

Revised CBCS SYLLABUS
FOR
THREE YEARS UNDER-GRADUATE COURSE
IN
Computer Science (PROGRAMME)
(w.e.f. 2022-23)



BANKURA UNIVERSITY

BANKURA

WEST BENGAL

PIN 722155

After successful completion of 6 Semesters with Computer Science as Core subject a student should be able to:-		
SI No	Program Outcome	Description
PO 1	Effective domain knowledge in Computer Science	To acquire theoretical knowledge of different algorithms and emerging areas in Computer Science.
PO 2	Laboratory skill in Computer Science	Students will be able to write programs in different programming languages and run them in computer.
PO 3	Familiarity with recent developments in a particular field	To be able to upgrade themselves to apply modern theories and approaches to explain all spatial phenomena.
SI No	Program Specific Outcomes	Description
PSO 1	Critical appreciation of the Subject.	To acquire sound theoretical knowledge on the fundamentals of Computer Science and to apply them in practical and professional situations.
PSO 2	Technical Skill Development	To create updated knowledge on research methodology and to develop skills in application oriented Computer Science.
PSO 3	Personality Development	To help students develop personality in their professional and personal lives and thus make them responsible and sincere citizens of the society.
PSO 4	Basic Human Values	To help the learners to understand human behavioural nature by the study of various texts and mutual interaction among the students inside and outside the class room.
PSO 5	Fundamental Nature of Computer Science	To help students comprehend that Computer Science underpins understanding and progress in almost every sphere of science, technology and industry.

MODEL STRUCTURE IN Computer Science (PROGRAMME)

SEMESTER – I

Course Code	Course Title	Credit	Marks			No. of Hours			
			I.A	ESE	Total	Lec	Tu.	Pr.	
UGP/CSC/ 101/C-1A	Computers and Problem Solving	6	10	40		50	4	-	4
				T: 25	L:15				
UGP/102/ C-2A	Discipline-2	6	10	40		50			
UGP/103/ C-3A	Discipline-3	6	10	40		50			
UG/ 104/ AECC- ENV	Environmental Studies	4	10	40		50			
Total in Semester – I		22	40	160		200			

SEMESTER –II

Course Code	Course Title	Credit	Marks			No. of Hours			
			I.A	ESE	Total	Lec	Tu	Pr.	
UGP/CSC. /201/C-1B	Database Fundamentals	6	10	40		50	4	-	4
				T:25	L:15				
UGP/202/ C-2B	Discipline – 2	6	10	40		50			
UGP/ 203/C- 3B	Discipline – 3	6	10	40		50			
UG/204/ AECC- E/MIL	English/MIL	2	10	40		50			
Total in Semester – II		20	40	160		200			

SEMESTER – III

Course Code	Course Title	Credit	Marks			No. of Hours			
			I.A	ESE	Total	Lec	Tu.	Pr.	
UGP/CSC/ 301/C-1C	Operating System Concepts	6	10	40		50	4	-	4
				T: 25	L: 15				
UGP/302/ C-2C	Discipline – 2	6	10	40		50			
UGP/ 303/ C-3C	Discipline – 3	6	10	40		50			
UGP/CSC/ 304/ SEC- 1	Anyone of the following: <ul style="list-style-type: none"> ● Office Automation Tools ● C-programming 	2	10	40		50	1	-	2
				T: 25	L: 15				
Total in Semester - III		20	40	160		200			

SEMESTER – IV

Course Code	Course Title	Credit	Marks			No. of Hours			
			I.A.	ESE	Total	Lec	Tu.	Pr.	
UGP/CSC/40 1/C-1D	Digital Logic and Computer Organization	6	10	40		50	4	-	4
				T: 25	L: 15				
UGP/ 402/ C-2D	Discipline-2	6	10	40		50			
UGP/ 403/ C-3D	Discipline-3	6	10	40		50			
UGP/CSC/40 4/ SEC-2	HTML Programming	2	10	40		50	1	-	2
				T: 25	L: 15				
Total in Semester – IV		20	40	160		200			

SEMESTER – V

Course Code	Course Title	Credit	Marks			No. of Hours		
			I.A.	ESE	Total	Lec	Tu.	Pr.
UGP/CSC/ 501/DSE- 1A	Any one of the following:	6	10	40	50	4	-	4
	<ul style="list-style-type: none"> ● Internet Technologies ● Object Oriented Programming with JAVA 			T: 25 L: 15				
UGP/ 502/DSE- 2A	Discipline – 2	6	10	40	50			
UGP/ 503/DSE- 3A	Discipline – 3	6	10	40	50			
UGP/CSC/ 504/SEC-3	Anyone of the following:	2	10	40	50	1	-	2
	<ul style="list-style-type: none"> ● MYSQL Programming (using SQL/ PL-SQL) ● Programming with UNIX/LINUX 			T: 25 L: 15				
Total in Semester – V		20	40	160	200			

SEMESTER – VI

Course Code	Course Title	Credit	Marks			No. of Hours			
			I.A.	ESE	Total	Lec	Tu.	Pr.	
UGP/CSC/ 601/DSE- 1B	Any one of the following: ● Project Work ● Discrete Structures	6	10	40	50	2	-	8	
						5	1	-	
UGP/ 602/DSE- 2B	Discipline – 2	6	10	40	50				
UGP/ 603/DSE- 3B	Discipline – 3	6	10	40	50				
UGP/CSC/ 604/SEC-4	Programming with Visual Basic	2	10	40		50	1	-	2
				T: 25	L: 15				
Total in Semester – VI		20	40	160	200				

UGP= Under Graduate programme/Pass, S.C.= Subject Code C= Core Course, E/H/MIL= English/ Hindi/ Modern Indian Language, H/MIL/E= Hindi/ Modern Indian Language/ English, AECC-E= Ability Enhancement Compulsory Course-English, AECC-ENV= Ability Enhancement Compulsory Course-Environmental Science, SEC= Skill Enhancement Course, GE= Generic Elective, DSE= Discipline Specific Elective IA= Internal Assessment, ESE= End-Semester Examination, Lec.= Lecture, Tu.= Tutorial, and Pr.=Practical

CORE PAPERS:

Core Paper I :Semester I:

C-1A: THEORY: 60L

Course Learning Outcomes: After successful completion of the Course a student will be able to:

- Learn about basic operations of a computer.
- Develop problem solving skills using computer.
- Become skilled at developing simple algorithms and flow charts.
- Convert the algorithms into simple Python programs.
- Develop simple Python programs for solving real life problems.

Computers and Problem Solving

Computer Fundamentals: Introduction to Computers: Characteristics of Computers, Uses of computers, Types and generations of Computers. (4L)

Basic Computer Organization - Units of a computer, CPU, ALU, memory hierarchy, registers, I/O devices. (6L)

Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation. (4L)

Techniques of Problem Solving: Flowchart, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming. (4L)

Overview of Programming: Structure of a Python Program, Elements of Python (6L)

Introduction to Python: Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator). (8L)

Creating Python Programs: Input and Output Statements, Control statements (Looping-while Loop, for Loop, Loop Control, Conditional Statement- if...else, Difference between break, continue and pass). (14L)

Structures: Numbers, Strings, Lists, Tuples, Dictionary, Date & Time, Modules, Defining Functions, Exit function, default arguments. (14L)

Reference Books:

1. P. K. Sinha & Priti Sinha , “Computer Fundamentals”, BPB Publications, 2007.
2. Dr. Anita Goel, Computer Fundamentals, Pearson Education, 2010.
3. T. Budd, Exploring Python, TMH, 1st Ed, 2011
4. Python Tutorial/Documentation www.python.org2010
5. Allen Downey, Jeffrey Elkner, Chris Meyers , How to think like a computer scientist : learning with Python , Freely available online.2012
6. <http://docs.python.org/3/tutorial/index.html>
7. <http://interactivepython.org/courselib/static/pythonds>
8. <http://www.ibiblio.org/g2swap/byteofpython/read/>

C-1A: LAB

Software Lab based on “Computers and Problem Solving”

(using Python Programming Language)

1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user’s choice.
2. WAP to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria :
 - Grade A: Percentage ≥ 80
 - Grade B: Percentage ≥ 70 and < 80
 - Grade C: Percentage ≥ 60 and < 70
 - Grade D: Percentage ≥ 40 and < 60
 - Grade E: Percentage < 40
3. Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4. WAP to display the first n terms of Fibonacci series.
5. WAP to find factorial of the given number.
6. WAP to find sum of the following series for n terms: $1 - 2/2! + 3/3! - \dots - n/n!$
7. WAP to calculate the sum and product of two compatible matrices.

Core Paper II: Semester-II: **C-1B: THEORY: 60L**

Course Learning Outcomes: After successful completion of the Course a student will be able to:

- Know about different database management techniques.
- They can create, delete, and update the databases in practical classes.
- Through database management system they can work with any real life database.

Database Fundamentals

Introduction to Database Management Systems: Characteristics of database approach, data models, DBMS architecture and data independence.

(10L)

Entity Relationship and Enhanced ER Modeling: Entity types, relationships, SQL-Schema Definition, constraints, and object modeling.

(15L)

Relational Data Model : Basic concepts, relational constraints, relational algebra, SQL queries.

(15L)

Database design: ER and EER to relational mapping, functional dependencies, normal forms up To 3rd Normal Form

(20 L)

Books Recommended:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.
2. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002.
3. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.
4. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education, 2013.

C-1B: LAB

Software Lab based on “Database Fundamentals”

(using My Access / My SQL)

The following concepts must be introduced to the students:

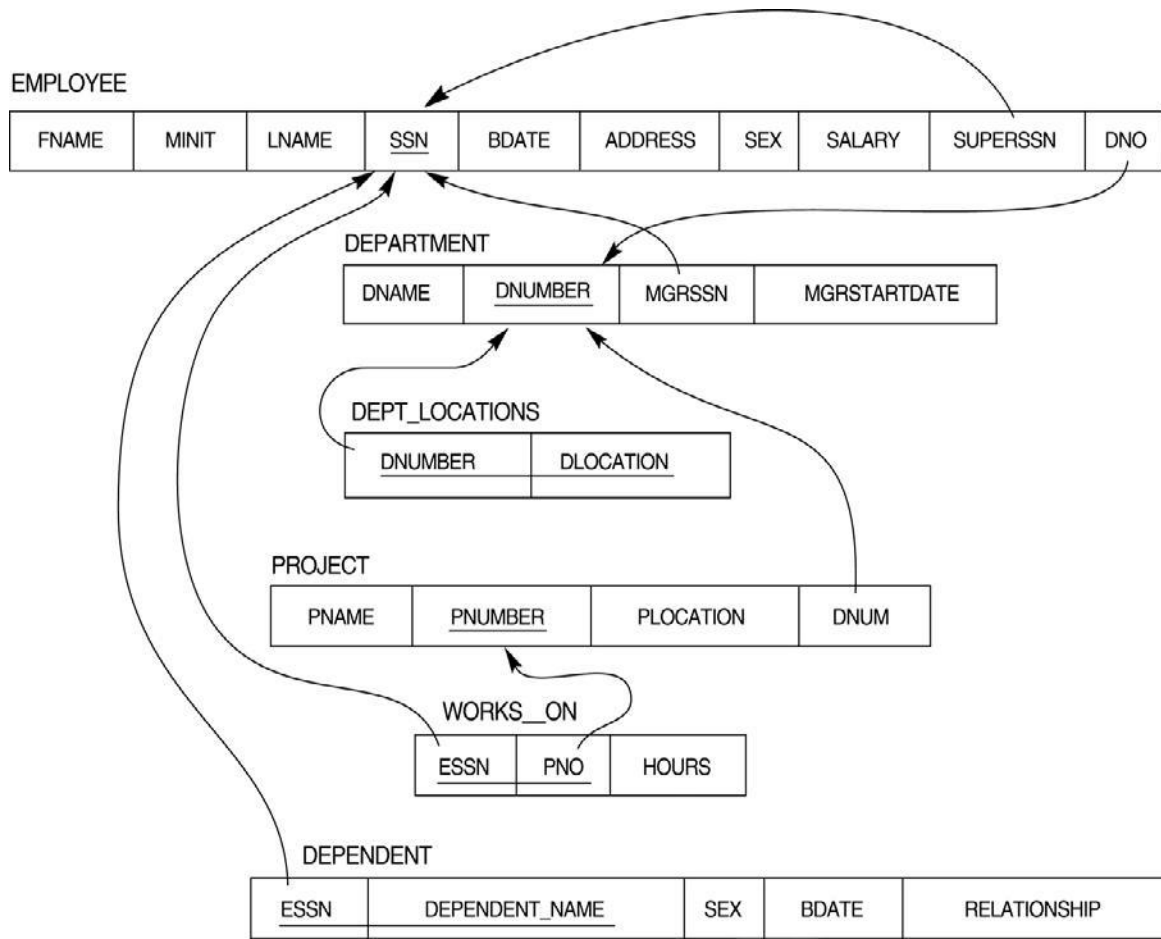
DDL Commands

- Create table, alter table, drop table

DML Commands

- Select , update, delete, insert statements
- Condition specification using Boolean and comparison operators (and, or, not,=,<>,>,<,>=,<=)
- Arithmetic operators and aggregate functions(Count, sum, avg, Min, Max)
- Multiple table queries (join on different and same tables)
- Nested select statements
- Set manipulation using (any, in, contains, all, not in, not contains, exists, not exists, union, intersect, minus, etc.)
- Categorization using group by.....having
- Arranging using order by

Relational Database Schema - COMPANY



Questions to be performed on above schema

1. Create tables with relevant foreign key constraints
2. Populate the tables with data
3. Perform the following queries on the database :
 - i. Display all the details of all employees working in the company.
 - ii. Display ssn, lname, fname, address of employees who work in department no 7.
 - iii. Retrieve the birthdate and address of the employee whose name is 'Franklin T. Wong'
 - iv. Retrieve the name and salary of every employee
 - v. Retrieve all distinct salary values
 - vi. Retrieve all employee names whose address is in 'Bellaire'

- vii. Retrieve all employees who were born during the 1950s
- viii. Retrieve all employees in department 5 whose salary is between 50,000 and 60,000(inclusive)
- ix. Retrieve the names of all employees who do not have supervisors
- x. Retrieve SSN and department name for all employees
- xi. Retrieve the name and address of all employees who work for the 'Research' department
- xii. For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birthdate.
- xiii. For each employee, retrieve the employee's name, and the name of his or her immediate supervisor.
- xiv. Retrieve all combinations of Employee Name and Department Name
- xv. Make a list of all project numbers for projects that involve an employee whose last name is 'Narayan' either as a worker or as a manager of the department that controls the project.
- xvi. Increase the salary of all employees working on the 'ProductX' project by 15%. Retrieve employee name and increased salary of these employees.
- xvii. Retrieve a list of employees and the project name each works in, ordered by the employee's department, and within each department ordered alphabetically by employee first name.
- xviii. Select the names of employees whose salary does not match with salary of any employee in department 10.
- xix. Retrieve the name of each employee who has a dependent with the same first name and same sex as the employee.
- xx. Retrieve the employee numbers of all employees who work on project located in Bellaire, Houston, or Stafford.
- xxi. Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary. Display with proper headings.
- xxii. Find the sum of the salaries and number of employees of all employees of the 'Marketing' department, as well as the maximum salary, the minimum salary, and the average salary in this department.
- xxiii. Select the names of employees whose salary is greater than the average salary of all employees in department 10.
- xxiv. For each department, retrieve the department number, the number of employees in the department, and their average salary.
- xxv. For each project, retrieve the project number, the project name, and the number of

employees who work on that project.

- xxvi. Change the location and controlling department number for all projects having more than 5 employees to 'Bellaire' and 6 respectively.
- xxvii. For each department having more than 10 employees, retrieve the department no, no of employees drawing more than 40,000 as salary.
- xxviii. Insert a record in Project table which violates referential integrity constraint with respect to Department number. Now remove the violation by making necessary
- xxix. insertion in the Department table.
- xxx. Delete all dependents of employee whose ssn is '123456789'.
- xxxi. Delete an employee from Employee table with ssn = '12345' (make sure that this employee has some dependents, is working on some project, is a manager of some department and is supervising some employees). Check and display the cascading effect on Dependent and Works on table. In Department table MGRSSN should be set to default value and in Employee table SUPERSSN should be set to NULL
- xxxii. Perform a query using alter command to drop/add field and a constraint in Employee table.

Core Paper III: Semester-III:

C-1C: THEORY: 60L

Course Learning Outcomes: After successful completion of the Course a student will be able to:

- Acquire knowledge in the objectives of operating systems.
- Know how operating systems are related to computer hardware, what functionalities are provided to users, and what the major components in operating systems are.
- Perform experiments on process scheduling and other operating system tasks through simulation.
- Understand concepts of memory management including virtual memory.

Operating System Concepts

Introduction: System Software, Resource Abstraction, OS strategies. (3L)

Types of operating systems - Multiprogramming, Batch, Time Sharing, Single user and Multiuser, Process Control & Real Time Systems. (4L)

Operating System Organization: Factors in operating system design, basic OS functions, implementation consideration; process modes, methods of requesting system services – system calls and system programs. (10L)

Process Management : System view of the process and resources, initiating the OS, process

address space, process abstraction, resource abstraction, process hierarchy, Thread model (15L)

Scheduling: Scheduling Mechanisms, Strategy selection, non pre-emptive and pre-emptive strategies. (14L)

Memory Management: Mapping address space to memory space, memory allocation strategies, fixed partition, variable partition, paging, virtual memory (14L)

Books Recommended:

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
2. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.
3. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education 1997.
4. W. Stallings, Operating Systems, Internals & Design Principles , 5th Edition, Prentice Hall of India. 2008.
5. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.

C-1C: LAB

Software Lab based on “Operating System Concepts”

(using ‘C’ Programming Language)

1. WRITE A PROGRAM (using *fork()* and/or *exec()* commands) where parent and child execute:
 - a) same program, same code.
 - b) same program, different code.
 - c) before terminating, the parent waits for the child to finish its task.
2. WRITE A PROGRAM to print file details including owner access permissions, file access time, where file name is given as argument.
3. Write program to implement FCFS scheduling algorithm.
4. Write program to implement Round Robin scheduling algorithm.
5. Write program to implement SJF scheduling algorithm.
6. Write program to implement non-preemptive priority based scheduling algorithm.
7. Write program to implement preemptive priority based scheduling algorithm.
8. Write program to implement SRJF scheduling algorithm.
9. Write program to calculate sum of n numbers using *thread* library.
10. Write a program to implement first-fit, best-fit and worst-fit allocation strategies

Core Paper IV: Semester-IV: **C-1D: THEORY: 60L**

Course Learning Outcomes: After successful completion of the Course a student will be able to:

- Learn about function and design of various components of a computer.
- Become skilled at developing different types of combinational and sequential circuits.
- Learn about the working principle of central processing unit of a Computer.
- Learn about the internal structure of different types of memory used in a computer.

Digital Logic and Computer Organization

Introduction: Logic gates, Boolean algebra, Combinational circuits, circuits implementation, flip-flops and sequential circuits, decoders, multiplexers, registers, counters and memory units. (12L)

Data Representation and basic Computer Arithmetic: Number systems, complements, fixed and floating point representation, character representation, addition, subtraction, magnitude comparison. [8L]

Basic Computer Organization and Design: Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference, input-output and interrupt. (18L)

Central Processing Unit: Register organization, arithmetic and logical micro-operations, stack organization, micro programmed control. (10L)

Programming the Basic Computer: Instruction formats, addressing modes, instruction codes, machine language, assembly language. (8L)

Input-output Organization: Peripheral devices, I/O interface, Modes of data transfer, direct memory access. (4L)

Books Recommended:

1. M. Mano, Computer System Architecture, Pearson Education 1992.
2. A. J. Dos Reis, Assembly Language and Computer Architecture using C++ and JAVA, Course Technology, 2004
3. W. Stallings, Computer Organization and Architecture Designing for Performance, 8th

Edition, Prentice Hall of India ,2009

4. Digital Design, M.M. Mano, Pearson Education Asia, 1979

C-1D: LAB

Digital Logic Lab based on Digital Logic and Computer Organization

(Besides the traditional Hardware Platform use of open source Simulators are also encouraged)

1. Implement X-OR Gate using NAND Gates.
2. Implement X-OR Gate using NOR Gates.
3. Implement Half-Adder using Basic Gates.
4. Implement Half-Adder using NAND Gates.
5. Implement Full-Adder using NAND Gates.
6. Implement Full-Subtractor using NAND Gates.
7. Implement the Function: using Basic Gates.
8. Implement the Function: using Basic Gates.
9. Implement the Function: $F = ABC + DEF$ using IC 7411.
10. Implement a 4-bit Binary Adder using IC 7483.
11. Implement 2×1 Multiplexer using Basic Gates.
12. Implement 4×1 Multiplexer using NAND Gates.
13. Implement 8×1 MUX using IC 74153.
14. Implement a 3-bit Even Parity Checker using Basic Gates.
15. Implement a 2-bit Comparator using Basic Gates.
16. Implement S-R Flip-Flop using NAND Gates.

Discipline Specific Elective Papers: (Credit: 06 each) (DSE-1A, DSE -1B):

1. Internet Technologies (DSE-1A): THEORY: 60L

Course Learning Outcomes: After successful completion of the Course a student will be able to:

- Design different types of Client side applications.
- Design Web-enabled applications using JavaScript, Programming, Java Server Pages and Java Database Connectivity.
- Can learn and implement different web applications.

Introduction to Web Design: Introduction to hyper text mark up language(html) document type definition, creating web pages, graphical elements, lists, hyperlinks, tables, webforms, inserting images, frames. (9L)

Customized Features: Cascading style sheets, (css) for text formatting and other manipulations. (7L)

JavaScript: Data types, operators, functions, control structures, events and event handling. (11L)

Java: Use of Objects, Array and Array List class, Designing classes, Inheritance, Input/ Output, Exception Handling. (18L)

JDBC: JDBC Fundamentals, Establishing Connectivity and working with connection interface, Working with statements, Creating and Executing SQL Statements, Working with Result Set Objects. (15L)

Books Recommended:

1. Web Enabled Commercial Application Development Using Html, Dhtml, javascript, Perl Cgi By Ivan Bayross, BPB Publications, 2009.
2. BIG Java Cay Horstmann, Wiley Publication, 3rd Edition., 2009
3. Java 7, The Complete Reference, Herbert Schildt, 8th Edition, 2009.
4. The Complete Reference J2EE, TMH, Jim Keogh, 2002.
5. Java Server Pages, Hans Bergsten, Third Edition, O'Reilly Media December 2003.

Internet Technologies: LAB Software Lab based on “Internet Technologies”

JAVA Script

1. Create a student registration form. Create functions to perform the following checks:
 - a. Roll number is a 7-digit numeric value
 - b. Name should be an alphabetical value (String)
 - c. Non-empty fields like DOB
2. Implement a static password protection.
3. Write a JavaScript
 - a. To change the colour of text using `SetTimeout()`
 - b. To move an image across screen using `SetInterval()`

JAVA Programs

1. WAP to find the largest of n natural numbers.
2. WAP to find whether a given number is prime or not.
3. WAP to print the sum and product of digits of an Integer and reverse the Integer.
4. Write a program to create an array of 10 integers. Accept values from the user in that array. Input another number from the user and find out how many numbers are equal to the number passed, how many are greater and how many are less than the number passed.
5. Write a Java program for the following matrix operations:
 - a. Addition of two matrices
 - b. Summation of two matrices
 - c. Transpose of a matrixInput the elements of matrices from user
6. Write a Java program that computes the area of a circle, rectangle and a Cylinder using function overloading.

JDBC

1. Create a table 'Student' and 'Teacher' in 'College' database and insert two rows in this newly created table using JDBC API and do the following:
 - a. Update an already created table 'Teacher' in 'College' database by updating a teacher's name, with "Dr." appended before the name, whose name is "Rita".
 - b. Repeat the same thing for all the teachers using `PreparedStatement`.
 - c. Delete the student with ID=3 from 'Student' database.
 - d. Insert two students to the `ResultSet` returned by the query which selects all students

withFirstName="Ayush".The database must also get updated along with ResultSet.

2. Create a procedure in MySQL to count the number of rows in table 'Student'. Use Callable Statement to call this method from Java code.

2. Object Oriented Programming with JAVA(DSE-1A): THEORY: 60L

Course Learning Outcomes: After successful completion of the Course a student will be able to:

- Learn about Object Oriented Programming.
- Use, write, compile, debug and learn in Java Programming.
- The practical part of this course will enable the students to develop apps based on Java.

Object Oriented Programming Concept: Overview of Programming, Paradigm, Classes, Abstraction, Encapsulation, Inheritance, Polymorphism

(10L)

Introduction to Java: Features of Java, JDK Environment

(1L)

JAVA Programming Fundamental: Structure of program, Data types, Variables, Operators, Keywords, Naming Convention, Decision Making (if, switch), Looping (for, while), Type Casting, Difference between C++ and JAVA

(10L)

Classes and Objects: Creating Classes and objects, Memory allocation for objects, Constructor, Implementation of Inheritance, Implementation of Polymorphism, Method Overloading, Method Overriding, Nested and Inner classes

(10L)

Arrays and Strings: Arrays, Creating an array, Types of Arrays, String class Methods, String Buffer methods.

(6L)

Abstract Class, Interface and Packages: Modifiers and Access Control, Abstract classes and methods, Interfaces, Packages Concept, Creating user defined packages

(8L)

Exception Handling: Exception types, Using try catch and multiple catch, Nested try, throw, throws and finally, Creating User defined Exceptions.

(4L)

File Handling: Byte Stream, Character Stream, File IO Basics, File Operations, Creating file, Reading file, Writing File

(5L)

Applet Programming: Introduction, Types Applet, Applet Life cycle, Creating Applet, Applet Tag

(6L)

Books Recommended:

1. Ivan Bayross, Web Enabled Commercial Application Development Using Html,

- Dhtml,javascript, Perl Cgi , BPB Publications, 2009.
2. Cay Horstmann, BIG Java, Wiley Publication , 3rd Edition., 2009
 3. Herbert Schildt , Java 7, The Complete Reference, , 8th Edition, 2009.
 4. E Balagurusamy , Programming with JAVA, TMH, 2007

Software Lab based on “Object Oriented Programming with JAVA”

1. WAP to find the largest of n natural numbers.
2. WAP to find whether a given number is prime or not.
3. Write a menu driven program for following:
 - a. Display a Fibonacci series
 - b. Compute Factorial of a number
 - c. WAP to check whether a given number is odd or even.
 - d. WAP to check whether a given string is palindrome or not.
4. WAP to print the sum and product of digits of an Integer and reverse the Integer.
5. Write a program to create an array of 10 integers. Accept values from the user in that array. Input another number from the user and find out how many numbers are equal to the number passed, how many are greater and how many are less than the number passed.
6. Write a program that will prompt the user for a list of 5 prices. Compute the average of the prices and find out all the prices that are higher than the calculated average.
7. Write a program in java to input N numbers in an array and print out the Armstrong numbers from the set.
8. Write java program for the following matrix operations:
 - a. Addition of two matrices
 - b. Summation of two matrices
 - c. Transpose of a matrix
 - d. Input the elements of matrices from user.
9. Write a java program that computes the area of a circle, rectangle and a Cylinder using function overloading.
10. Write a Java for the implementation of Multiple inheritance using interfaces to calculate the area of a rectangle and triangle.
11. Write a java program to create a frame window in an Applet. Display your name, address and qualification in the frame window.

12. Write a java program to draw a line between two coordinates in a window.
13. Write a java program to display the following graphics in an applet window.
 - a. Rectangles
 - b. Circles
 - c. Ellipses
 - d. Arcs
 - e. Polygons
14. Write a program that reads two integer numbers for the variables a and b. If any other character except number (0-9) is entered then the error is caught by Number Format Exception object. After that ex. getMessage() prints the information about the error occurring causes.
15. Write a program for the following string operations:
 - a. Compare two strings
 - b. Concatenate two strings
 - c. Compute length of a string
16. Create a class called Fraction that can be used to represent the ratio of two integers. Include appropriate constructors and methods. If the denominator becomes zero, throw and handle an exception.

3. Project Work (DSE-1B)

- This option is to be offered only in 6th Semester.
- The students will be allowed to work on any project based on the concepts studied in core/elective or skill based elective courses.
- The group size should be maximum of three (03) students.
- Each group will be assigned a teacher as a supervisor who will handle both their theory as well lab classes.
- A maximum of Four (04) projects would be assigned to one teacher.
- Theory classes will cover project management techniques.

4. Discrete Structures (DSE-1B): THEORY : 60L

Course Learning Outcomes: After successful completion of the Course a student will be able to:

- Study the objectives and problems related to all branches of computer science.
- Apply mathematical thinking, mathematical proofs, and algorithmic thinking in problem solving.
- Understand the basics of combinatorics, and be able to apply the methods in problem solving.
- Understand some basic properties of graphs and related discrete structures, and be able to relate these to practical examples.

Introduction: Introduction to Sets, Finite and Infinite Sets, Unaccountably Infinite Sets. Introduction to Functions and relations, Properties of Binary relations, Closure, Partial Ordering Relations. (12L)

Pigeonhole Principle, Permutation and Combinations, Mathematical Induction, Principle of Inclusion and Exclusion. (12L)

Asymptotic Notations (4L)

Recurrence Relations: Introduction, Generating Functions, Linear Recurrence Relations with constant coefficients and their solution. (12L)

Graphs Theory: Basic Terminology of Graphs, Models and Types, Multigraphs, Weighted Graphs, Graph Representation. Graph Isomorphism Graph Connectivity, Euler and Hamiltonian Paths and Circuits, Planar Graphs, Graph Coloring, Basic Terminology of Trees, Properties of Trees, Spanning Trees. (12L)

Inference Theory: Introduction, Logical Connectives, Well Formed Formulas, Tautologies, Equivalence (8L)

Books Recommended:

1. C. L. Liu and D.P. Mohapatra, Elements of Discrete Mathematics, Third Edition, Tata McGraw Hill , 2008.
2. K. Rosen, Discrete Mathematics and Its Applications, Sixth Edition, Tata McGraw Hill,2007.
3. T.H. Cormen, C.E. Leiserson, R.L. Rivest, Introduction to Algorithms, 3E Edition,Prentice Hall of India,2010.
4. J.P. Trembley, R. Manohar, Discrete Mathematical Structures with Application to Computer Science, First Edition, Tata McGraw Hill, 2001.
5. David Gries, Fred B. Schneider, A Logical Approach to Discrete Math,

Springer; 2010.

Online Reading/Supporting Material:

1. <http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-042j-mathematics-for-computer-science-fall-2005/>

Discrete Structures: TUTORIAL

Skill Enhancement Courses

(SEC 1, SEC 2, SEC 3, SEC 4)

1. Office Automation Tools (SEC-1): THEORY: 15L

Course Learning Outcomes: After successful completion of the Course a student will be able to:

- a) Learners will be able to claim proficiency in MS-Office.
- b) Learners will be able to independently create professional-looking documents and presentations.
- c) Learners will be familiar with some advanced Word Power Point and Excel functions.

Introduction to open office/MS office/Libre office (2L) Word Processing: Formatting Text, Pages, Lists, Tables (4L)

Spreadsheets: Worksheets, Formatting data, creating charts and graphs, using formulas and functions, macros, Pivot Table (5L)

Presentation Tools: Adding and formatting text, pictures, graphic objects, including charts, objects, formatting slides, notes, hand-outs, slide shows, using transitions, animations (4L)

Books Recommended:

1. Sushila Madan , Introduction to Essential tools,JBA,2009.
2. Anita Goel, Computer Fundamentals, Pearson, 2012

Office Automation Tools: LAB Computer Lab Based on Office Automation

Practical List for WORD:

1. Create a telephone directory.

- The heading should be 16-point Arial Font in bold
- The rest of the document should use 10-point font size
- Other headings should use 10-point Courier New Font.
- The footer should show the page number as well as the date last updated.

2. Design a time-table form for your college.

- The first line should mention the name of the college in 16-point Arial Font and should be bold.
- The second line should give the course name/teacher's name and the department in 14-point Arial.
- Leave a gap of 12-points.

- The rest of the document should use 10-point Times New Roman font.
- The footer should contain your specifications as the designer and date of creation.

3. Create the following one page documents.

(a) Compose a note inviting friends to a get-together at your house, including a list of things to bring with them.

(b) Design a certificate in landscape orientation with a border around the document.

4. Create the following document: A newsletter with a headline and 2 columns in portrait orientation, including at least one image surrounded by text.

5. Convert following text to a table, using comma as delimiter

Type the following as shown (do not bold).

Color, Style, Item

Blue, A980, Van

Red, X023, Car

Green, YL724, Truck

Name, Age, Sex

Bob, 23, M

Linda, 46, F

Tom, 29, M

6. Prepare a grocery list having four columns (Serial number, the name of the product, quantity and price) for the month of April, 06.

- Font specifications for Title (Grocery List): 14-point Arial font in bold and italics.
- The headings of the columns should be in 12-point and bold.
- The rest of the document should be in 10-point Times New Roman.
- Leave a gap of 12-points after the title.

7. XYZ Publications plans to release a new book designed as per your syllabus. Design the first page of the book as per the given specifications.

(a) The title of the book should appear in bold using 20-point Arial font.

(b) The name of the author and his qualifications should be in the center of the page in 16-point Arial font.

(c) At the bottom of the document should be the name of the publisher and address in 16-point Times New Roman.

(d) The details of the offices of the publisher (only location) should appear in the footer.

8. Create the following one page documents.

a) Design a Garage Sale sign.

b) Make a sign outlining your rules for your bedroom at home, using a numbered list.

9. Enter the following data into a table given next

Salesperson	Dolls	Trucks	Puzzles
Amit	1327	1423	1193
Shivi	1421	3863	2934

Om	5214	3247	5467
Ananya	2190	1278	1928
Anupama	1201	2528	1203
Maharshi	4098	3079	2067

Add a column Region (values: S, N, N, S, S, S) between the Salesperson and Dolls columns to the given table Sort your table data by Region and within Region by Salesperson in ascending order:

Practical List for EXCEL

- Q1. Create a student worksheet containing roll numbers, names and total marks. Open a document in Word and insert the excel worksheet using:-
 - i) Copy/Paste
 - ii) Embedding
 - iii) Linking
- Q2. The term wise marks for APS class of 20 students are stored in 3 separate sheets named term1, term2 and term3. Create 4th worksheet that contains student names and their total and average marks for the entire year. Give proper headings using headers. Make the column headings bold and italic. The 4th worksheet should contain college name as the first line. Make it bold, italic and center it.
- Q3. Using a simple pendulum, plot 1-T and 1-T² graph.

I	t1	t2	t3	Mean (t)	T= t/20	T ²
70						
80						
90						
100						

Q4. Consider the following employee worksheet:-

Full Name (First Last)	Grade 1/2/3	Basic Salary	HRA A	P F	GROSS S	NET T	VA (Vehicle Allowance)

Grade	HRA %(of Basic)
1	40%
2	35%
3	30%

Gross = Basic + HRA + VA

Net = Gross –PF

PF is 8% for all Grades

VA is 15000, 10000 and 7000 for Grades 1, 2 and 3.

- i) Find max, min and average salary of employees in respective Grade
- ii) Count no. of people where VA>HRA
- iii) Find out most frequently occurring grade.
- iv) Extract records where employee name starts with “A” has HRA>10000
- v) Print Grade wise report of all employees with subtotals of net salary and also grand totals. Use subtotal command.
- vi) Extract records where Grade is 1 or 2 and salary is between 10000 and 20000 both inclusive.

Q5. In a meeting of a marketing department of an organization it has been decided that price of selling an item is fixed at Rs40. It was resolved to increase the sell of more of more items and getting the profit of Rs40,000/. Use Goal Seek to find out how many items you will have to sell to meet your profit figure.

Q6. To study the variation in volume with pressure for a sample of an air at constant temperature by plotting a graph for P – V and P-I/V. Sample observations are:-

Pressure(P)	Volume (V)	I/V	PV	P/V
75	20			
78.9	19			
83.3	18			
88.2	17			

Q7. Plot the chart for marks obtained by the students (out of 5) vs. frequency (total number of students in class is 50).

Q8. Create the following worksheet(s) containing an year wise sale figure of five salesmen in Rs.

Salesman	2002	2003	2004	2005
MOHAN	10000	12000	20000	50000
MITRA	15000	18000	50000	60000
SHIKHA	20000	22000	70000	70000
ROHIT	30000	30000	100000	80000
MANGLA	40000	45000	125000	90000

Apply the following Mathematical & Statistical functions:

- i) Calculate the commission for each salesman under the condition :-
 - a) If total sales is greater than Rs. 3, 00,000/-, then commission is 10% of total sale made by the salesman.
 - b) Otherwise, 4% of total sale.
- ii) Calculate the maximum sale made by each salesman.
- iii) Calculate the maximum sale made in each year.
- iv) Calculate the minimum sale made by each salesman.

- v) Calculate the minimum sale made in each year.
- vi) Count the no. of sales persons.
- vii) Calculate the cube of sales made by Mohan in the year 2002.
- viii) Find the difference in sales by salesman Mitra between the year 2002 and 2003.
Find the absolute value of difference.
- ix) Also calculate the Mode, Stddev, Variance, Median for the sale made by each salesman.
- ix) Calculate the year wise Correlation coefficient between the sales man Mohan and Mitra year wise

Q9. The following table gives an year wise sale figure of five salesmen in Rs.

Salesman	2000	2001	2002	2003
S1	10000	12000	20000	50000
S2	15000	18000	50000	60000
S3	20000	22000	70000	70000
S4	30000	30000	100000	80000
S5	40000	45000	125000	90000

- v) Calculate total sale year wise.
- vi) Calculate the net sales made by each salesman
- vii) Calculate the commission for each salesman under the condition :-
 - c) If total sales is greater than Rs. 4, 00,000/-, then commission is 5% of total sale made by the salesman.
 - d) Otherwise, 2% of total sale.
- viii) Calculate the maximum sale made by each salesman.
- ix) Calculate the maximum sale made in each year.
- x) Draw a bar graph representing the sale made by each salesman.
- xi) Draw a pie graph representing the sale made by salesmen in year 2001.

Q10. Consider the following worksheet for APS 1st year students:-

S.No.	Name	PH	CH	BY	MT	CS	Total Marks	%	Grade
1									
2									

Grade is calculated as follows:-

- If % ≥ 90 Grade A
- If % ≥ 80 & < 90 Grade B
- If % ≥ 70 & < 80 Grade C
- If % ≥ 60 & < 70 Grade D

Otherwise students will be declared fail.

- i) Calculate Grade using if function
- ii) Sort the data according to total marks
- iii) Apply filter to display the marks of the students having more than 65% marks.
- iv) Draw a pie chart showing % marks scored in each subject by the topper of the class.
- v) Draw the doughnut chart of the data as in (iv)

- vi) Enter the S.No. of a student and find out the Grade of the student using VLOOKUP.
vii) Extract all records where name
- Begins with “A”
 - Contains “A”
 - Ends with “A”

Practical List for Power Point:

- Create five Power point slides. Each slide should support different format. In these slides explain areas of applications of IT. Make slide transition time as 10 seconds.
- Create five Power Point slides to give advantages/disadvantages of computer, application of computers and logical structure of computer.
- Create five Power Point slides detailing the process of internal assessment. It should be a self-running demo.

2 C-Programming(SEC-1): THEORY: 15L

Course Learning Outcomes: After successful completion of the Course a student will be able to:

- Develop problem solving skills coupled with top down design principles.
- Convert the algorithms into simple C programs.
- Develop simple C programs for solving real life problems.

Introduction to C

(1 Lecture)

History of C, Overview of Procedural Programming and Object-Orientation Programming, Using main() function, Compiling and Executing Simple Programs in C.

Data Types, Variables, Constants, Operators and Basic I/O

(2 Lectures)

Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (get c, get char, put c, put char etc), Formatted and Console I/O (printf(), scanf()), Using Basic Header Files (stdio.h , conio.h etc).

Expressions, Conditional Statements and Iterative Statements

(2 Lectures)

Simple Expressions in C (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operators Precedence in Expressions, Conditional Statements (if construct, switch-case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative).

Functions and Arrays

(3 Lectures)

Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Inline Functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Command Line Arguments/Parameters in Functions, Functions with variable number of Arguments.

Creating and Using One Dimensional Arrays (Declaring and Defining an Array, Initializing an Array, Accessing individual elements in an Array, Manipulating array elements using loops), Use Various types of arrays (integer, float and character arrays / Strings) Two- dimensional Arrays (Declaring, Defining and Initializing Two Dimensional Array, Working with Rows and Columns)

Derived Data Types (Structures and Unions)

(3 Lectures)

Understanding utility of structures and unions, Declaring, initializing and using simple structures and unions, Manipulating individual members of structures and unions, Array of Structures, Individual data members as structures, Passing and returning structures from functions, Structure with union as members, Union with structures as members.

Pointers in C

(2 Lectures)

Understanding a Pointer Variable, Simple use of Pointers (Declaring and Dereferencing Pointers to simple variables), Pointers to Pointers, Pointers to structures, Problems with Pointers, Passing pointers as function arguments, Returning a pointer from a function, using arrays as pointers, Passing arrays to functions. Pointers vs. References

Memory Allocation in C

(2 Lectures)

Differentiating between static and dynamic memory allocation, use of malloc , calloc and free functions, storage of variables in static and dynamic memory allocation.

Reference Books

1. C Programming, Karnighan,&Ritchie, PHI
2. Herbtz Schildt, "C++: The Complete Reference", Fourth Edition, McGraw Hill.2003
3. Bjarne Stroustrup, "The C++ Programming Language", 4th Edition, Addison-Wesley ,2013.
4. E Balaguruswamy, " Programming with C", Tata McGraw-Hill Education, 2008.
5. Programming through C, Richard Johnsonbaugh and Martin Kalin, Pearson Education
6. Programming in C, B.S. Gottfried, Sahaum Series.
7. Y Kanetkar, "Let us C", BPB

SEC LAB based on "C-Programming"

1. WAP to print the sum and product of digits of an integer.
2. WAP to reverse a number.
3. WAP to compute the sum of the first n terms of the following series
 $S = 1 + 1/2 + 1/3 + 1/4 + \dots$
4. WAP to compute the sum of the first n terms of the following series
 $S = 1 - 2 + 3 - 4 + 5 - \dots$
5. Write a function that checks whether a given string is Palindrome or not. Use this function to find whether the string entered by user is Palindrome or not.
6. Write a function to find whether a given no. is prime or not. Use the same to generate the prime

numbers 1 through 100.

7. WAP to compute the factors of a given number.
8. Write a macro that swaps two numbers. WAP to use it.
9. WAP to print a triangle of stars as follows (take number of lines from user):

```
      *
     ***
    *****
   ********
  **********
 **********
```

10. WAP to perform following actions on an array entered by the user:
 - i) Print the even-valued elements
 - ii) Print the odd-valued elements
 - iii) Calculate and print the sum and average of the elements of array
 - iv) Print the maximum and minimum element of array
 - v) Remove the duplicates from the array
 - vi) Print the array in reverse order

The program should present a menu to the user and ask for one of the options. The menu should also include options to re-enter array and to quit the program.

11. WAP that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.
12. Write a program that swaps two numbers using pointers.
13. Write a program in which a function is passed address of two variables and then alter its contents.
14. Write a program which takes the radius of a circle as input from the user, passes it to another function that computes the area and the circumference of the circle and displays the value of area and circumference from the main() function.
15. Write a program to find sum of n elements entered by the user. To write this program, allocate memory dynamically using malloc() / calloc() functions or new operator.
16. Write a menu driven program to perform following operations on strings:
 - a) Show address of each character in string
 - b) Concatenate two strings without using strcat function.
 - c) Concatenate two strings using strcat function.
 - d) Compare two strings
 - e) Calculate length of the string (use pointers)
 - f) Convert all lowercase characters to uppercase
 - g) Convert all uppercase characters to lowercase
 - h) Calculate number of vowels
 - i) Reverse the string
17. Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered array.
18. WAP to display Fibonacci series (i)using recursion, (ii) using iteration
19. WAP to calculate Factorial of a number (i)using recursion, (ii) using iteration
20. WAP to calculate GCD of two numbers (i) with recursion (ii) without recursion.
21. Write a menu-driven program to perform following Matrix operations (Use 2-D array implementation) a) Sum b) Difference c) Product d) Transpose

22. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
23. Write a program to retrieve the student information from file created in previous question and print it in following format:

Roll No.	Name	Marks
----------	------	-------
24. Copy the contents of one text file to another file, after removing all whitespaces.
25. Write a function that reverses the elements of an array in place. The function must accept only one pointer value and return void.
26. Write a program that will read 10 integers from user and store them in an array. Implement array using pointers. The program will print the array elements in ascending and descending order.

3 HTML Programming(SEC-2): THEORY: 15L

Course Learning Outcomes: After successful completion of the Course a student will be able to:

- Use the HTML programming language.
- Resolves written HTML codes.
- Runs the page he/she has designed using HTML codes.
- Design simple web site and pages through HTML programming.

UNIT I: Introduction	(1L)
UNIT II: Basics	(2L)
Head, Body, Colors, Attributes Lists, Ordered, Unordered	
UNIT III: Links	(3L)
Introduction Relative and Absolute Links Link Attributes Using the ID Attribute to Link within a Document	
UNIT IV: Images	(2L)
Putting an Image on a Page Using Images as Links Putting an Image in the Background	
UNIT V: Tables	(4L)
Creating a Table Table Headers Captions Spanning Multiple Columns Styling Table	
UNIT VI: Forms	(3L)
Basic Input and Attributes	

Other Kind of Inputs
Styling Forms with CSS
Where to Go from Here

Book Recommended:

1. Introduction to **HTML** and CSS -- O'Reilly , 2010
2. Jon Duckett, HTML and CSS, John Wiely, 2012

HTML Programming: LAB Software Lab Based on HTML:

Q.1 Create an HTML document with the following formatting options:

- I. Bold
- II. Italics
- III. Underline
- IV. Headings (Using H1 to H6 heading styles)
- V. Font (Type, Size and Color)
- VII. Paragraph
- VIII. Line Break
- IX. Horizontal Rule
- X. Pre tag

Q.2 Create an HTML document which consists of:

- I. Ordered List
- II. Unordered List
- III. Nested List
- IV. Image

Q.3. Create a table having students' Roll, Name and Grade

Q.4 Create a Table with an inserted image

Q.5 Create a form using HTML which has the following types of controls:

- I. Text Box
- II. Option/radio buttons
- III. Check boxes
- IV. Reset and Submit buttons

Q6. Create HTML documents (having multiple frames) in the following three formats

Frame 1
Frame 2

Frame 1	
Frame 2	Frame 3

4. MySQL Programming (using SQL/PL-SQL) (SEC-3): THEORY: 15L

SQL Vs. SQL * Plus:

SQL Commands and Data types, Operators and Expressions, Introduction to SQL * Plus. (2L)

Managing Tables and Data:

- Creating and Altering Tables (Including constraints)
- Data Manipulation Command like Insert, update, delete
- SELECT statement with WHERE, GROUP BY and HAVING, ORDER BY, DISTINCT, Special operator like IN, ANY, ALL BETWEEN, EXISTS, LIKE
- Join, Built in functions (4L)

Other Database Objects

- View
- Synonyms, Index (2L)

Transaction Control Statements

- Commit, Rollback, Savepoint (2L)

Introduction to PL/SQL

- SQL v/s PL/SQL
- PL/SQL Block Structure
- Language construct of PL/SQL (Variables, Basic and Composite Data type, Conditions looping etc.)
- % TYPE and % ROWTYPE
- Using Cursor (Implicit, Explicit) (5L)

Books Recommended:

1. Baron Schwartz , High Performance MySQL, O'Reilly, 2012.
2. Vikram Vaswani , The Complete Reference MySQL , McGraw Hill Educations, 2004.

MySQL Programming (using SQL/PL-SQL): LAB

Software Lab Based on MySQL (SQL/PL-SQL):

[SQL COMMANDS]

- 1) SQL* formatting commands
- 2) To create a table, alter and drop table.
- 3) To perform select, update, insert and delete operation in a table.
- 4) To make use of different clauses viz where, group by, having, order by, union and intersection,
- 5) To study different constraints.

[SQL FUNCTION]

- 6) To use oracle function viz aggregate, numeric, conversion, string function.
- 7) To understand use and working with joins.
- 8) To make use of transaction control statement viz rollback, commit and save point.
- 9) To make views of a table.
- 10) To make indexes of a table.

[PL/SQL]

- 11) To understand working with PL/SQL
- 12) To implement Cursor on a table.
- 13) To implement trigger on a table

6 Programming with UNIX / LINUX (SEC-3): THEORY: 15L

Course Learning Outcomes: After successful completion of the Course a student will be able to:

- Effectively use the UNIX/Linux system to accomplish typical personal, office, technical, and software development tasks.
- Design scripts and programs to demonstrate simple effective user interfaces.

Theory: 15 Lectures

Introduction

(4L)

What is linux/unix Operating systems

- a. Difference between linux/unix and other operating systems
- b. Features and Architecture
- c. Various Distributions available in the market
- d. Installation, Booting and shutdown process
- e. System Processes (an Overview)
- f. Internal and External Commands
- g. Creation of Partitions in O/S
- h. Processes and its creation Phases- Fork, Exec, wait

User Management and File Systems

(5L)

- a. Types of Users, Creating users, Granting rights
- b. User management commands
- c. File quota and various file systems available

- d. File System Management and Layout, File permissions
- e. Login process, Managing Disk Quotas
- f. Links (hard links, symbolic links)

Shell introduction and shell scripting

(6L)

- a. What is shell and various type of shell, Various editors present in linux
- b. Different modes of operation in vi editor
- c. What is shell script, Writing and executing the shell script
- d. Shell variable (user defined and system variables)
- e. System calls, Using system calls
- f. Pipes and Filters
- g. Decision making in Shell Scripts (If else, switch), Loops in shell
- h. Functions
- i. Utility programs (cut, paste, join, tr , uniq utilities)
- j. Pattern matching utility (grep)

Reference Books:

1. Sumitabha, Das, Unix Concepts And Applications, Tata McGraw-Hill Education, 2006
2. Michael Jang RHCSA/ RHCE Red Hat Linux Certification: Exams (Ex200 & Ex300) (Certification Press), 2011
3. Nemeth Synder & Hein, Linux Administration Handbook, Pearson Education, 2nd Edition ,2010
4. W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, Unix Network Programming, The sockets Networking API, Vol. 1, 3rd Edition,2014

Software Lab Based on UNIX/ Linux:

1. Write a shell script to check if the number entered at the command line is prime or not.
2. Write a shell script to modify `—cal` command to display calendars of the specified months.
3. Write a shell script to modify `—cal` command to display calendars of the specified range of months.
4. Write a shell script to accept a login name. If not a valid login name display message `—Entered login name is invalidl.`
5. Write a shell script to display date in the `mm/dd/yy` format.
6. Write a shell script to display on the screen sorted output of `—who` command along with the total number of users .
7. Write a shell script to display the multiplication table any number,
8. Write a shell script to compare two files and if found equal asks the user to delete the

duplicate file.

9. Write a shell script to find the sum of digits of a given number.
10. Write a shell script to merge the contents of three files, sort the contents and then display them page by page.
11. Write a shell script to find the LCD (least common divisor) of two numbers.
12. Write a shell script to perform the tasks of basic calculator.
13. Write a shell script to find the power of a given number.
14. Write a shell script to find the binomial coefficient $C(n, x)$.
15. Write a shell script to find the permutation $P(n, x)$.
16. Write a shell script to find the greatest number among the three numbers.
17. Write a shell script to find the factorial of a given number.
18. Write a shell script to check whether the number is Armstrong or not.
19. Write a shell script to check whether the file have all the permissions or not.

7 Programming with VB(SEC-4): THEORY: 15L

Course Learning Outcomes: After successful completion of the Course a student will be able to:

- I. List the visual programming concepts.
- II. Explain basic concepts and definitions.
- III. Express constants and arithmetic operations.
- IV. Distinguish variable and data types.
- V. Code visual programs by using Visual Basic work environment.

GUI Environment: Introduction to graphical user interface (GUI), programming language (procedural, object oriented, event driven), the GUI environment, compiling, debugging, and running the programs.

(2L)

Controls : Introduction to controls textboxes, frames, check boxes, option buttons, images, setting borders and styles, the shape control, the line control, working with multiple controls and their properties, designing the user interface, keyboard access, tab controls, default & cancel property, coding for controls.

(4L)

Operations: Data types, constants, named & intrinsic, declaring variables, scope of variables, valfunction, arithmetic operations, formatting data.

(2L)

Decision Making : If statement, comparing strings, compound conditions (and, or, not), nested if statements, case structure, using if statements with option buttons & check boxes, displaying message in message box, testing whether input is valid or not.

(3L)

Forms Handling : Multiple forms creating, adding, removing forms in project, hide, show method, load, unload statement, me keyword, referring to objects on a different forms.

(2L)

Iteration Handling: Do/loops, for/next loops, using msgbox function, using string function.

(2L)

Book Recommended:

Programming in Visual Basic 6.0 by Julia Case Bradley, Anita C. Millispangh (Tata McGraw Hill Edition 2000 (Fourteenth Reprint 2004))

Software Lab Based on Visual Basic: LAB

Practical exercises based on concepts listed in theory using VB.

1. Write a VB application to compute the sum of two variables.
2. Write a VB application to compute the factorial of a number n.
3. Write a VB application to compute the Fibonacci series of a number n.
4. Write a VB application to compute the series of prime numbers till number n.
5. Write a VB application to compute the maximum of three numbers.
6. Write a VB application to compute the sum of odd numbers and even numbers in an array of n integers.
7. Write a VB application to compare the strings.
8. Write a VB application to make a calculator.
9. Write a VB application to choose your hobbies from a list.
10. Write a VB application to illustrate the use of color radio button.
11. Write a VB application to illustrate the use of color scroll bar form.
12. Write a VB application to illustrate the use of color scroll bar label text.
13. Write a VB application to illustrate the use of color text box.
14. Write a VB application to show a timer.