications of Python; Python Versions; Installation of Python; Python Command Line mode and Python IDEs; Simple Python Program.

(12 Lecture Hours)

Unit II

Python Basics: Identifiers; Keywords; Statements and Expressions; Variables; Operators; Precedence and Association; Data Types; Indentation; Comments; Built-in Functions- Console Input and Console Output, Type Conversions; Python Libraries; Importing Libraries with Examples.

(12 Lecture Hours)

Unit III

Python Control Flow: Types of Control Flow; Control Flow Statements- if, else, elif, while loop, break, continue statements, for loop Statement; range () and exit () functions.

Exception Handling: Types of Errors; Exceptions; Exception Handling using try, except and finally.

(12 Lecture Hours)

Unit IV

Python Functions: Types of Functions; Function Definition- Syntax, Function Calling, Passing Parameters/arguments, the return statement; Default Parameters; Command line Arguments; Keyword Arguments; Recursive Functions; Scope and Lifetime of Variables in Functions.

Creating and Storing Strings; Accessing String Characters; the str() function; Operations on Strings- Concatenation, Comparison, Slicing and Joining, Traversing; Format Specifiers; Escape Sequences; Python String Methods; Illustrative programs.

(12 Lecture Hours)

Unit V

Lists: Creating Lists; Operations on Lists; Built-in Functions on Lists; Implementation of Stacks and Queues using Lists; Nested Lists.

Dictionaries: Creating Dictionaries; Operations on Dictionaries; Built-in Functions on Dictionaries; Dictionary Methods; Populating and Traversing Dictionaries.

File Handling: File Types; Operations on Files– Create, Open, Read, Write, Close Files; File Names and Paths; Format Operator.

(12 Lecture Hours)

Books:

1. Let us Python, YashwnatKanetkar, Aditya Kanetkar, 4th Edition, BPB Publications
2. Think Python How to Think Like a Computer Scientist, Allen Downey et al., 2nd Edition, Green Tea Press. Freely available online 2015.
3. Introduction to Python Programming, Gowrishankar S et al., CRC Press, 2019.
4. Introduction to Computation and Programming using Python, John V. Guttag, Prentice Hall of India.

Suggested E-resources.

1. <http://www.ibiblio.org/g2swap/byteofpython/read/>
2. http://scipy-lectures.org/intro/language/python_language.html
3. <https://docs.python.org/3/tutorial/index.html>

Semester VI

Course Code:	BCS7106T
Title of the course:	Data mining and warehousing
Level of the Course:	NHEQF Level 5.5
Credit of the Course:	4
Type of the Course:	Discipline Specific Elective (DSE) Course for B.Sc. in computer science
Total Lectures	60(40+20), 40 lectures for content delivery and 20 hours on diagnostic, formative assessment, class activity and problem solving.

Prerequisites:

Data Modelling, Databases and Database Management Systems(CS7301T), or equivalent.

Objectives of the Course:

1. This course gives an introduction to methods and theory for data warehouse principles and its working, development of data warehouses and data analysis using data mining.
2. Data quality and methods and techniques for preprocessing of data.
3. Modeling and design of data warehouses.
4. Algorithms for classification, clustering and association rule analysis.
5. Practical use of software for data analysis.
6. Learn Data mining concepts and understand Association Rule Mining, Study Classification Algorithms .
7. Gain knowledge of how data is grouped using clustering techniques.

Syllabus

UNIT I

The Compelling Need for data warehousing: Escalating Need for strategic information, failures of Past decision-support systems, operational versus decision-support systems, data warehousing – the only viable solution, data warehouse defined Data warehouse

The building Blocks: Defining Features, data warehouses and data marts, overview of the components, metadata in the data warehouse Defining the business requirements: Dimensional analysis, OLAP operations : Drill-down and roll-up, slice-and-dice or rotation.

(12 Lecture Hours)

UNIT II

Principles of dimensional modeling: the STAR schema, STAR Schema Keys, Advantages of the STAR Schema

Dimensional Modeling: Updates to the Dimension tables, miscellaneous dimensions, the snowflake schema, aggregate fact tables, families of STARS

Steps for the Design & Construction of Data warehouse : Framework , Architecture

Type of OLAP Servers : ROLAP , MOLAP , Data warehouse implementation tolls & techniques.

(12 Lecture Hours)

UNIT III

Data Mining: Data Mining of what kind of Data , Knowledge discovery process (KDD) , What kind of patterns can be mined , OLAP versus data mining, data mining and the data warehouse, Data mining functionalities, classification Systems

Data processing : Cleaning , Integration & transformation, Reduction . Data Mining primitives: What defines a Data Mining Task

(12 Lecture Hours)

UNIT IV

Data Mining Query language (DMQL), Cluster Analysis : Partitioning , Hierarchical Density , Grid & Model based methods, Major Data Mining Techniques, Cluster detection, decision trees, memory-based reasoning, link analysis, neural networks, genetic algorithms, moving into data mining, Data Mining Applications

(12 Lecture Hours)

Books:

1. Kamber and Han, “Data Mining Concepts and Techniques”, Hartcourt India P. Ltd., 2001.
2. G. K. Gupta, “Introduction to Data Mining with Case Studies”, PHI, 2006.

Suggested E-resources:-

1. NPTEL
2. COURSERA

Semester VI

Course Code:	BCS7104P
Title of the course:	Web Designing Lab
Level of the Course:	NHEQF Level 5.5
Credit of the Course:	2
Type of the Course:	(DSE) Course for Computer Science
Total Lectures	60 Practical
Prerequisites:	Computer operating knowledge

List of Sample Programs

1. Write an HTML code to display your education details in a tabular format.
2. Write an HTML code to display your resume on the web page.
3. Write an HTML code to create a login form. On submitting the form, the user should get navigated to a profile page.
4. Write an HTML code to create a Registration Form. On submitting the form, the user should be asked to login with these new credentials.
5. Write an HTML code Print a paragraph that is a description of a book, include the title of the book as well as its author. Names and titles should be underlined, adjectives should be italicized and bolded.
6. Write an HTML code to create your College website, Department
7. Website and Tutorial website for specific subject.
8. Write an HTML code to illustrate the usage of the following:
 - a. Ordered List
 - b. Unordered List
 - c. Definition List
9. Write an HTML code to create a webpage with two images which alternately changes on mouse over using CSS.
10. Write an HTML code to demonstrate the usage of inline CSS.
11. Write an HTML code to demonstrate the usage of internal CSS.
12. Write an HTML code to demonstrate the usage of external CSS.
13. Demonstrate the use of CSS Box Model.
14. Write JavaScript program for Web Page to display browsers information.
15. Write a JavaScript code for counting odd, even, prime numbers from 1 to 100.
16. Write a JavaScript program to convert temperatures to and from Celsius, Fahrenheit.
17. Write a JavaScript program to change the case of a string (i.e. upper case to lower-case and vice versa.)
18. Develop and demonstrate a HTML file that includes JavaScript script for switching an image source for an image on click of “change” and “original”.
19. Write JavaScript to validate the following fields of the Registration page.
20. First Name (Name should contain alphabets and the length should not be less than 6 characters).
21. Password (Password should not be less than 6 characters length).
22. E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com)
23. Mobile Number (Phone number should contain 10 digits only).
24. Last Name and Address (should not be Empty).
25. Write a JavaScript code that displays text “Bigger Text “with increasing font size in the interval of 10 m in red color, when the font size reaches 50pt it displays” Smaller Text” in green color. Then the font size should decrease to 50 pt and then stop.
26. Write a JavaScript code in which one form is created in which the username must be of 10 characters, last name must be 5 characters long, validate email address and also validate for nonempty (fields must not be blank fields.)

Scheme of EoSE :

- (i) Exercise(s):45 (ii) Viva Voce: 20 (iii) Evaluation of record book: 15

Semester VI

Course Code:	BCS7105P
Title of the course:	Python Programming Lab
Level of the Course:	NHEQF Level 5.5
Credit of the Course:	2
Type of course:	(DSE) Course For B.Sc. Discipline/Subject.
Total Lectures:	60 Practical

Objectives of the Course:

1. To learn how to write functions and pass arguments in Python.
2. To learn how to build and package Python modules for reusability.
3. To learn how to read and write files in Python.
4. To learn how to design object-oriented programs with Python classes.

Learning Outcomes:

1. Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.
2. Express proficiency in the handling of strings and functions.
3. Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.
4. Identify the commonly used operations involving file systems and regular expressions.
5. Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python

List of Sample Programs

1. Write a program to demonstrate different number data types in python.
2. Write a program to perform different arithmetic operations on numbers in python.
3. Write a program to create, concatenate and print a string and accessing substring from a given string.
4. Write a program to create, append and remove lists in python.
5. Write a program to demonstrate working with tuples in python.
6. Write a program to find the largest among three numbers.
7. Write a program to construct the pattern using nested for loop
8. Write a program to print prime numbers less than 20.
9. Write a program to find the factorial of a number.
10. Write a program that accepts the length of three sides of a triangle as inputs. The program should indicate whether or not the triangle is a right angled triangle (use Pythagorean theorem)
11. Write a program to reverse a number.
12. Write a program to display a particular month of a year using the calendar module.
13. Write a program to check whether a number is Armstrong or not.
14. Write a program to convert a Binary number to Decimal.
15. Write a program to reverse a string word by word.
16. Write a Python program to demonstrate the Exceptions in Python.
17. Write a Python program to demonstrate use of Dictionaries.
18. Write a Python program to demonstrate use of LIST.
19. Write a Python program to read and write into a file.
20. Write a Python program for passing a single parameter into the function.
21. Using list comprehension , write a program to generate a list of numbers in the range 2 to 50 that are divisible by 2 and 4.
22. Write a program to receive three integers from the keyboard and get their sum and products calculated through a user defined function cal_sum_prod().

23. Write a function to create and return a list containing tuples of the form (x,x2,x3) for all x between 1 and 20 (both included).
24. Write a program that defines a function count_alphabets_digits() that accepts a string and calculates the number of alphabets and digits in it. It should return these values as a dictionary.
25. A list contains names of employees. Write a Python program to filter out those names whose length is more than 8 characters.(filter function())
26. Write a Python program that uses a generator to find out maximum marks obtained by a student and his name from tuples of multiple students.
27. Write a Python program that infinitely receives positive integers as input and print its square. If a negative number is entered then raise an exception , display a relevant error message and make a graceful exit.

Suggested E-Resources:

Online virtual lab

Scheme of EoSE :

(i) Exercise(s) :45 (ii) Viva Voce :20 (iii) Evaluation of record book :15

Semester VI

Course Code:	BCS7106P
Title of the course:	Data mining and warehousing Lab
Level of the Course:	NHEQF Level 5.5
Credit of the Course:	2
Type of course:	(DSE) Course For B.Sc. Discipline/Subject.
Total Lectures	60 Practical
Prerequisites:	Data Modelling, DBMS or equivalent.

Objectives of the Course:

Learn how to perform data mining tasks using a data mining toolkit (such as open source WEKA), Understand the data sets and data pre-processing, Demonstrate the working of algorithms for data mining tasks such as association rule mining, classification, clustering and regression, Exercise the data mining techniques with varied input values for different parameters. This course helps the students to practically understand a data warehouse, techniques and methods for data gathering and data pre-processing using OLAP tools. The different data mining models and techniques will be discussed in this course.

1. To teach principles, concepts and applications of data warehousing and data mining
2. To introduce the task of data mining as an important phase of knowledge recovery process
3. To inculcate Conceptual, Logical, and Physical design of Data Warehouses OLAP applications and OLAP deployment
4. To inculcate fundamental concepts that provide the foundation of data mining
5. Design a data warehouse or data mart to present information needed by management in a form that is usable for management client
6. Ability to understand the various kinds of tools.
7. Demonstrate the classification clusters and etc. in large data sets

List of sample programs for reference

1. Explore WEKA Data Mining/Machine Learning Toolkit
 - a. Downloading and/or installation of WEKA data mining toolkit,
 - b. Understand the features of WEKA toolkit such as Explorer, Knowledge Flow interface, Experimenter, command-line interface.
 - c. Navigate the options available in the WEKA
 - d. (ex. Select attributes panel, Preprocess panel, Classify panel, Cluster panel, Associate panel and Visualize panel)
 - e. Study the arff file format
 - f. Explore the available data sets in WEKA.
2. Load a data set (ex. Weather dataset, Iris dataset, etc.) Load each dataset and observe the following:
 - a. List the attribute names and they types
 - b. Number of records in each dataset

- c. Identify the class attribute (if any)
 - d. Plot Histogram
 - e. Determine the number of records for each class.
 - f. Visualize the data in various dimensions
3. Perform data preprocessing tasks and Demonstrate performing association rule mining on data sets
 - a. Explore various options available in Weka for preprocessing data and apply unsupervised filters like Discretization, Resample filter, etc. on each dataset
 - b. Load weather, nominal, Iris, Glass datasets into Weka and run Apriori algorithm with different support and confidence values. Study the rules generated.
 - c. Apply different discretization filters on numerical attributes and run the Apriori association rule algorithm. Study the rules generated. Derive interesting insights and observe the effect of discretization in the rule generation process.
4. Demonstrate performing classification on data sets
 - a. Load each dataset into Weka and run 1d3, J48 classification algorithm. Study the classifier output. Compute entropy values, Kappa statistic.
 - b. Extract if-then rules from the decision tree generated by the classifier, Observe the confusion matrix.
 - c. Load each dataset into Weka and perform Naïve-bayes classification and k-Nearest Neighbour classification. Interpret the results obtained.
 - d. Plot RoC Curves
 - e. Compare classification results of ID3, J48, Naïve-Bayes and k-NN classifiers for each dataset, and deduce which classifier is performing best and poor for each dataset and justify.
5. Demonstrate performing clustering of data sets
 - a. Load each dataset into Weka and run simple k-means clustering algorithm with different values of k (number of desired clusters). Study the clusters formed. Observe the sum of squared errors and centroids, and derive insights.
 - b. Explore other clustering techniques available in Weka.
 - c. Explore visualization features of Weka to visualize the clusters. Derive interesting insights and explain.
6. Demonstrate knowledge flow application on data sets
 - a. Develop a knowledge flow layout for finding strong association rules by using Apriori,FP- Growth algorithms
 - b. Set up the knowledge flow to load an ARFF (batch mode) and perform a crossvalidation using
 - c. J48 algorithm
 - d. Demonstrate plotting multiple ROC curves in the same plot window by using j48 and Random forest tree

Books:

1. Dunham M H, "Data Mining: Introductory and Advanced Topics", Pearson Education, New Delhi, 2003. Estd.
2. Jaiwei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Elsevier, 2006.
3. M Sudeep Elayidom, "Data Mining and Warehousing", 1st Edition, 2015, Cengage Learning India Pvt. Ltd. 20. 2014
4. Mehmed Kantardzic, "Data Mining Concepts, Methods and Algorithms", John Wiley and Sons, USA, 2003.
5. Pang-Ning Tan and Michael Steinbach, "Introduction to Data Mining", Addison Wesley, 2006.

Suggested E-Resources:

1. Online virtual lab
2. <https://www.cs.waikato.ac.nz/ml/weka> <https://weka.wikispaces.com>

Scheme of EoSE :

- (i) Exercise(s):45 (ii) Viva Voce: 20 (iii) Evaluation of record book: 15

Semester VI

Course Code:	SES7336T
Title of the course:	Python Fundamentals
Level of the Course:	NHEQF Level 5.5
Credit of the Course:	2
Type of the Course:	SEC Course for Computer Science
Total Lectures	30 Lectures.
Prerequisites:	Basic Knowledge of logic building

Objectives of the Course:

Students will be able to build basic programs using fundamental programming constructs like variables, conditional logic, looping, and functions

Course Learning Outcomes:

1. Understand the fundamentals of writing Python scripts.
2. Learn core Python scripting elements such as variables and flow control structures.
3. Discover how to work with lists and sequence data etc.
4. Write Python functions to facilitate code reuse.
5. Learn how to design and program Python

Syllabus

Unit I

Introduction to python: Python Syntax, Installation of python, applications of python, Using Python interpreter, Execute a Scrip, Structuring with Indentation, Editors, Execution model of Python, Salient features of Python

(6 Lecture)

Unit II

Python Basics:Print statement, basic data structure like list, tuple, and dictionary, sets and data types, String operations, Input and output, operators in python, comments in python

(6 Lecture)

Unit III

Programming Flow:Program flow, if statement, while loop, for loop, range statement, break and continue, List comprehension, set Comprehension

(6 Lecture)

Unit IV

Function and Modules: Function definition, function parameter, Variable arguments, scope of function, Lambda function and maps, module and its significance, standard modules

(6 Lecture)

Unit V

Exception Handling:Errors, Exception with try, handling multiple exceptions, write your own exception

(6 Lecture)

Books

1. Head First Python, A Brain-Friendly Guide, Paul Barry, O'Reilly Media
2. Python Programming for the Absolute Beginner, Volume 1, Mike Dawson, Michael Dawson , Thomson Course Technology
3. A Python Book Beginning Python, Advanced Python, and Python Exercises, Dave Kuhlman, Platypus Global Media

E-Resources:

1. <https://www.learnpython.org/>
2. <https://www.chhttps://mikkegoes.com/learn-python-online-best-resources/#python-org-tutorial>
3. [odecademy.com/courses/learn-python/](https://www.odecademy.com/courses/learn-python/)

Semester VI

Course Code	: SES7337T
Title of the course	: Data Analysis using MS Office
Level of the Course	: NHEQF Level 5.5
Credit of the Course	: 2
Type of the Course	: Skill Enhancement Course SEC
Total Lectures	: 30 lectures for content delivery
Prerequisites	: None
Objectives of the Course	:

1. Accurate comparisons and analysis
2. graphical representation of data
3. performs all mathematical and logical functions
4. solve both simple and complex calculations.

Course Learning Outcomes:

1. Use advanced functions and productivity tools to assist in developing worksheets
2. Manipulate data lists using Outline, Auto filter and PivotTables
3. Use Consolidation to summaries and report results from multiple worksheets
4. Record repetitive tasks by creating Macros
5. Working with multiple worksheets

Syllabus

Unit I

Introduction About Excel & Microsoft, Uses of Excel, Selecting Columns & Rows, Changing Column Width & Row Height, Autofitting Columns & Rows, Hiding/Unhiding Columns & Rows, Inserting & Deleting Columns & Rows, Cell, Address of a cell, Components of a cell – Format, value, formula, Use of paste and paste special Functionality ,Using Ranges, Selecting Ranges, Entering Information Into a Range, Using AutoFill Creating

(6 Lecture Hours)

Unit II

Formulas.

Formula Functions – Sum, Average, if, Count, max, min, Proper, Upper, Lower, Using AutoSum, Advance Formulas ,Concatenate, Vlookup, Hlookup, Match, Countif, Text, Trim, Spreadsheet Charts, Creating Charts,

(6 Lecture Hours)

Unit III

Different types of chart, Formatting Chart Objects, Changing the Chart Type, Showing and Hiding the Legend

Showing and Hiding the Data Table ,Sorting, Filter, Text to Column, Data Validation, Creating PivotTables, Manipulating a PivotTable, Using the PivotTable Toolbar, Changing Data Field, Properties, Displaying a PivotChart, Setting PivotTable Options, Adding Subtotals to PivotTables

(6 Lecture Hours)

Unit IV

Spreadsheet Tools ,Moving between Spreadsheets, Selecting Multiple Spreadsheets, Inserting and Deleting Spreadsheets Renaming Spreadsheets, Splitting the Screen, Freezing Panes, Copying and Pasting Data between Spreadsheets, Hiding , Protecting worksheets Making Macros Recording Macros, Running Macros, Deleting Macros

(6 Lecture Hours)

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Unit V

Introduction to Database, Retrieve Data using the SQL SELECT Statement, Learn to Restrict and Sort Data, Usage of Single-Row Functions to Customize Output, Invoke Conversion Functions and Conditional Expressions, Aggregate Data Using the Group Functions, Display Data from Multiple Tables Using Joins, Use Sub-Queries to Solve Queries, Data Manipulation Statements, Use of DDL Statements to Create and Manage Tables

(6 Lecture Hours)

Books:

1. Excel 2019 Bible by Michael Alexander, 1th edition, Wiley
2. Excel 2019 All-in-One for Dummies by Greg Harvey,1st edition, For Dummies
3. Slaying Excel Dragons by Mike Girvin, 1st edition, Holy Macro! Books

Suggested E-resources:-

1. NPTEL
2. COURSERA

Semester VI

Course Code	: SES7338T
Title of the course	: PC Packages
Level of the Course	: NHEQF Level 5.5
Credit of the Course	: 2
Type of the Course	: Skill Enhancement Course SEC
Total Lectures	: 30 lectures for content delivery
Prerequisites	: None

Objectives of the Course:

The course aims to strengthen the conceptual knowledge of basics of computer science and some package essential in daily life and good to learn for any individual to effectively use a computer

Course Learning Outcomes:

1. Prepare presentation and report on computer system.
2. Understand the essential of Information Technology Concepts
3. Develop practical skills in data capture, analysis and presentation, report formatting
4. Use a range of current, standard, Office Productivity software applications
5. Apply the basic concepts of a word processing package, electronic spreadsheet and PowerPoint tool

Unit I

(Computer Basics) Introduction to computers – Definition, Characteristics, Classification of computers, Components of a Computer System –Hardware Components -Central Processing Unit, Input devices, Output devices, Computer Memory. Categories of Software - System Software and Application Software, Operating Systems - definition and functions. Data - Definition, Types, Data Representation, Types of Number system- Binary, Octal, Hexadecimal Conversion between number bases

(6 Lecture Hours)

Unit II

(Word Processor) Word processing concepts: Use of Templates, Working with word document: Editing text, Find and replace text. Formatting- Text, Paragraphs, Styles, Columns. Bullets and numbering, Tabs, Indent, Page Formatting. Design Themes, Page Background. Page setup Insert: Tables, Illustrations, Links, Comments, Header and Footer, Symbols. Tables: Inserting, filling and formatting a table, Changing cell width and height, Alignment of Text in cell, Delete / Insertion of Row, Column and Merging & Splitting of Cells, Border and Shading. Referencing- Captions, Footnotes and Endnotes Citations and Bibliography, Reference Tables and Indexes, Bookmarks and Cross-References.

(6 Lecture Hours)

Unit III

Spreadsheets Spreadsheet concepts: Managing worksheets; Formatting, Conditional formatting, Entering data, Editing, Handling operators in formula, Project involving multiple

spreadsheets, Organizing Charts and graphs, Generally used Spreadsheet functions: Mathematical, Statistical, Financial, Logical, Date and Time, Lookup and reference, Database, and Text functions, Summarizing data using filter. Pivot tables to analyze data. Using What-If Scenario Manager, Goal Seek. Printing a worksheet-working with page breaks, adding headers or footers, choosing what to print.

(6 Lecture Hours)

Unit IV

Presentation Software Creating a presentation, creating a Presentation Using a Template, Creating a Blank Presentation, Inserting & Editing Text on Slides, Inserting and Deleting Slides in a Presentation, Saving a Presentation, Manipulating Slides, Inserting Table, Adding ClipArt Pictures, Inserting Other Objects, Resizing and Scaling an Object, Creating & using Master Slide, Presentation of Slides, Choosing a Set Up for Presentation, Running a Slide Show, Transition and Slide Timings, Automating a Slide Show, Providing Aesthetics to Slides & Printing, Enhancing Text Presentation, Working with Color and Line Style, Adding Movie and Sound, Adding Headers, Footers and Notes, Printing Slides and Handouts

(6 Lectures Hours)

Unit V

User Generated Content Blogs and Wikis. Online Data Capture Tools: Types of data capture form templates (Personal, Work and Education). Question Formats for data capture (short answer, paragraph, multiple choice, check- box, drop-down, linear-scale, multiple choice grid). Data form design (Add new question, add section, add title/description/image/video). Data form distribution techniques (Send via email, publish on social media, send as link). Response management (Print responses, Export to spreadsheet, View analysis, Include analysis in word processing reports)

(6 Lectures Hours)

Books

1. Introduction to Information Technology by ITL Education Solutions Limited, second edition.
2. “O” Level made simple “Introduction to ICT resources” by Satish Jain, Shashank Jain, Shashi Singh & M. Geetha Iyer, BPB publication.
3. Computer fundamentals fourth edition by Pradeep K. Sinha and Priti Sinha BPB publications
4. Information Technology The breaking wave by Dennis Curtin Tata McGraw-hill edition

Suggested E-resources:-

1. NPTEL
2. COURSERA