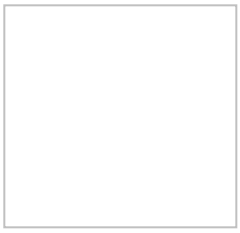
Jharkhand Raksha Shakti University

RANCHI



Syllabus

B.Sc. (Hons.) in Computer Application & Cyber Security

[Duration: Three years]

OVERVIEW OF CURRICULUM

CORECOURSE

Year	Semester	Paper No.	Title of Paper
First	I	BCACS -101	Programming Using C & Data Structure Using C
		BCACS -102	Computer System Architecture
	II	BCACS -201	Object Oriented Programming Using C++
		BCACS -202	Operating System Linux/Unix Programme
Second	III	BCACS -301	Object Oriented Programming Using Java
		BCACS -302	Windows Programming Using VB.Net
		BCACS -303	Computer Network
	IV	BCACS -401	Internet Technology
		BCACS -402	Software Engineering
		BCACS -403	Data Base Management System
Third	V	BCACS -501	Information Security & Cyber Law
		BCACS -502	Data Mining
	VI	BCACS -601	Artificial Intelligence
		BCACS -602	Computer graphics

II. **ELECTIVECOURSE**

A. Discipline Specific	B. Generic Elective/Interdisciplinary
Two each in Semester V and VI. To be chosen from the following-	One each in Semester I, II, III and IV. To be chosen from the following.
BCACS-DSE-1: Web and E-Commerce Technologies	BCACS GE- 1: Mathematics
BCACS-DSE-2: Python Programming	BCACS GE- 2: Physics
BCACS-DSE-3:Network & Information Security	BCACS GE- 3: Discrete Mathematics

BCACS-DSE-4:Cloud Computing BCACS-DSE-5:Cyber Forensics BCACS-DSE-6:Dissertation/Project work (compulsory, Semester VI only)	BCACS GE- 4 Statistical Studies BCACS GE- 5: Online Learning Course of "SWAYAM" or Course offered by any other University

III. **ABILITY ENHANCEMENTCOURSE**

1. Ability Enhancement Compulsory	2. Skill Enhancement Course
Semester I AECC-101: English Communication Skills AECC-102: Environmental Studies Semester II AECC-201: Online Learning Course of "SWAYAM" *The students will have to register themselves in the "SWAYAM" Portal and select a course of their choice. On completion students have to submit '**course completion certificate**'.	One each in Semester III and IV. To be chosen from the following. SEC-101: PHP Programming SEC-202: Programming using MATLAB SEC-301: Online Learning Course of "SWAYAM" or Course offered by any other University

First Year

Semester- 1

Paper Code -BCACS- 101

Programming Using C & Data Structure Using CCredit - 04

Unit 1

1. **Introduction to C**

Introduction to computer programming.Basic structure of a C program.Writing a C program. The compilation and execution process of C program. Building Blocks of C Programs (Keywords, Identifiers, Constants, String, Special Symbols and Operators).

2. **Data Types, Variable, Constants, Operators and Basic I/O**

Data Types in C, Variables, Modifiers, Escape Sequences, Expressions and Operators (Arithmetic, Logical, Assignment, Relational, Bitwise, Special Operators) Un Formatted Input (Reading of Single Character using the functions getc() and getchar()) and output (Writing of single character using the functions () and putchar ()). Formatted input (Reading of different data type values using the function scanf ()) and Output (Writing of different data type values using the function print())

3. **Expressions, Conditional Statements and Iterative Statements**

Expressions, conditional statements and iterative statements. Decision Making and Branching using (Unconditional Branching using goto and Conditional: Two Way Branching using if, if-else, nested if, it-else if ladder and Multi Way Branching using Switch Case). Decision Making and Looping using while (), do-while() and for() Looping construct.

4. **Functions and Arrays**

Function and its need.Implementation of function.Type of functions. Return type of functions. Type of parameters (to be passed) to a function. Function with variable arguments.

Array and its utility, creating and using one/multi dimensional array of primitive data types (Character, integer and floating point). Initialization of array elements (static and dynamic initialization)

5. **Derived Data types (Structures and Unions)**

Limitation of array. Need of derived data types (structure and union). Basic difference between implementation of structure and union.Declaration of structure and union.Accessing data members of structure and union.Initialization of data members of structure and union. Passing and returning structure to/from the function. Nesting of structure.Structure with union as a member.Union with structure as a member.

6. **Data Structure**

Arrays

Single and Multidimensional Arrays (Row Major and Column Major), Sparse Matrices and its representation

Stack

Implementing single/multiple stack/s in an array, Limitation of Array representation of stack, prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another, Application of stack

Queues

Array and Linked representation of Queue, Operation performed on Queue, Operation performed on queue, Cirular Queue and its implementation using array, De-queue, Priority Queue

Linked list

Singly, Doubly and Circular Linked list, Various operations performed on Linked-List

Recursion

Developing Recursive Definition of Simple Problems and their implementation, Types of Recursion, Advantages and Limitations of Recursion, Understanding what goes behind recursion

Tree

Introduction to Tree as a data structure, Binary Tree, Tree Teraversal, Binary Search Tree, various operations performed on Binary Search Tree (Search/Insert/Delete), Threaded Binary Tree, Type of Threaded Binary Tree and its traversal

Searching and Sorting

Linear Search, Binary Search, Comparison of Linear Search and Binary Search, Bubble Sort, Selection Sort, Insertion Sort, Comparison of Sorting Techniques

Hashing

Introduction to Hashing, Perfect Hashing Function, Type of Hash Function (Remainder Method, Mid-Square Method, Folding Method), Hash Collision, Resolving Collision, Resolving Collision (Separate Chaining and open Addressing)

Recommended Books:-

1. Data Structure Using C, Ajay Agarwal, Cyber Tech
2. Data Structure Using C, Radhakrishnan and Shrinivasan, ISTE/EXCEL.
3. C and Data Structures, Radhaganesan, Scitech.
4. Data Structure Using C & C++, Tannenbaum, PHI
5. Data Structures & Program Design in C, 2nd Ed, Kruse, Tondo& Leung, PHI

Semester- 1

Paper Code -BCACS- 101 PR

Programming Using C & Data Structure Using C (Practical) Credit – 02

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+.....
4. WAP to compute the sum of the first n terms of the following series S=1-2+3+4+5.....
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 number less than 100.
7. WAP to compute the factors of a given number.
8. Write a macro that swap 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:
    a. Print the even-valued elements

b. Print the odd-valued elements

c. Calculate and print the sum and average of the elements of array

d. Print the maximum and minimum element of array

e. Remove the duplicates from the array

f. Print the array in reverse order

11. WAP that prints a table indicating the number of occurrences of each alphabet inthe 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 tow strings using strcat function

    d. Compare tow 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

    a. Using recursion

    b. Using iteration

20. WAP to calculate GCD of two numbers

a. With recursion

b. Without recursion.

21. Create Matrix class using templates. Write a menu-driven program to perform following Matrix operations (2-C array implementation):

    a. Sum

    b. Difference

    c. Product

    d. Transpose

22. Create the Person class. Create some objects of this class (by taking information from the user). Inherit the class Person to create two classes Teacher and Student class. Maintain the respective information in the classes and create, display and delete objects of these two classes (Use Runtime Polymorphysm).

23. Create a class Triangle. Include overloaded functions for calculating area. Overload assignment operator and equality operator.

24. Create a class Box containing length, breath and height. Include following methods in it:

    a. Calculate surface Area

    b. Calculate Volume

    c. Increment, Overload ++ operator (both prefix & postfix)

    d. Decrement, Overload ++ operator (both prefix & postfix)

    e. Overload operator = = (to check equality of two boxes), as a friend function

    f. Overload Assignment operator

    g. Check if it is a Cube or cuboid Write a program which takes input from the user for length, breath and height to test the above class.

25. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.

26. Write a program to retrieve the student information from file created in previous question and print it in following format: Roll No. Name Marks

27. Copy the contents of one text file to another file, after removing all whitespaces.

28. Write a function that reverses the elements of an array in place. The function must accept only one pointer value and return void.

29. 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.

30. Program to represent sparse matrix manipulation using arrays.

31. Program to represent Singly Linked List.

32. Program to represent Doubly Linked List.

33. Program to represent Circular Linked List.

34. Polynominal addition using Arrays and Linked List.

35. Program to represent stack operations using array and linked list.

36. Program to represent Queue operations using array and linked list

37. Program for Conversion of infix to postfix.

38. Program for Evaluation of Expressions.

39. Program to represent Binary Tree Traversals.

40. Program to represent Searching procedures (Linear search, Binary Search

41. Program to represent sorting procedures (Selection, Bubble, insertion, Quick, Heap, Merge, Radix, Shell)

42. Program to find the minimum cost spanning tree using Prim's Method.

43. Program to implement 8 Queens Problem.

Semester- 1

Paper Code- BCACS- 102

Computer System ArchitectureCredit - 04

Unit

1. **Introduction**

Basics of computer- Definition, Characteristics, Classification, Parts and block diagram of a digital computer Logic gates- Types of logic gates, basic logic operations, truth tables, Boolean algebra, simplification of Boolean expression by applying Boolean Theorem and Karnaugh Map (K-Map up to 4 variables), Sum of products, product of sums and canonical forms.

2. **Data Representation and Basic Computer Arithmetic**

Number System – Different types of number systems (i.e. Decimal, binary, octal, hexadecimal), conversion of numbers from one Number system to the other, (r-l)'s & r's complement representation, subtraction using r's and (r-l)'s complement, binary arithmetic, signed and usigned numbers.

Code Conversion- BCD (Binary Coded Decimal), Gray Code and ASCII, BCD-to-Binary Conversion, Binary-to-Gray conversion, Gray-to-Binary conversion, Error detection and correction codes (Parity method for error detection and hamming error detection code).

3. **Basic Computer Organization and Design**

Combinational Circuit- Half Adder, Full Adder, Multiplexer, De-multiplexer, Encoder, Decoder.

Sequential Circuits – Flip Flops (SR, D, JK, T, Master Slave), Registers (Registers with parallel load, Shift Registers), Counters (Synchronous and Asynchronous Counters), Structure of a digital machine (VON-Neumann architecture).

4. **Central Processing Unit**

Microprocessors- Definition, Features and Architecture or 8085, microprocessor, Register organization Timing and control unit of 8085, Pin diagram of 8085, Addressing modes of 8085, DMA (Direct Memory Access)

Instruction set- Instruction formats. Classification of 8085, instructions (Data Transfer, Arithmetic, logical and Branch instruction), Types of instructions (Three address, two address, one address and zero address).

5. **Memory Organization**

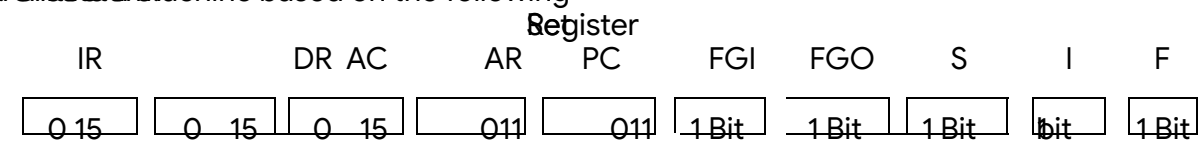
Memory Organization- Concept of Memory Hierarchy Organization, CacheMemory, Semiconductor Memory (RAM and ROM), Magnetic Memory (Magnetic disks i.e. Hard disks and floppy disks, Magnetic tapes, Optical disks), Associative memory

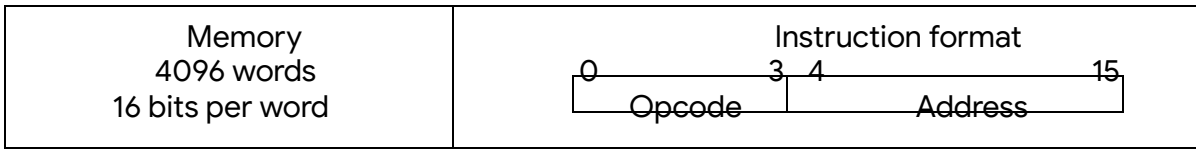
Semester- 1

Paper Code -BCACS- 102 PR

Computer System Architecture(Practical)Credit - 02

1. Create a machine based on the following architecture.





Basic Computer Instructions

Memory Reference			Register Reference		Input-Output	
Symbol	Hex		Symbol	Hex	Symbol	Hex
AND	0xxx		CLA	E800	INP	F80 0
ADD	2xxx		CLE	E400	OUT	F40 0
LDA	4xxx	Direct	CMA	E200	SKI	0
STA	6xxx	Addressing	CME	E100	SKO	F10 0

BUN	8xxx		CIR	E080	ION	F08 0
BSA	Axxx		CIL	E040	IOF	F04 0
ISZ	Cxxx		INC	E020		
AND_I	1xxx		SPA	E010		
ADD_I	3xxx		SNA	E008		
LDA_I	5xxx	Indirect	SZA	E004		
STA_I	7xxx	Addressing	SZE	E002		
BUN_I	9xxx		HLT	E001		
BSA_I	Bxxx					
ISZ_I	Dxxx					

2. Refer to Chapter-5 of Morris Mano for description of instructions.

Create the micro operations and associate with instructions as given in the chapter (except interrupts) Design the register set, memory and the instruction set. Use this machine for the assignments of this section.

3.Create a Fetch routine of the instruction cycle.

4.Simulate the machine to determine the contents of AC, E, PC, AR and IR registers in hexadecimal after..... Execution of each of following register reference instructions:

a. CLA
b. CLE
c. CMA
d. CME
e. CIR
f. CIL
g. INC
h. SPA
i. SNA
j. SZA
k. SZE
l. HLT

Initialize the contents of AC to $(A937)_{16}$, that of PC to $(022)_{16}$ and E to 1.

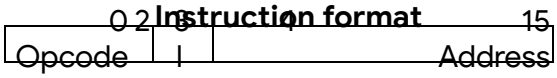
5. Simulate the machine for the following memory-reference instructions with I= 0 and address part = 082. The instruction to be stored at address 022 in RAM. Initialize the memory word at address 082 with the operand B8F2 and AC with A937. Determine the contents of AC, DR, PC, AR and IR in hexadecimal after the execution.

a. ADD
b. AND
c. LDA
d. BUN
e. BSA
f. JSZ
g. STA

6.Simulate the machine for the memory-reference instructions referred in above question with I= 1 and address part = 082. The instruction to be stored at address 026 in RAM. Initialize the memory word at address 082 with the value 298. Initialize the memory word at address 298 with operand B8F2 and AC with A937. Determine the contents of AC, DR, PC, AR and IR in hexadecimal after the execution.

7.Modify the machine created in Practical 1 according to the following instruction format:

Instruction format



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a. The instruction format contains a 3-bit opcode, a 1-bit addressing mode and a 12-bit address. There are only two addressing modes, I = 0 (direct addressing) and I = 1 (indirect addressing).

b. Create a new register I of 1 bit.

c. Create two new microinstructions as follows :

i. Check the opcode of instruction to determine type of instruction (Memory Reference/Register Reference/Input-Output) and then jump accordingly.

ii. Check the I bit to determine the addressing mode and then jump accordingly.

Semester- II

Paper Code –BCACS-201

Object Oriented Programming using C++Credit-04

Unit

1. Introduction of Object oriented Programming Concept. Benefits of Object oriented Programming.

2. Features of Object Oriented Programming (Data Hiding, Classes and Objects, Encapsulation and Abstractions, Polymorphism and Inheritances).

3. Class and Object. Access Specification (Private, Protected and Public). Default Visibility Mode. Member Method Definition (Inside Class Definition and Outside Class Definition). Declaration of Object as an instance of class. An array of type class. Objects as an argument to a function (pass by value and pass by reference). Function having return type as class type. Friend Function. Constructors and its type. Constructor Overloading. Destructor.

4. Inheritance (Single, Multiple, Multilevel, Hierarchical and Hybrid). Defining derived class. Visibility Modes (Private, Protected, Public). Ambiguity in MultipleInheritance. Inheritance and Access Control. Nested Class (Containership). Virtual base Class. Virtual Function. Calling a Virtual Function through a base class reference. Pure Virtual Function. Abstract and Concrete Class.

5. Polymorphism (Compile Time (Operator Overloading and Function Overloading) and Run Time).

6. Generic Function. Need of Template. Defining Template Class. Normal Function Template. Function Template with Multiple Arguments. Overloading of Template Functions. Class Template with Overloaded Operators. Class Template and Inheritance. Exception Handling.

7. Exception Mechanism (The keywords try, throw and catch). Throwing an Exception from a function outside the try-block. Localizing a try-block to a function. Multiple catch blocks. Catching class types. Handling derived class exceptions. Catching all/multiple exceptions. Rethrowing Exception. Restricting (Specifying) Exceptions. Taking care of uncaught exceptions (by) using the methods terminated(), unexpected(), set_terminate() and uncaught_exception()).

8. Manipulators (Predefined (Setw(), Setbase, setprecision(), setfill(), Setiosflags(), resetiosflags(), endl, skipwsnoskipws, ends, flush, lock, ws, hex, dec, oct) and User Defined). Input and Output in C++

9. Streams in C++, Predefined Streams. Unformatted Input Functions with cin Object. Unformatted Output Functions with cout Object. IOS class functions (width(), precision(), fill(), setf() and unsetf()) and flags (left, right, internal, scientific, fixed, dec, oct, hex) and bitfields (adjustfield, floatfield, basefield).

Semester- II

Paper Code –BCACS-201 PR

Object Oriented Programming using C++(Practical)**Credit-02**

Unit

1. WAPC++ to design a class Student having member variables as

Student_Roll

Student_Name

Declare them in the public section and initialize them using object of the class Student

a. Compile time initialization

b. Run time initialization

2. WAPC++ to design a class Student having members as

Variables:

Student_Roll

Student_Name

Methods:

Void read()

Void write()

Declare member variables in private section and member methods in public section. Read and Write values to and from the member variable using object of class Student.

3. WAPC++ to implement the solution of assignment question 2 by declaring

a. Global Object

b. Local Object

4. WAPC++ to initialize the member variables declared in assignment question 2 using default constructer.

5. WAPC++ to initialize the member variables declared in assignment question 2 using parameterized constructer.

6. WAPC++ to initialize the member variables declared in assignment question 2 using parameterized constructer and constructor overloading.

7. WAPC++ to overload the member methods.

8. WAPC++ to overload the unary operator+.

9. WAPC++ to overload the unary operator-

10. WAPC++ to overload the binary operator+

11. WAPC++ overload the binary operator-.

12. WAPC++ to implement the idea of single inheritance with following constraints

a. Member Variable(s) to be declared in private section

b. Member Methods for input and output operations to be declared in public section.

c. Member methods for non input and output operations to be declared in non public section

d. Mode of inheritance has to be

i.Public

ii.Private

iii.Protected

13. WAPC++ to implement the idea of multiple inheritance with following constraints

a. Member Variable(s) to be declared in private section

b. Member Methods for input and output operations to be declared in public section.

c. Member methods for non input and output operations to be declared in non public section

d. Mode of inheritance has to be

i.Public

ii.Private

iii.Protected

14. WAPC++ to resolve the ambiguity if arises due to the presence of same member identification in multiple base classes.

15. WAPC++to implement the idea of hierarchical inheritance with following constraints

a. Member Variable(s) to be declared in private section

b. Member Methods for input and output operations to be declared in public section.

c. Member methods for non input and output operations to be declared in non public section

d. Mode of inheritance has to be

i.Public

ii.Private

iii.Protected

16. WAPC++to implement the idea of multi level inheritance with following constraints

a.Member Variable(s) to be declared in private section

b.Member Methods for input and output operations to be declared in public section.

c.Member methods for non input and output operations to be declared in non public section

d.Mode of inheritance has to be

i.Public

ii.Private

iii.Protected

17. WAPC++ to implement the idea of hybrid inheritance with following constraints

a. Member Variable(s) to be declared in private section

b. Member Methods for input and output operations to be declared in public section.

c. Member methods for non input and output operations to be declared in non public section

d. Mode of inheritance has to be

i.Public

ii.Private

iii.Protected

Resolve the ambiguity coming out due to multi path inheritance.

18. WAPC++ to show the order of execution of constructors in case of multiple inheritance.

19. WAPC++ to access the member variables of class using non member function (friend) of the class.

20. WAPC++ to show the concept of nesting of class (containership).

21. WAPC++ to display unformatted I/O using the objects cin and cout.

22. WAPC++ to display unformatted I/O using library member functions

a. Get()

b. Put()

c. Getline()

d. Write()

23. WAPC++ to display formatted I/O using manipulators like

a. Setw()

b. Setprecision()

c. Setfill()

24. WAPC++ to display formatted I/O using ios member functions like

a. Width()

b. Precision()

c. Fill()

25. WAPC++ to show the use of pointer variable and an address of operator.

26. WAPC++ to show the use of address operator address operator & and indirection operator

27. WAPC++ to show the use of array of pointers.

28. WAPC++ to show the use of operators like “new” and “delete”.

29. WAPC++ to show the use of pointer to an array.

30. WAPC++ to show the use of pointer to String.

31. WAPC++ to show the use of pointers to pointers.

32. WAPC++ to pass values as arguments to the called function.

33. WAPC++ to pass alias (reference) as arguments to the called function.

34. WAPC++ to pass objects as arguments to the function and return objects.

35. WAPC++ to pass pointers as arguments to the called function.

36. WAPC++ to access the member variables of an object using pointer to the object.

37. WAPC++ to show the use of array of pointers to objects.

38. WAPC++ to implement the concept of self referencing pointers in context of class.

39. WAPC++ to show the use to of “this” pointer.

40. WAPC++ to show the use of pointer to base class object to be the pointer to the derived class objects.

41. WAPC ++ to implement the concept of polymorphism

a. Compile Time

b. Runtime

42. WAPC++ to implement the idea of virtual WAPC++ to show the use of Abstract Data Type.

43. WAPC++ to show the use of Abstract Data Type.

44. WAPC++ to open a file called studentinfo.txt.in write mode, read a record (data values like name and age) of student and write is in the file.

45. WAPC++ to open a file called studentinfo.txt.in append mode, read a record (data values like name and age) of student and append is in the file.

46. WAPC++ to open the file called studentinfo.txt.in read mode, read the contents and display the data onto monitor.

47. WAPC++ to open the file studentin.txtin read mode and studentout.txt in wirte mode, read the contents of the file studentin.txt and write them in the file studentout.txt.

48. WAPC++ to open the file studentin.txt in read mode and studentout.txt in append mode, read the contents of the file studentin.txt and append them in the file studentout.txt.

49. WAPC++ to add two more records in the file "studentinfo.txt".

50. WAPC++ to invoke a function that generates exceptions.

51. WAPC++ to catch an exception.

52. WAPC++ to catch multiple exceptions.

53. WAPC++ to catch all exceptions.

54. WAPC++ to throw an exception.

Semester- II

Paper Code –BCACS-202

Operating System and Unix/Linux ProgrammingCredit-04

Unit

1. **Introduction to Operating System**

Introduction to operating system.Basic functions of Operating System. Simple Batch, Systems, Multi Programmed Batch Systems, Time-Sharing Systems, Parallel System, Distributed systems, Real-Time Systems. Computer System Structure – Computer System Operation, I/O Structure (I/O Interrupts and DMA Structure) Storage Structue, Storage Hierarchy and Hardware Protection (Dual Mode Operation, I/O Protection, Memory Protection and CPU protection).

2. **Operating System Structure**

System Components (Process Management, Main Memory Management, File Management, I/O System Management, Secondary Storage Management, Networking, Protection System and Command interpreter system), Operating System Services (Program Execution, I/O Operations, File System Manipulation, Communication and Error detection).

3. **Process**

Process Concept (Process, Process State, Process Control Blocks), Process Scheduling (Scheduling Queues, Schedulers and Context Switching) Operations of Processes (Process Creation and Process Termination), inter process communication (Information Sharing, Computation Speedups, Modularity and Convenience), Thread (Thread Structure) and difference between Thread and Process.

4. **CPU Scheduling**

CPU scheduling (CPU-I/O Burst Cycle, CPU Scheduler, Types of Scheduling (Pre-emptive and Non-Pre-Emptive Scheduling and Dispatcher), Scheduling Criteria (CPU Utilization, Throughput, Turnaround Time, Waiting Time and Response Time), Scheduling Algorithms (First Come First Served Scheduling, Shortest

Job First Scheduling, Priority Scheduling, Round Robin Scheduling, Multi Level Queue Scheduling Multi Level Feedback Queue Scheduling.

5. **Memory**

Memory Management (Address Binding (Compile Time, Load Time and Execution Time), Dynamic Loading, Dynamic Linking and Overlays).Comparison between Logical and Physical Address Space.Swapping. Contiguous Allocation (Single Partition Allocation, Multiple Partition Allocation and External and Internal Fragmentation), Paging (Idea of Paging, Page Table Structure, Multi Level Paging, Inverted page Table and Shared Pages), Segmentation (idea of segmentation, Hardware Support, Implementation of Segment Tables, Protection and sharing and Fragmentation).

Virtual memory (Idea of Virtual Memory, Demand Paging, Page Replacement, Page Replacement Algorithms (First In First Out Algorithm and Least Recently Used Algorithm).

6. **File**

File (Idea of File, File Attributes, File Operations, File Types and File Structure), File System Structure (File System Organization, File Allocation Methods (Contiguous Allocation, Liked Allocation, Indexed Allocation), Free Space Management (Bit Vector, Linked List, Grouping and Counting).

7. **Introduction**

 What is linux/unix operating systems

 Difference between linux/unix and other operating systems

 Features and Architecture

 Various Distributions available in the market

 Installation, Booting and shutdown process

 System processes (an overview)

 External and internal commands

 Creation of partitions in OS

 Processes and its creation phases- Fork, Exec, wait

8. User Management and the File System

 Types of Users, Creating users, Granting rights

 User management commands

 File quota and various file systems available

 File System Management and Layout, File permissions

 Login process, Managing Disk Quotas

 Links (hard links, symbolic links)

9. Shell introduction and shell Scripting

 What is shell and various type of shell, various editors present in linux

 Different modes of operation in vi editor

 What is shell script, writing and executing the shell script

 Shell variable (user defined and system variables)

 System calls, Using system calls

 Pipe and Filters

 Decision making in shell Scripts (if else, switch), Loops in shell

 Functions

 Utility programs (cut, paste, join, tr, uniq utilities)

 Pattern matching utility (grep)

Semester- II

Paper Code –BCACS-202 PR

Operating System and Unix/Linux Programming (Practical)Credit-02

Unit

1. DOS Commands.

2. Batch Files Creation and Execution.

3. Write a C/C++ program to copy files using system calls.

4. Write a C/C++ program to implement FCFS scheduling algorithm.

5. Write a C/C++ program to implement Round Robin scheduling algorithm.

6. Write a C/C++ program to implement SJF scheduling algorithm.

7. Write a C/C++ program to implement non-preemptive priority based scheduling algorithm.

8. Write a C/C++ program to implement preemptive priority based scheduling algorithm.

9. Write a C/C++ program to implement SRJF scheduling algorithm.

10. Write a C/C++ program to calculate sum of n number using thread library.

11. Write a C/C++ program to implement first-fit, best-fit and worst-fit allocation strategies.

12. Write a shell script to check if the number entered at the command line is prime or not.

13. Write a shell script to modify- cal command to display calendars of the specified months.

14. Write a shell script to modify- cal command to display calendars of the specified range of months.

15. Write a shell script to accept a login name if not a valid login name display message entered login name is invalid.

16. Write a shell script to display date in the mm/dd/yy format.

17. Write a shell script to display on the screen sorted output of –who command along with the total number of users.

18. Write a shell script to display the multiplication table any number,

19. Write a shell script to compare two files and if found equal asks the user to delete the duplicate file.

20. Write a shell script to find the sum of digits of a given number.

21. Write a shell script to merge the contents of three files, sort the contents and then display them page by page.

22. Write a shell script to find the LCD (least common divisor) of two numbers.

23. Write a shell script to perform the tasks of basic calculator.

24. Write a shell script to find the power of a given number.

25. Write a shell script to find the binomial coefficient C(n,x)

26. Write a shell script to find the permutation P(n,x)

27. Write a shell script to find the greatest number among the three numbers.

28. Write a shell script to find the factorial of a given number.

29. Write a shell script to check whether the number is Armstrong or not.

30. Write a shell script to check whether the file have all the permissions or not. 20. Program to show the pyramid of special character -*

Second Year

Semester- III

Course Code- BCACS-301

Object oriented Programming Using Java Credit-04

Unit Contents

1. **Introduction to Java**

Java Architecture and Features, Understanding the semantic and syntax differences between C++ and Java, Compiling and Executing a java Program, Variables, Constants, Keywords Data Types, Operators (Arithmetic, Logical and Bitwise) and Expressions, Comments, Doing Basic Program Output, Decision Making Constructs (conditional statements and loops) and Nesting, Java Methods (Defining, Scope, Passing and Returning Arguments, Type Conversion and Type and Checking, Built-in java Class Methods).

2. **Arrays, Strings and I/O**

Creating & Using Arrays (One Dimension and Multi- dimensional), Referencing Arrays Dynamically, Java Strings: The Java String class Creating & Using String Objects, Manipulating Strings String Immutability & Equality, Passing String To & From Methods, String Buffer Classes. Simple I/O using System.Out and the Scanner class, Bytes and Character streams, Reading/Writing from console and files.

3. **Object-Oriented Programming Overview**

Principles of Object-Oriented Programming, Defining & Using Classes, Controlling Access to Class Members, Class Constructors, Method Overloading Class Variables & Methods, Objects as parameters, final classes, Object class, Garbage Collection.

4. **Inheritance, Interfaces, Packages, Enumerations, Autoboxing and Metadata**

Inheritance: (Single Level and Multilevel, Method Overriding, Dynamic Method Dispatch, Abstract Classes), Interfaces and Packages, Extending interfaces and packages, Package and Class Visibility, Using Standard Java Packages (unit, lang, io, net), Wrapper Classes, Autoboxing /Unboxing, Enumerations and Metadata.

5. **Exception Handling, Threading, Networking and Database Connectivity**

Exception types, uncaught exceptions, throw, built-in exceptions, Creating your own exceptions; Multi-threading: The Thread class and Runnable interface, creating single and multiple threads, Thread prioritization, synchronization and communication, suspending/resuming threads. Using java.net package, Overview of TCP/IP and Datagram programming. Accessing and manipulating databases using JDBC.

6. **Applets and Event Handling**

Java Applets: Introduction to Applets, Writing

Java Applets, Working with Graphics, Incorporating Images & Sounds.Event Handling Mechanisms, Listener Interfaces, Adapter and Inner Classes.The design and Implementation of GUI using the AWT CONTROLS, Swing components of java Foundation Classes such as labels, buttons, textfields. layout managers, menus, events and listeners; Graphic objects for drawing figures such as Lines , rectangles, ovals, using different fonts. Overview of servlets.

Semester-III

Course Code-BCACS-301-PR

Object Oriented Programming using Java (Practical)Credit-02

Sl. No. Programs

1. To find the sum of any number of integers entered as command line arguments.

2. To find the factorial of a given number.

3. To learn use of single dimensional array by defining the array dynamically

4. To learn use of length in case of a two dimensional array.

5. To convert a decimal to binary number.

6. To check if a number is prime or not, by taking the number as input from the keyboard.

7. To find the sum of any number of integers interactively, i.e., entering every number from the keyboard, whereas the total number of integers is given as a command line arguments.

8. Write a program that show working of different functions of String and String Buffer class like set Chart AT (,Set Length(), append(), insert(), concat() and equals().

9. Write a program to create a- distance class with methods where distance is computed in terms of feet and inches, how to create objects of a class and to see the use of this pointer.

10. Modify the- distance class by creating constructor for assigning values (feet and inches) to the distance object. Create another objects and assign second object as reference variable to another object reference variable. Further create a third object which is a clone of the first object.

11. Write a program to show that during function overloading, if no matching argument is found, then java will apply automatic type conversions (from lower to higher data type).

12. Write a program to show the difference between public and private access specifiers. The program should also show that primitive data types are passed by value and objects are passed by reference and to learn use of final keyword.

13. Write a program to show the use of static functions and to pass variable length arguments in a function.

14. Write a program to demonstrate the concept of boxing and unboxing.

15. Create a multi-file program where in one file a string message is taken as input from the user and the function to display the message on the screen is given in another file (make use of Scanner package in this program).

16. Write a program to create a multilevel package and also creates a reusable class to generate Fibonacci series, where the function to generate Fibonacci series is given in a different file belonging to this package.

17. Write a program that creates illustrates different levels of protection in classes/subclasses belonging to same package or different packages

18. Write a program- Divide by Zero that takes two numbers a and b as input, computers a/b, and invokes Arithmetic Exception to generate a message when the denominator is zero.

19. Write a program to show the use of nested try statement that emphasizes the sequence of checking for catch handler statements.

20. Write a program to create your own exception types to handle situation specific to your application (Hint: Define a subclass of Exception which itself is a subclass of Throwable).

21. Write a program to demonstrate priorities among multiple threads.

22. Write a program to demonstrate multithread communication by implementing synchronization among threads (hint: you can implement a simple producer and consumer problem).

23. Write a program to create URL object, create a URL Connection using the open connection() method and then use it examine the different components of the URL and content.

24. Write a program to implement a simple datagram client and serve in which a message that is typed into the server window is sent to the client side where it is displayed.

25. Write a program that creates a Banner and then creates a thread to scrolls the message in the banner from left to right across the applet's window.

26. Write a program to get the URL/Location of code (i.e. java code) and document (i.e. html file).

27. Write a program to demonstrate different mouse handling events like mouse Clicked (), mouse Entered (), mouse Exited (), mouse Pressed, mouse Released () and mouse Dragged ().

28. Write a program to demonstrate different keyword handling events.

29. Write a program to generate a window without an applet window using main () function.

30. Write a program to demonstrate the use of push buttons.

Semester- III

Course Code- BCACS-302

Window Programming Using Visual Basic. Net Credit-04

Unit Contents

1. **Introduction to VB.NET**

Event Driven Programming

.Net as better Programming Platform

.Net Framework

Net Architecture

The Just-In-Time Compiler

.Net Framework class library introduction

2. **VB.NET Development Environment**

Applications

Building Projects

Using simple components

Running VB.NET applications

3. **Mastering VB Language**

Data , Operators, Conditionals and Loops.

Procedures, Error Handling, Classes and Objects.

4. **Windows Applications in VB.NET**

Window Forms

Text Boxes, Buttons, Labels, Check Boxes, and Radio Buttons.

List Boxes, Combo Boxes. Picture Boxes, Scrollbars, Splitters, Timer

Menus, Built-in Dialogs

Image List, Tree Views, List Views, Toolbars, Status Bar and Progress bars.

5. **Object Oriented Programming in VB.NET**

Class and Object

Properties, methods and events.

Constructors and Destructors

Method overloading

Inheritance

Access modifiers : Public, Private, Protected, friend.

Overloading and Overriding.

Interfaces

Polymorphism

6. **File handling**

File handling using FileStream, StreamWriter, StreamReader, BinaryReader, BinaryWriter classes.

File and Directory Classes

7. **Databases in VB .NET**

Database : Connections, Data adapters, and datasets, data Reader,

Connection to database with server explorer

Multiple Table Connection

Data binding with controls like Text Boxes, List Boxes, Data Grid etc.

Navigation data source

Data Grid View, Data form wizard

Data validation

Connection Objects, Command Objects, Data Adapters, Dataset Class

8. **Crystal Report**

Connection to Database, table, Queries, Building Report, Modifying Report,

Formatting Field and Object

Header, Footer, Details, Group Header, Group footer, Summery

Working with formula fields, Parameter fields, Group, Special fields

Working with Multiple Tables, SQL in Crystal Report, Report Temples

Recommended Books:

SL. No. Book Name

1. Visual Basic .NET Programming Block Book, Steven Holzner, Dreamtech Press
2. Professional Vb.Net 2003, Bill Evjen, Willey Dreamtech Press.

Semester- III

Course Code- BCACS-302 PR

Windows Programming using Visual Basic.Net (Practical) Credit-02

SL. No. Program

1. Introduction to Visual Basic. Net
2. User Interface Design
3. Variables, Constants and Calculations

4. Decision making, Looping

5. Arrays

6. Forms and Controls, MDI Forms, Common Dialog Boxes

7. Sub Procedures, Functions

8. Parameter passing by value and by reference

9. Thread/Time slicing related programs.

10. Class/Interface based programming (Object Oriented Programs)

11. Inheritance / Polymorphism

12. Database connectivity.

13. Saving Data and Objects in Files

14. Web Forms

Semester-III

Course Code- BCACS-303

Computer NetworksCredit-04

Unit

1. **Introduction to Computer Networks**

Network definition; Advantages and Disadvantages of Computer Networks, network topologies; BUS, RING, STAR, MESH, TREE and HYBRID Topologies, Distribution Processing, Network Criteria, Network Models, Purpose of Layered Network Architecture , Overiew of OSI and TCP/IP Reference Models, Network addressing: Physical, Logical and Port Address.

2. **Data Communication Fundamentals and Techniques**

Analog and digital signal, Sine Waves, Wavelength, Composite Singles, Digital to Digital Line Coding Schemes, Uni-polar NRZ, RZ, bi-polar AMI, Bi-phase Manchester and Differential Manchester Encoding, Synchronous and Asynchronous Transmission, Digital to Analog Conversion: Amplitude Shift Keying, Frequency Shift Keying and Phase Shift Keying, Analog to Analog Conversion: Amplitude Modulation, Frequency Modulation, Frequency Modulation and Phase Modulation, Bandwidth and its utilization, Multiplexing and its types, TDM, FDM and WDM. Guided and Unguided transmission media.

Data-rate limits; digital to digital line encoding schemes; pulse code modulation; parallel and serial transmission; digital to analog modulation-; multiplexing techniques- FDM, TDM; transmission media.

3. **Networks Switching Techniques and Access mechanisms**

Circuit Switching, Structure of Circuit Switches, Datagram Switching, Routing Tables, Addressing in virtual Circuit Network, Comparison between Connection Oriented and Connection less transmission.

Circuit Switches; packet switching- connectionless datagram switching, connection- oriented virtual circuit switching; dial-up modems; digital subscriber line; cable TV for data transfer.

4. **Data Link Layer Functions and Protocol**

Errors in communication, Types of Errors, Error detection and correction, Parity Check, Hamming distance, CRC, Checksum, Flow and Error Control, Noiseless Channels: Simplest Protocol, Stop and Wait Protocol, Noisy Channels: Stops and Wait ARQ, GO BACK N ARQ, HDLC, Configuration and Transfer modules in HDLC.

Error detection and error correction techniques; data-link control- farming and flow control; error recovery protocols- stop and wait ARQ, go-back-n ARQ; Point to point protocol on Internet.

5. **Multiple Access Protocol and Networks**

ALOHA Network, CSMA, CSMA with Collision Detection and with Collision Avoidance (CSMA/CD, CSMA/CA), Channelization and Farming Concepts, Code Division Multiple Access(CDMA), Introduction to networking security, Cryptography, Symmetric and Asymmetric Key Cryptography, Traditional Ciphers, Substitution & Rearrangement Concepts, Simple Modern Ciphers, Overview of Steganography.

CSMA/CD protocols; Ethernet LANS; connecting LAN and back-bone networks- repeaters, hubs switches, bridges, router and gateways;

6. **Networks Layer Functions and Protocols**

Routing Concepts, Types of Routing, Flood based Routing Techniques, Dijkstras Shortest Path Algorithm, Introduction to IP Addressing, Classful and Classless Addressing structures, Network Congestion and Associated Concepts, Open and Closed loop congestion control, Traffic Shaping, Leaky Bucket Algorithm, Overview of DNS.

Routing; routing algorithms; network layer protocol of Internet- IP protocol, Internet control protocols.

7. **Transport Layer Function and Protocols**

Transport services- error and flow control, Connection establishment and release- three way handshake;

8. **Overview of Application layer protocol**

Overview of DNS protocol; overview of WWW & HTTP Protocol.

Recommended Books:

SL. No. Book Name

1. B. A. Forouzan: Data Communications and Networking, Fourth edition, THM Publishing Company Ltd 2007.

2. A. S. Tanenbaum: Computer Networks, Fourth edition, PHI Pvt. Ltd 2002.

Semester-III

Course Code- BCACS-303 PR

Computer Networks (Practical)Credit-02

SL. No. Programs

1. Simulate Cyclic Redundancy Check (CRC) error detection algorithm for noisy channel.

2. Simulate and implement stop and wait protocol for noisy channel.

3. Simulate and implement go back n sliding widow protocol.

4. Simulate and implement selective repeat sliding window protocol.

5. Simulate and implement distance vector routing algorithm

6. Simulate and implement Dijkstra algorithm for shortest path routing.

Semester-IV

Course Code- BCACS-401

Internet technologiesCredit-04

1. **Internet**

What is Internet? Evaluation and history of internet, internet services and resources, internet service provider, internet addressing (Domain names and IP addresses), resource Addressing (URL), Advantages of Internet, TCP/IP,

Type of internet connections (Dial-up connection, ISDN, ADSL, Leased Line connections, Satellite connections).

Services on Internet-E-Mail, WWW, Telnet, FTP, IRC and Search Engine

Web Browser, Web Server, HTTP (Hypertext Transfer Protocol), MIME (Multipurpose Internet Mail Extension).

Internet Security Management- Overview of Internet Security, Firewalls, Internet Security, Management Concepts and Information Privacy and Copyright issues

2. **Java Script**

Overview of Javascript, Advantages of Javascript, Basic Programming Techniques, Operators and Expressions, Simple programs on Javascript (for ex. Finding factorial, Fibonacci, power etc.) String properties and methods, Date objects, Screen output and Keyboard input (confirm, prompt, alert), Simple concept of arrays, functions in Javascript (writing programs using functions), Javascript document object model (DOM), Javascript object hierarchy model, Hostory objects, Events Handling.

3. **JDBC**

What is JDBC? JDBC Architecture, JDBC Components, JDBC Environment Setup, Type of JDBC drivers, JDBC Establishing Connectivity and working with connection interface, JDBC Database Connection, JDBC-Statements, Prepared Statement and Callable Statement, JDBC Result Sets, JDBC Transactions (Commit, Rollback and Save points).

4. JSP

What are Java Server Pages (JSP), HTTP and Servlet Basics, The Problem with servlets, JSP-Environment Setup, JSP-Architecture, JSP Processing, JSP Life Cycle, JSP Scriptlet, JSP Declarations, JSP Expression, JSP Comments, JSP Directives, JSP Actions, JSP Implicit Objects, JSP Control-Flow statements (Decision Making and Loop), JSP Operators, JSP Directives, Placing JSP in the web Server, JSP-Client request.

Semester-IV

Course Code- BCACS-401-PR

Internet Technologies (Practical) Credit-02

Unit

1. Write a javascript to find the largest of three numbers.

2. Write a javascript to find the factorial of a number.

3. Write a javascript to check whether the number is prime or not.

4. Write a javascript to check whether the number is Armstrong or not.

5. Write a javascript to input a number and then display in words. For ex. 123 should be displayed as one two three

6. Write a javascript to demonstrate Math objects.

7. Write a javascript to find factorial of a number using function.

8. Write a javascript to generate the Fibonacci series.

9. Write a javascript to find largest number in an array using function.

10. Write a javascript to demonstrate String properties and methods.

11. Write a javascript to demonstrate event handling.

12. Write a javascript to demonstrate history object.

Execute the following JSP programs. Make the use of Tomcat Server wherever needed.

1. Write a JSP program to display “Hello World.”

2. Write a JSP program to find the sum of two numbers.

3. Write a JSP program to print even numbers.

4. Write a JSP program to print even numbers.

5. Write a JSP program to generate Fibonacci series.

6. Write a JSP program to enter value between 0 and 6. Now display the weekday according to the value ie. Sunday for “0”, Monday for “1” and so on. Make the use of Switch-case.

7. Write a JSP program to create a string using the JSP. Save it in a folder inside the Tomcat directory. Finally run it using the Tomcat server.

8. Write a JSP program for printing “Hello World” for a specified number of times “say n” on the web browser. The value of n should be entered through the browser and then submitted to the server. Now the web server should execute JSP code and should with an HTML page displaying “Hello World” n number of times on the Web Browser.

9. Write a JSP program to accept the value of n and print number from 1 to n. the values of n should be entered in a jsp and the program should be saved under the Tomcat director. Finally the Tomcat server is executed to display the output.

10. Write a JSP program for displaying the text “JSP Programming” in font-size ranging 1 to 10 and with font.color “green”.

11. Write a JSP program using <jsp:include> directive of Action to display today's date and time. Include two jsp files for ex. "main.jsp" and "date.jsp". Embed date.jsp inside the mian.jsp using the <jsp:include> directive.

12. Write a JSP program using <jsp:forward> directive of Action to display today's date and time.

Include two jsp file ex. "main.jsp" and "date.jsp" . Embed dat.jsp inside the main.jsp using the <jsp:forward> directive.

Notice and write the difference between the output of prog no. 11 and prog no. 12.

Execute the following JDBC programs. Make use of JDBC driver.

1. Write a JDBC program to retrieve the data for a table using the "Select" command.
2. Write a JDBC program to insert data into a specified table.
3. Write a JDBC program to insert data into a specified table using "Prepared Statement".
4. Write a JDBC program to demonstrate the use of "ResultSet" interface.
5. Write a JDBC program to create a table.
6. Write a JDBC program to drop a table.

Semester-IV

Course Code-BCACS-402

Software EngineeringCredit-04

1. **Introduction to Software Engineering**

Introduction to software.Qualities of good software.Introduction to software engineering.Components of software engineering.Software development models.Comparative analysis of software Development Life Cycle.

2. **Software Estimation (Size, effort and cost)**

Software metrics.Metrics Database (process metrics, documentation, line of code, reviews, quality metrics).Software size estimation (Function Point Analysis and Makers II Function Point Analysis).

Estimation of effort and schedule

Impact of risk estimation on effort and time.Impact of schedule and manpower constraints. Delphi Cost Estimation Technique, expert judgement COCOMO model, Application Suite Model. COCOMO II model.

Software cost estimation (personal cost, hardware cost, software cost, training cost, marketing cost, outsourcing cost etc).

3. **Software Risk Management**

   Introduction to software risk.Types of risk.Nature of risk.Software risk management Risk mitigation management.

   Software Reliability

4. **Software Engineering Tools**

Modeling, Analysis, Requirement Engineering, Work Breakdown Structure, Work Breakdown Structure Scheduling, Prototyping, CASE, 1-CASE.

5. **System Analysis**

Introduction and types of System.Principles of System Development.Organization as a System.Measurement of System Performance.System control.System Modeling.Structured System Analysis. Understanding the system environment (organization., business, management and system). Software Requirement Specification.Information Systems (input, process, output, store and control).

6. **System Design**

Introduction to system design. The modelling of user requirement using System Decomposition and Modeling, Work Flow Diagram, Data Flow Diagram, Entity Relationship Diagram and System Flow Charts. Converting E-R Diagram to Relational Tables.

7. **User Interface Design**

Introduction to user interface.Dimensions of User Interface Design.Types of User Interface.Reaports.User Interface Analysis and Design.

8. **Software Project Management**

Introduction to Software Product Management.Project Management Cycle (inception elaboration, construction and transition). Factors affecting Project Management like people, product (software), process and project. Project Management Keys (scope, time, cost, risk, quality, human resource, communication, procurement and integration).

9. **Software testing (8)**

Introduction to software testing.Software testing needs and goals. Testing paths (non- execution based testing and execution based testing. White Box Testing and Black Box Testing, Non execution based testing like walkthrough and review. Execution Based Testing. Tree Structure of Testing.Functional Testing (Unit testing and Integration testing), System testing (Alpha and Beta testing and runtime operations testing) and User Satisfaction Testing.

Recommended Books:

SL. No. Book Name

1. R.S. Pressman, Software Engineering: A Practitioner's Approach (7th Edition), McGraw-Hill, 2009.

2. P.Jalote, AnIntergrated Approach to Software Engineering (2nd Edition), Narosa Publishing House, 2003.

3. K.K. Aggarwal and Y.Singh, Software Engineering (revised 2nd Edition), New Age International Publishers, 2008.

4. I. Sommerville, Software Engineering (8th edition), Addison Wesle, 2006.

5. D. Bell, Software Engineering for Students (4th Edition), Addison-Wesley, 2005.

6. R. Mall, Fundamentals of Software Engineering (2nd Edition), Prentice-Hall of India, 2004.

Semester-IV

Course Code-BCACS-402-PR

Software Engineering (Practical) Credit-02

Unit

1. Problem Statement

Process Model

2. Requirement Analysis
   - Creating a Data Flow
   - Data Dictionary, Use Case
3. Project Management
   - Computing FP
   - Effort
   - Schedule, Risk Table, Time Line chart
4. Design Engineering
   - Architectural Design
   - Data Design, Component Level Design
5. Testing
   - Basis Path Testing

SL. No. Project

1. Criminal Records Management: Implement a criminal record management system forjailers, police officers and CBI officers
2. DTC Route Information: Online information about the bus routes and their frequency and fares.
3. Car Pooling: To maintain a web based intranet application that enables the corporate employees within an organization to avail the facility of carpooling effectively.
4. Patient Appointment and Prescription Management System
5. Organized Retail Shopping Management Software
6. Online Hotel Reservation Service System
7. Examination and Result computation system

8. Automatic Internal Assessment System

9. Parking Allocation System

10. Wholesale Management System

Semester-IV

Course Code-BCACS-403

Database Management Systems (Oracle / MySQL)Credit-04

Unit

1. Introduction to DBMS, Purpose, difference with respect to conventional file processingsystem, data abstraction, data independence, data models (object-based, record based, physical data models), database manager, database administrator , overall system structure.

2. Entity- Relationship model Relationship sets, Mapping, Keys and entity sets. Entity-Relationship diagram, specialization, generation and aggregation, database schema under relation model.

3. Relational algebra –Project, select, Cartesian product, joins, natural join, union, intersection, minus, division operations.

4. Normalization – Functional dependency, INF, 2NF ,3NF,BCNF, Multi valued dependency & 4NF. Lossless joins, dependency preservation, redundancy control and integrity preservation during decomposition.

5. Transaction- concepts, transaction state, concurrent executions, serializability, conflict serializability, view serializability.

6. Concurrency control-locks, granting of locks, timestamps based protocols, deadlock prevention, detection& recovery. Security & integrity violation. Authorization, views.

7. Oracle functions, SQL (DDL, DML), simple queries, nested sub- queries, self join, equijoin, non-equijoin.

Semester-IV

Course Code-BCACS-403-PR

Database Management Systems (Oracle / MySQL) (Practical)Credit-02

EMPLOYEE Schema

Field Type Null Key Default

EnoChar(3) No PK NULL

EnameVarchar(50) No NULL

Job_TypeVarchar(50) No NULL

Manager Char(3) Yes FK NULL

Hire_Date Date No NULL

Dno Integer Yes FK NULL

Commission Decimal(10,2) Yes NULL

Salary Decimal(7,2) No NULL

DEPARTMENT Schema

Field Type Null Key Default

Dno Integer No PK NULL

DnameVarchar(50) Yes NULL

Location Varchar(50) Yes New Delhi

SL. No. Query

1. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee with the Employee Number appearing first.

2. Query to display unique Jobs from the Employee Table.

3. Query to display the Employee Name concatenated by a Job separated by a comma.

4. Query to display the data from the Employee Table. Separate each Column by a comma and name the said column as THE_OUTPUT.

5. Query to display the Employee Name and Salary of all the employee earning more than $2850.

6. Query to display Employee Name and Department Number for the Employee No =-7900.

7. Query to display Employee Name and Salary for all employees whose salary is not in the range of $1500 and $2850.

8. Query to display Employee Name and department No. of all the employeesinDept 10 and Dept 30 in the alphabetical order by name.

9. Query to display Name and Hire Date of every Employee who was hired in 1981.

10. Query to display Name and Job of all employees who don't have a current Manager.

11. Query to display the Name, Salary and Commission for all the employees who earn commission.

12. Sort the data in descending order of Salary and Commission.

13. Query to display Name of all the employees where the third letter of their name is =A'.

14. Query to display Name of all employees either have two =R's or have two =A's in their name and are either in Dept No =30 or their Manger's Employee No = 7788.

15. Query to display Name, Salary and Commission for all employees whose Commission Amount is 14 greater than their Salary increased by 5%.

16. Query to display the Current Date.

17. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after six months of employee was hired.

18. Query to display Name and calculate the number of months between today and the date each employee was hired.

19. Query to display the following for each employee <E-Name> earns <Salary> monthly but wants < 3* Current Salary >. Label the Column as Dream Salary.

20. Query to display the Name with the 1st letter capitalized and all other letter lower case and length of their name of all the employees whose name starts with =J', 'A' and =M'.

21. Query to display Name, Hire Date and Day of the week on which the employee started.

22. Query to display Name, Department Name and Department No for all the employees.

23. Query to display Unique Listing of all Jobs that are in Department # 30.

24. Query to display Name, Dept Name of all employees who have an =A' in their name.

25. Query to display Name, Job, DepartmentNo. And Department Name for all the employees working at the Dallas location.

26. Query to Display Name and Employee no. Along with their Manger's Name and the Manager's employee no; along with the Employees' Name who do not have a Manager.

27. Query to display Name, Dept No. And Salary of any employee whose department No. and salary matches both the department no .And the salary of any employee who earns a commission.

28. Query to display Name and Salaries represented by asterisks, where each asterisk (*) signifies $ 100.

29. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees.

30. Query to display the number of employees performing the same Job type function

31. Query to display the no. of managers without listing their names.

32. Query to display the Department Name, Location Name, No. of Employees and the average salary for all employees in that department.

33. Query to display Name and Hire Date for all employees in the same dept. as Blake.

34. Query to display the Employee No. And Name for all employees who earn more than the average salary.

35. Query to display Employee Number and Name for all employees who work in a department with any employee whose name contains a = 'T'.

36. Query to display the name and salaries of all employees who report to King.

37. Query to display the department no, name and job for all employees in Sales department.

Third Year

Semester-V

Course Code-BCACS 501

Information Security and Cyber LawsCredit-04

Contents

I) Introduction Security, Attacks, Computer Criminals, Security Services, Security Mechanisms. – 3 Lectures

II) Cryptography, Substitution Ciphers, Transpositions Cipher, Confusion, Diffusion, Symmetric, Asymmetric Encryption, DES Modes of DES, Uses of Encryption, Hash Function, Key Exchange, Digital Signatures, Digital Certificates. – 7 Lectures

III) Program Security Secure Programs, Non malicious Program errors, Malicious codes Virus, Trap doors, Salami attacks, Covert channels, Control against Program – 7 Lectures

IV) Threats. Protection in OS: Memory and Address Protection, Access control, File Protection, User Authentication – 7 Lectures

V) Database Security Requirements, Reliability, Integrity, Sensitive Data, Interference, Multilevel Security. – 6 Lectures

VI) Security in Networks, Threat in Networks, Security Controls, Firewalls, Intrusion Detection Systems, Secure E-mails. – 7 Lectures

VII) Administrating Security, Security Planning, Risk Analysis, Organizational Security Policy, Physical Security, Ethical issues in Security: Protection Programs and data. Information and Law.

Cyber Laws

Cyber laws to be covered as per IT 2008:

- Chapter 1: Definitions
- Chapter 2: Digital Signature and Electronic Signature
- [Section 43] Penalty and Compensation for damage to Computer, Computer System, etc.
- [Section 65] Tampering with Computer Source Documents
- [Section 66 A] Punishment for sending offensive messages through communication service, etc.
- [Section 66 B] Punishments for dishonestly receiving stolen Computer resource or communication device.
- [Section 66 C] Punishment for Identity Theft.
- [Section 66 D] Punishment for cheating by personation by using Computer resource.
- [Section 66 E] Punishment for violation of Privacy.
- [Section 66 F] Punishment for Cyber Terrorism.
- [Section 67] Punishment for publishing or transmitting obscene material in electronic form.

- [Section 67 A] Punishment for publishing or transmitting of material containing sexually explicit act, etc. in electronic form.
- [Section 67 B] Punishment for publishing or transmitting of material depicting children in sexually explicit act, etc. in electronic form.
- [Section 72] Breach of confidentiality and privacy.

Semester-V

Course Code-BCACS 501 PR

Information Security and Cyber Law LabCredit - 02

Program

1) Demonstrate the use of Network Tools: ping, ipconfig, tracert, arp, netstat, whois.
2) Use of Password cracking tools: John the Ripper, Ophcrack, Verify the strength of passwords using these tools.
3) Perform encryption and decryption of Caesar cipher. Write a script for performing these operations.
4) Perform encryption and decryption of a Rail fence cipher. Write a script for performing these operations.
5) Use nmap/zenmap to analyse a remote machine.
6) Use Burp proxy to capture and modify the message.
7) Demonstrate sending of a protected word document.
8) Demonstrate sending of a digitally signed document.
9) Demonstrate sending of a protected worksheet.
10) Demonstrate use of stenography tools.
11) Demonstrate use of a gpg utility for signing and encrypting purposes.

Recommended Books

1) C.P. Pfleeger, S.L. Pfleeger; Security in Computing, Pentice Hall of India, 2006.
2) W. Stallings; Network Security Essentials: Applications and Standards, 4/E, 2010.
3) M. Merkow, J. Breithaupt, Information Security Principles and Practices ,Pearson Education.
4) G.R.F. Snyder, T.Pardoe, Network Security, Cengage Learning, 2010.
5) A. Basta, W. Halton, Computer Security: Concepts, Issues and Implementation, Cengage Learning India, 2008.

Semester-V

Course Code-BCACS 502

Data MiningCredit-04

I) **Introduction to Data Mining – 1 Lecture**

II) **Data Processing - 5 Lectures**

Pre Processing of Data

Descriptive Data Summarization

- Measuring the Central Tendency.
- Measuring the Dispersion of Data.
- Graphic Display of Basic Descriptive Data Summaries.

Data Cleaning

- Missing Value.
- Noisy Data
- Data Cleaning as a Process

Data Integration and Transformation

- Data Integration.
- Data Transformation.

Data Reduction

- Data Cube Aggregation.
- Attribute Subset Selection.
- Dimensionally Reduction.
- Numerosity Reduction.

Data Discretization and Concept Hierarchy Generation

- Discretization and Concept Hierarchy Generation for Numerical Data.
- Concept Hierarchy Generation for Categorical Data.

III) **Data Warehouse and OLAP(Online Analytical Process) Technology - 6 Lectures**

Data Warehouse

- Difference between Operational Database System and Data Warehouses.

Multidimensional Data Model

- From Tables and Spreadsheet to Data Cubes.
- Stars, Snowflakes, and Fact Constellations: Schemas for Multidimensional Databases.

Measures: Their Categorization and Computation

Concept Hierarchy

OLAP Operations in Multidimensional Databases

Starnet Query Model for Querying Multidimensional Databases

Data Warehouse Architectures

- Steps for Design and Construction of Data Warehouses.
- Three – Tier Data Warehouse Architecture.
- Data Warehouse Back-End Tools and Utilities.
- Metadata Repository.
- Types of OLAP Servers: ROLAP versus MOLAP versus HOLAP.

Data Warehouse Implementation

- Efficient Computation of Data Cubes
- Indexing OLAP Data.

From Data Warehousing to Data Mining

- Data Warehouse Usage.
- From On-Line Analytical Processing to On-Line Analytical Mining.

IV) **Data Cube Computation and Data Generalization - 6 Lectures**

Efficient Methods for Data Cube Computation

- A Road Map for the Materialization of Different kinds of Cubes.
- Multiway Array Aggregation for full Cube Computation.
- BUC: Computing Iceberg Cubes from the Apex Cuboid Downward.
- Star Cubing: Computing Iceberg Cubes using a Dynamic Star Tree Structure.
- Pre-Computing Shell Fragments for fast high dimensional OLAP.
- Computing Cubes with Complex Iceberg Conditions.

Further Development of Data Cube and OLAP Technology

- Discovery Driven Exploration of Data Cubes.
- Multiway Array Aggregation at Multiway Granularity: Multifeature Cubes.
- Constrained Gradient Analysis in Data Cubes.

Attribute Oriented Induction: An Alternative Method for Data Generalization and Concept description

- Attribute Oriented Induction for Data Characterization.
- Efficient Implementation of Attribute Oriented Induction.
- Presentation of Derived Generalization.
- Data Mining Comparisons: Discriminating between Different Clauses.
- Class Description Presentation of both Characterization and Comparison.

V) **Mining Frequent Patterns, Associations and Correlations – 6 Lectures**

Basic Concepts and a Road Map

- Market Based Analysis.
- Frequent Itemsets, Closed Itemsets and Association Rules.

Efficient and Scalable Frequent Itemsets Mining Methods

- Apriori Algorithm.
- Generating Association Rules from Frequent Itemsets.
- Improving the Efficiency of Apriori.
- Mining Frequent Itemsets without Candidate Generation.
- Mining Frequent Itemsets using Vertical Data Format.
- Mining Closed Frequent Itemsets.

Mining Various Kinds of Association Rules

- Mining Multilevel Rules
- Mining Multidimensional Association Rules from Relational Databases and Data Warehouses.

From Association Analysis to Correlation Analysis

- Strong Rules are Not Necessarily Interesting
- From Association Analysis to Correlation Analysis

Constraint Based Association Mining

- Metarule Guided Mining of Association Rules.
- Constraint Pushing Mining Guided by Rule Constraints.

VI) **Classification and Prediction - 6 Lectures**

What is Classification? What is Prediction?

Issues Regarding Classification and Prediction

- Preparing the Data for Classification and Prediction.
- Comparing Classification and Prediction Methods.

Classification by Decision Tree Induction

- Decision Tree Induction
- Attribute Selection Measures
- Tree Pruning
- Scalability and Decision Tree Induction

Bayesian Classification

- Bayes' Theorem
- Naïve Bayesian Classification
- Bayesian Belief Network
- Training Bayesian Belief Network

Rule Based Classification

- Using IF-THEN rules for Classification
- Rule Extraction from a Decision Tree
- Rule Induction using a Sequential Covering Algorithm.

Classification by Backpropagation

- Multilayer Feed Forward Neural Network
- Defining a Network Topology
- Backpropagation
- Inside the Black Box: Backpropagation and Interpretability.

Support Vector Mechanism

- The Case When the Data are Linearly Separable.
- The Case When the Data are Linearly Inseparable.

Associative Classification: Classification by Association Rule Analysis

Lazy Lerners

- K-Nearest neighbour Classifiers

- Case Based Reasoning

Other Classification Methods

- Generic Algorithms.
- Rough Set Approach.
- Fuzzy Set Approaches.

Predictions

- Linear Regression
- Non Linear Regression
- Other Regression Based Methods.

Accuracy and Error Measures

- Classifier Accuracy Measures.
- Predictor Accuracy Measures.

Evaluating the Accuracy of a Classifier or Predictor

- Holdout Method and Random Subsampling.
- Cross Validation.
- Bootstrap

Ensemble methods Increasing the Accuracy

- Bagging
- Boosting

Model Selection

- Estimating Confidence Intervals
- ROC Curves

VII) **Cluster Analysis – 6 Lectures**

What is Cluster Analysis?

Types of Data in Cluster Analysis

- Interval Scaled Variables
- Binary Variables
- Categorical, Ordinal and Ration Scaled Variables.
- Variables of Mixed types.

- Vector Objects

Categorization of major Clustering Methods.

Partitioning Methods

- Classical Partitioning Methods: *k*-means and *k*-Mediods.
- Partition Methods in Large Databases from *k*-methods to CLARNS.

Hierarchical Methods

- Agglomerative and Divisive Hierarchical Clustering
- BIRCH (Balanced Iterative Reducing and Clustering) using Hierarchies.
- ROCK: Hierarchical Clustering Algorithm for Categorical Attributes.
- Chameleon: Hierarchical Clustering Algorithm using Dynamic Modeling.

Density Based Methods

- DBSCAN: Density Based Clustering Methods based on Connected Regions with Sufficiently High Density.
- OPTICS: Ordering Point to Identify the Clustering Structure.
- DENCLUE: Clustering Based on Density Distribution Functions.

Grid based Methods

- STING: Statistical Information Grid.
- WaveCluster: Clustering using Wavelet Transformation.

Model Based Clustering Methods

- Expectation Maximization.
- Conceptual Clustering
- Neural Network Approach

Clustering High Dimensional Data

- CLIQUE: Dimension Growth Subspace Clustering Method.
- PROCLUS: Dimension Reduction Subspace Clustering Method.
- Frequent Pattern Based Clustering Methods.

Constraint Based Cluster Analysis

- Clustering with Obstacle Objects.
- User Construction Cluster Analysis.

- Semi Supervised Cluster Analysis.

Outlier Analysis

- Statistical Distribution Based Outlier Detection.
- Distance Based Outlier Detection.
- Density Based Local Outlier Detection.
- Deviation Based Outlier Detection.

VIII) **Mining Stream, Time Series and Sequence Data**

Mining Data Stream

- Methodologies for Stream Data Processing and Stream Data Systems.
- Stream OLAP and Stream Data Cubes.
- Frequent Pattern Mining in Data Streams.
- Clustering Evolving Data Streams.

Mining Time Series Data

- Trend Analysis.
- Similarity Search in Time Series Analysis

Mining Sequence Patterns in Transactional Databases

- Sequential Pattern Mining.
- Concepts and Primitives.
- Scalable Methods for Mining Sequential Patterns.
- Constraint Based Mining of Sequential Patterns.
- Periodicity Analysis for Time Based Sequence Data.

Mining Sequence Patterns in Biological Data

- Alignment of Biological Sequences.
- Hidden Markov Model for Biological Sequence Analysis

IX) **Graph Mining, Social Network Analysis and Multirelational Data Mining**

- Methods for Mining Frequently Subgraphs.
- Mining Variant and Constrained Substructure Patterns.
- Applications: Graph Indexing, Similarity Search, Classification and Clustering.

Social Network Analysis

- What is Social Network?
- Characteristics of Social Network.
- Link Mining: Tasks and Challenges.
- Mining on Social Networks.

Multirelational Data Mining

- What is Multirelational Data Mining?
- ILP Approach to Multirelational Classification.
- Tuple ID Propagation.
- Multirelational Classification using Tuple ID Propagation.
- Multirelational Clustering with User Guidance.

X) **Mining Object, Spatial, Multimedia, Text and Web Data**

Multidimensional Analysis and Descriptive Mining of Complex Data Objects

- Generalization of Structured Data.
- Aggregation and Approximation in Spatial and Multimedia Data Generalization.
- Generalization of Object Identifiers and Class/ Subclass Hierarchies.
- Generalization of class Composition Hierarchies.
- Construction and Mining of Object Cubes.
- Generalization Based Mining of Plan Databases by Divide and Conquer.

Spatial Data Mining

- Spatial Data Cube Construction and Spatial OLAP.
- Mining Spatial Association and Co-Location Patterns.
- Spatial Clustering Methods.
- Spatial Classification and Spatial Trend Analysis.
- Mining Raster Databases.

Multimedia Data Mining

- Similarity Search in Multimedia Data.
- Multidimensional Analysis of Multimedia Data.
- Classification and Prediction Analysis of Multimedia Data.
- Mining Associations in Multimedia Data.

- Audio and Video Data Mining.

Text Mining

- Text Data Analysis and Information Retrieval
- Dimensional Reduction for Text.
- Text Mining Approaches.

Mining the World Wide Web

- Mining the Web Page Layout Structures.
- Mining the Web's Link Structure to Identify Authoritative web Pages.
- Mining Multimedia Data on the Web.
- Automatic Classification of Web Documents.
- Web Usage Mining.

XI) **Application and Trends in Data Mining**

Data Mining Applications

- Data Mining for Financial Data Analysis.
- Data Mining for the Retail Industry.
- Data Mining for the Telecommunication Industry.
- Data Mining for Biological Data Analysis.
- Data Mining in Other Scientific Applications.
- Data Mining for Intrusion Detection.

Data Mining System Products and Research Prototypes

- How to Choose a Data Mining System?
- Examples of Commercial Data Mining Systems.

Additional Themes on Data Mining

- Theoretical Foundations of Data Mining.
- Statistical Data Mining.
- Visual and Audio Data Mining.
- Data Mining and Collaborative Filtering

Social Impact of Data Mining

- Ubiquitous and Invisible Data Mining.

Semester-V

Course Code-BCACS 502 PR

Data Mining(Practical)Credit-02

SL. No. Topic

1. Data Mining and Machine Learning. Simple Examples
2. Field Application

Statistics

Generalization as Search

Ethics

Input: Concepts, Instance and Attributes

3. Output

Knowledge Representation

Inferring Rudimentary Rules

Missing Values

Constructing Decision trees

4. Covering Algorithms

Mining Association Rules

Linear Models

Instance Based Learning

Clustering

Multi-Instance Learning

5. Training and Testing

Predicting

Performance

Cross-Validation

Comparing Data Mining Schemes

Counting the Cost

6. Evaluating Numeric Prediction

Minimum Description Length

Minimum Description Length for Clustering

Decision Trees

Semester-VI

Course Code- BCACS-601

Artificial IntelligenceCredit-04

Unit Contents

1. **Introduction**

Introduction to Artificial Intelligence, Background and Applications, Turing Test and Rational Agent approaches to AI, Introduction to Intelligent Agents, their structure, behaviour and environment.

2. **Problem Solving and Searching Techniques**

Problem Characteristics, Production Systems, Control Strategies, Breadth First Search, Depth First Search, Hill climbing and its Variations, Heuristics Search Techniques: Best First Search, A* algorithm, Constraint Satisfaction Problem, Means-End Analysis, Introduction to Game Playing, Min-Max and Alpha-Beta pruning algorithms.

3. **Knowledge Representation**

Introduction to First Order Predicate Logic, Resolution Principle, Unification, Semantic Nets, Conceptual Dependencies, Frames, and Scripts, Production Rules, Conceptual Graphs. Programming in Logic (PROLOG)

4. **Dealing with Uncertainty and Inconsistencies**

Truth Maintenance System, Default Reasoning, Probabilistic Reasoning, Bayesian Probabilistic Inference, Possible World Representations.

5. **Understanding Natural Languages**

Parsing Techniques, Context-Free and Transformational Grammars, Recursive and Augmented Transition Nets.

Semester-VI

Course Code- BCACS-601PR

Artificial Intelligence (Practical)Credit-02

SL. No. Program

1. Write a prolog program to calculate the sum of two numbers.
2. Write a prolog program to find the maximum of two numbers.
3. Write a prolog program to calculate the factorial of a given number.
4. Write a prolog program to calculate the n^{th} Fibonacci number.

5. Write a prolog program, insert_nth (iteam, n, into_list, result) that asserts that result is the list into_list with item inserted as the n'th element into every list at all levels.

6. Write a Prolog program to remove the Nth item from a list.

7. Write a Prolog program, remove-nth(Before, After) that asserts the After list is the Before list with the removal of every n'th item from every list at all levels.

8. Write a Prolog program to implement append for two lists.

9. Write a Prolog program to implement palindrome (List).

10. Write a Prolog program to implement max(X,Y,Max) so that Max is the greater of two number X and Y.

11. Write a Prolog program to implement maxlist (List, Max) so that Max is the greatest number in the list of numbers List.

12. Write a Prolog program to implement sumlist (List, Sum) so that Sum is the sum of a given List of numbers List.

13. Write a Prolog program to implement two predicates evenlength (List) and oddlength (List) so that they are true if their argument is a list of even or odd length respectively.

14. Write a Prolog program to implement reverse (List, Reversed List) that reverses lists.

15. Write a Prolog program to implement maxlist (List, Max) so that Max is the greatest number in the list of numbers List using cut predicate.

16. Write a Prolog program to implement GCD of two numbers.

17. Write a prolog programme that implements Semantic Network/ Frame Structures.

Semester-VI

Course Code- BCACS-602

Computer GraphicsCredit-04

Unit

1. **Introduction**

Basic elements of Computer graphics, Pixels, Resolution, Aspect Ratio, Applications of Computer Graphics.

2. **Graphics Hardware**

Architecture of Raster and Random scan display devices, Working Principle of Cathode Ray Tubes, Refresh Rate and Persistence Relation, Input/output devices.

3. **Fundamental Techniques in Graphics**

Raster scan line, Digital differential Analyzer Algorithm, Bresenham's Line Drawing Algorithm, Circle drawing algorithms, scan Line Polygon filling, Inside Outside test and Pairing Method, Clipping Algorithms: Point Clipping (Cohen Sutherland's Algorithm), Polygon Clipping (Sutherland Hodgeman's Alogrithm), Text

Clipping, line and polygon clipping algorithms, Geometric Transformations: Translation, Rotation and Scaling, Window to Viewport Transformations,

4. **Geometric Modeling**

Representing curves: Bezier Curves, Parametric Equations of Bezier Curves,

5. **Visible Surface Determination**

Hidden surface elimination, Back Face Removal Method, Algorithms for Visible Surface Detection: Depth Buffer/Z Buffer Algorithm, Scan Line Algorithm, Area Subdivision Method for Surface Detection.

6. **Surface Rendering**

Illumination and shading models, Basic color models, Additive and Subtractive Color generation concepts, CMYK and RGB Models and their Applications, Basic Elements of Computer Animation.

Semester-VI

Course Code- BCACS-602PR

Computer Graphics(Practical)Credit-02

SL. No. Program

1. Write a program to implement Bresenham's line drawing algorithm.
2. Write a program to implement mid-point circle drawing algorithm.
3. Write a program to clip a line using Cohen and Sutherland line clipping algorithm.
4. Write a program to clip a polygon using Sutherland Hodgeman algorithm.
5. Write a program to fill a polygon using Scan line fill algorithm.
6. Write a program to apply various 2D transformation on a 2D object (use homogenous coordinates).
7. Write a program to apply various 3D transformations on a 3D object and then apply parallel and perspective projection on it.
8. Write a program to draw Hermite/ Bezier curve.

Generic Elective

BCACS GE-1

MathematicsCredit – 6

Unit

1. **Differential calculus**:

Partial differentiation and Euler's theorem.Successive differentiation, formulae for the nth derivative of some standard fundtions.Leibnits' theorem.Nth for the nth derivative of some rational function.Expansions of functions.Taylors' infinite series.Maclaurins' series.Use of Taylors' and Maclaurins' series.Tangents and Normals, their equations in the Cartesian form, parametric form.Tangents at the origin.To find the angles of

intersection between two curves.Cartesian tangent, normal sub tangent, subnormal and their values in the Cartesian forms.

2. **Integral calculus**:

Quick revision of +2 CBSE level +2 indefinite and definite integrals.Some illustrations of double integrals possible via repeated integral over regular domains. Rule for change of variables (without proof).

3. **Vectors calculus**:

[null img][null img]Vector point function of a scalar variable and its Differentiation.Directional derivative of scalar variable and its Differentiation. Directional derivative of scalar and vector point function, grad, div f and curt f: definition, formulation in terms of components, geometrical and physical meaning. Their action on sum and product.

4. **Co-ordinate geometry of two dimension**:

Change of Co-ordinates under parallel translation of axes & rotation of axes about origin. Standard forms using change of co-ordinates & props of parabola, elipse and hyperbola. On transformation of general second degree equation in x and y: invariants, condition for this to represent parabola, ellipse and hyperbola. Equation of tangent and normal using calculus.

5. **Real analysis** :

Axiomatic description of real no. system 'R', deduction of some usual facts about addition, multiplication and order relation, including Archimedean property and rational density theorem. Notion of neighborhood, bounds closed sets and open sets together with their usual properties. Sequence and limit, uniqueness of limit, lim (a_n+b_n), lim $(a_n.b_n)$, sandwich theorem, Cauchy first theorem on limit, monotonic sequences and their convergence, Nested interval theorem, Bolzano-Weierstrass theorem, Theorem on decimal form model of real no.

Generic Elective

BCACS GE-2

PhysicsCredit-04

Unit

1. **Acoustics**

 Theory of vibrations: Analytical treatment of free, damped, forced and resonant vibrations.

 Intensity and loudness of sound: bel, phon, measurement of intensity by Rayleigh disc method, Reverberation time, deduction of Sabine's law, determination of absorption coefficient.

2. **Optics**

 Coherence: Temporal and spatial coherence. Interference in thin films, Newton's rings, Michelson's interferometer.

 Diffraction: Fresnel and Fraunhoffer diffraction, half-period zones, Zone plate, diffraction at single slit, double slit, n slit (plane diffraction grating).

 Polarization of light: double refraction, Nicol's prism, Construction of wave fronts in uniaxial crystals, Quarter wave plate. Production and detection of plane, circularly and elliptically polarized light, Rotatory polarization and polarization and polarimeters.

 Velocity of light: Group and phase velocity (concept to be brought by superposition of two waves), Kerr cell method for determining the velocity of light.

3. **Electrostatics**

[null img][null img][null img][null img][null img]Electric polarization and displacement vectors, $D= E_0 E+P$ relation (by simple method –slab placed in electric field between plates), Energy density (by

simple spherical distribution of charge), Boundary conditions of D and E at the interface of two dielectric media and their application to a dielectric sphere in uniform electric field.

4. **MAGENTISM:**

[null img][null img][null img]Gauss' law, Ampere's circuital law, Magnetic induction, B= $_0$. (H+M) relation (by Rowland ring method), Energy density of magnetic field (by simple solenoid method), Hysteresis and hysteresis loss, Dia,-para- and ferro- magnetic substances, Magnetic circuits, Design of permanent for dia,- para – and ferromagnetic materials.

5. **CURRENT ELECTRICITY**:

Field due to a solenoid, Theory of moving coil ballistic galvanometer and its uses: Comparison of Capacitance, Determination of angle of dip by Earth Inductor.

6. **Transients**:

Growth and decay of current in L.R.R.-Cand L-R-C circuits, Simple application of these circuits, Measurement of by Rayleigh's method.

7. **Alternating current circuit** :

Power and power factor of ac circuits, Wattmeter, vector diagram method j-operator method for ac circuits, Analytical treatment of series and parallel circuits including sharpness of resonance, Transformer and its principle by vector diagram method, Polyphase current, Rotating magnetic fields, Induction motor.

8. **Classical mechanics**:

Generalized co-ordinates and momenta, Lagrange's and Hamilton's equations form D' Alembert's principle, Application to simple pendulum, Compound pendulum and projectile motion, Motion in a central field, Kepler's laws- their deductions from law of gravitation and vice-versa.

9. **Quantum physics**:

Wave-particle duality, de Broglie's relation and experimental verification of matter waves, Uncertainty principle.

BCACS GE-2 PR

Physics (Practical)Credit-02

Unit

1. Kundt's tube method of measuring the velocity of sound

2. Melde's experiment.

3. Spectrometer: refractive index by symmetry method.

4. Hight resistance measurement

5. Low resistance measurement.

6. Young's modulus of a beam by bending method.

7. Newton's ring.

8. i-graph by spectrometer.

9. Resistance of a galvanometer by half deflection method.

10. Figure of merit of a galvanometer.

Generic Elective

BCACS GE--3

Discrete MathematicsCredit-06

Unit

1. **A1**: Partition of domain of a continuous function, Continuity and boundedness.

A2: Derivability, relationship with continuity, Rolle's theorem, Lagrange's Mean Value theorem,

Taylor's and Maclaurin,s Theorem with Rn.

2. **Set Theory**

B1: Indexed family of sets, Generalized set of operations &Demorgan laws, set mapping.

B2: Equivalence relation and related fundamental theorem of partition.

3. (**Complex Variable**)

C1: Real functions of two variables: Simultaneous and iterated limits: Continuity, partial

Derivative, Differentiability and related necessary and sufficient conditions.

4. **Abstract Algebra**

D1: Binary operations, Notion of group, Abelian group and non-abelian group with examples.

Uniqueness of identity element and inverse elements in a group, different ways of defining a group, concept of subgroup and cyclic group, Cosets, Lagrange's theorem.

5. **Differential Equations**

E1: First order higher degree, Clairaut's form, singular solution, orthogonal trajectories.

Recommended Books:-

1. Real Analysis : Dasgupta
2. Set Theory :Prasad & Prasad
3. Complex Variable:Lalji Prasad
4. Abstract Algebra :Dasgupta& Prasad
5. Differential Calculus : S.B. Prasad

Generic Elective

BCACS GE-4

Statistical Studies Credit - 04

Unit

1. Introduction: Definition and scope, of Statistics, concepts of statistical population and sample.

Data: quantitative and qualitative, attributes, variables, scales of measurement- nominal, ordinal, interval and ratio. Presentation: tabular and graphic, including histogram and ogives.

2. Measures of Central Tendency: mathematical and positional. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, moments, skewness and kurtosis.

3. Bivariate data : Definition, scatter diagram, simple, partial and multiple correlation (3 variables only), rank correlation. Simple linear regression, principle of least squares and fitting of polynominals and exponential curves.

4. Theory of attributes, consistency of data, independence and association of attributes, measures of association and contingency.

5. Estimation of population mean, confidence intervals for the parameters of a normal distribution (one sample and two sample problems).

The basics idea of significance test. Null and alternative hypothesis. Type of hypotheses for the parameters of a normal distribution (one sample and two sample problems).

6. Categorical data : Tests of proportions, tests of association and goodness-of-fit using Chisquare test, Yaters' correction.

7. Tests for the significance of correlation coefficient. Sign test for median, Sign test for symmetry, Wilcoxon two-sample test.

8. Analysis of variance, one-way classification. Brief exposure of three basic principles of design of experiments, treatment, plot and block design. Bioassay.

Recommended Books:

1. Daniel, Wayne W., Bio-statistics: A Foundation for Analysis in the Health Science. John Wiley (2005).

2. Goon, A.M., Gupta M.K. & Das Gupta, Fundamentals o Statistics, Vol.-I & II (2005).

3. Dass, M.N. & Giri, N.C: Design and analysis of experiments. John Wiley.

4. Dunn, O.J. Basic Statistics: A primer for the Biomedical Science. (1964, 1977) by John Wiley.

5. Bancroft, Holdon Introduction to Bio-Statistics (1962) P.B> Hoebar New York.

6. Goldstein, A biostatistics- An introductory text (1971). The Macmillion New York.

7. Goon, A.M., Gupta M.K. and Dasgupta B. (2002). Fundamentals of Statistics, Vol. I&II 8thEdn. The world Press, Kolkata.

8. Miller, Irwin and Miller, Maylees (2006) : John E. Freund's Mathematical Statistics with Applications, (7thEdn.) Pearson Education, Asia.

9. Mood, A.M. Graybill, F.A. and Boes, D.C. (2007): introduction to the Theory of Statistics, 3rdEdn., (Reprint), Tata McGraw-Hill Pub. Co. Ltd.

BCACS GE-4 PR

Statistical Methods (Practical)Credit - 02

1. Graphical representation of data.

2. Problems based on measures of central tendency.

3. Problems based on measures of dispersion.

4. Problems based on combined mean and variance and coefficient of variation.

5. Problems based on moments, skewness and kurtosis.

6. Fitting of polynomials, exponential curves

7. Karl Pearson correlation coefficient

8. Partial and multiple correlations

9. Spearman rank correlation with and without ties.

10. Correlation coefficient for a bivariate frequency distribution

11. Lines of regression, angle between lines and estimated values of variables.

12. Checking consistency of data and finding association among attributes.

13. Estimators of population mean.

14. Confidence interval for the parameters of a normal distribution (one sample and two sample problems.)

15. Tests of hypotheses for the parameters of a normal distribution (one sample and two sample problems.)

16. Chi square test of proportions

17. Chi-square test of goodness-of-fit.

18. Test for correlation coefficient.

19. Sign test for median.

20. Sign test for symmetry.

21. Wilcoxon two-sample test

22. Analysis of Varaince fo a one way classified data.

23. Analysis of Variance of a two way classified data.

24. Analysis of a CRD.

25. Analysis of an RBD.

Generic Elective

BCACS GE-5

Online Learning Course of "SWAYAM" or Course offered by any other University Credit – 06

*The students will have to register themselves in the "SWAYAM" Portal and select a course of their choice. On completion students have to submit '**course completion certificate'**.

Discipline Specific Elective

Course Code-BCACS-DSE-1

Web and E-Commerce TechnologiesCredit-04

Unit Contents

1. An introduction to Electronic commerce:

   What is E-Commerce (Introduction And Definition), Main activities E-Commerce, Goals of E-Commerce, Technical Components of E-Commerce, Functions of E-Commerce, Advantages

and disadvantage of E-Commerce, Scope of E-Commerce, Electronic Commerce Applications, 9 Electronic Business(C2C)(C2G,G2G,B2G,B2P,B2A,P2P,B2A,C2A,B2B,B2C).

2. The Internet and WWW:

Evolution of Internet, Domain Names and Internet Organization (.edu, .com, .mil, .gov, .net etc.), Types of Network, Internet Service Provider, World Wide Web, Internet & Extranet, Role of Internet in B2B Application, building own website, Cost, Time, Reach, Registering a Domain Name, Web promotion, Target email, Baner, Exchange, Shopping Bots.

3. Internet Security:

Secure Transaction, Computer Monitoring, Privacy on Internet, Corporate Email privacy, Computer Crime(Laws, Types of Crimes), Threats, Attack on Computer System, Software Packages for privacy, Hacking, Computer Virus(How it spreads, Virus problem, virus protection, Encryption and Decryption, Secret key Cryptography, DES, Public Key Encryption, RSA, Authorization and Authentication, Firewall, Digital Signature (How it Works).

4. Electronic Data Exchange:

Introduction, Concepts of EDI and Limitation, Application Of EDI, Disadvantage of EDI, EDI model, Electronic Payment System: Introduction, Types of Electronic Payment System, Payment Types, Value Exchange System, Credit Card System, Electronic Fund Transfer, Paperless bill, Modern Payment Cash, Electronic Cash

5. Planning for Electronic Commerce:

Planning Electronic Commerce initiates, Linking objectives to business strategies, Measuring cost objectives, Comparing benefits to Costs, Strategies for developing electronic commerce web sites.

6. Internet Marketing:

The PROS and CONS of online shopping, The cons of online shopping, justify an internet business, internet marketing techniques, The E-cycle of Internet marketing Personalization e-commerce.

Discipline Specific Elective

Course Code-BCACS-DSE-1PR

Web and E-Commerce Technologies (Practical)Credit-02

SL.No Problems

1. **Web and E-Commerce Technologies LAB (based on the following topics): HyperText Markup Language (HTML):**

   Structural setup ; page layout; text manipulation; special characters; images; links. Intermediate: image maps; tables; frames, forms; meta tags; web froms.

   Cascading Style Sheet (CSS):

   Embedding/Linking; HTML element selectors; classes; ID sectors, text manipulation; background; borders and spacing; layout; context selectors and grouping, pseudo-classes;

pseudo-elements.

2. **JavaScript:**

   Sriting your first script; creating HTML tags; user input and output; loops and tables; payroll calculator, forms and text fields; validating an email address; radio buttons; check boxes; self-grading tests, image rollovers; slide shows; real- time clock; controllable clock; working with cookies.

3. **Perl/CGI 10:**

   Sample Perl Operation; random numbers; lists; dealing four poker hands; time manipulation; subroutines, hash tables; files; string matching, CGI; registration lists; surveys.

4. **SQL and regular expressions:**

   Regular expressions: basics; repeating; positioning. Beginner: select; where; order by; insert; update; delete, like; between; in; distinct; group by; aliases; aggregate functions; create table; alter table; drop table., nested selects; SoundEx; joins; deterministic functions; non-deterministic functions.

5. **ASP structural setup:**

   Response. Write; retrieving from forms; retrieving from querystring; variables; control constructs; subroutines and functions; session state; application variables; server variables; debugging, reading and writing cookies; server-side includes; response; object methods; VBScript functions; error handling; debugging; browser detail; CDONTS; files; output from a recordset; global.asa; setup instructions for using IIS and ASP. Flash 3 Create Flash movies of moving and interactive objects.

Discipline Specific Elective

Course Code-BCACS-DSE-2

Python ProgrammingCredit-04

Unit Contents

1. **Planning the Computer Program:**

Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.

2. **Techniques of Problem Solving:**

Limethodologies viz. top-down and bottom-up programming.

3. **Overview of programming:**

Structure of a Python Program, Elements of Python

4. **Introduction to Python:**

Python Interpreter, Using Python as calculator, Python shell, Indentation.Atoms, 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)

5. **Creating Python Programs:**

Input and Output Statements, Control statements(Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass.), Defining Functions, default arguments, Errors and Exceptions.

6. **Iteration and Recursion:**

Conditional execution, Alternative execution, Nested conditionals, The return statement, Recursion, Stack diagrams for recursive functions, Multiple assignment, The while statement, Tables, Two-dimensional tables

7. **Strings and Lists:**

String as a compound data type, Length, Traversal and the for loop, String slices, String comparison, A find function, Looping and counting, List values, Accessing elements, List length, List membership, Lists and for loops, List operations, List deletion. Cloning lists, Nested lists

8. **Object Oriented Programming**

Introduction to Classes, Objects and Methods, Standard Libraries.

9. **Data structure**

Arrays, List, Set, Stack and Queues

10. **Searching and Sorting:**

Linear and Binary Search, Bubble, Selection and Insertion

Discipline Specific Elective

Course Code-BCACS-DSE-2PR

Python Programming (Practical)Credit-02

SL. No. Program

1. Using for loop, print a table of Celsius/ Fahrenheit equivalence. Let c be the Celsius temperatures ranging from 0 to 100, for each value of c, print the corresponding Fahrenheit temperature.

2. Using while loop, produce a table of sins, cosines and tangents. Make a variable x in range from 0 to 10 in steps of 0.2 for each value of x, print the value of sin(x), cos (x) and tan(x).

3. Write a program that reads an integer value and prints “leap year” or “not a leap year”.

4. Write a program that takes a positive integer n and then produces n lines of output shown as follows.

   For example enter a size: 5

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5. Write a function that takes an integer 'n' as input and calculates the value of

1+1/1! +1/2! + 1/3! + ...+ 1/n

6. Write a function that takes an integer input and calculates the factorial of that number.

7. Write a function that takes a string input and checks if it's a palindrome or not.

8. Write a list function to convert a string into a list, as in list ("abc") gives [a, b, c].

9. Write a program to generate Fibonacci series.

10. Write a program to check whether the input number is even or odd.

11. Write a program to compare three numbers and print the largest one.

12. Write a program to print factors of given number.

13. Write a method to calculate GCD of two numbers.

14. Write a program to create Stack Class and implement all its methods. (Use Lists).

15. Write a program to create Queue Class and implement all its methods. (Use Lists).

16. Write a program to implement linear and binary search on lists.

17. Write a program to sort a list using insertion sort and bubble sort and selection sort.

Discipline Specific Elective

Course Code-BCACS-DSE-3

Networks & Information Security Credit- 04

Introduction-Characteristics of Networks, Security Concepts,–Kinds of security breaches – Threatsand Risks, Points of vulnerability, Attacks – Passive and Active, Security Services, Confidentiality,Authentication, Non-Repudiation, Integrity, Access Control, Availability, –Methods of defense – Control measures – Effectiveness of controls, Model for Internetwork Security, Internet Standardsand RFCs Access Control Mechanisms ,Access Matrix, HRU, TAM, ACL and capabilities.

Access Control Models, Chinese Wall, Clark-Wilson, Bell-LaPadula, Non Interference and Role BaseModel. Cryptography, Encryption techniques – Characteristics of good encryption systems – Secret

Key and Public Key Cryptosystems, Symmetric Ciphers, Block Ciphers and Stream Ciphers, DES, IDEA and Key Escrow, RSA and ElGamal, Secure Hash and Key management, Non-repudiation, cryptanalysis.

Secure sockets – IPSec overview – IP security architecture – IPSec-Internet Key Exchanging (IKE) – IKE phases – encoding – Internet security – Threats to privacy – Packet sniffing – Spoofing – Web security

requirements – Real Time communication security – Security standards–Kerberos.X.509 Authentication Service.

Security protocols – Transport layer protocols – SSL – Electronic mail security – PEM and S/MIME security protocol – Pretty Good Privacy – Web Security - Firewalls design principles – Trusted systems – Electronic payment protocols. Intrusion detection – password management – Viruses and related Threats – Virus Counter measures, Virtual Private Networks.

Network Security Applications, Authentication Mechanisms: Passwords, Cryptographic authentication protocol, Smart Card, Biometrics, Digital Signatures and seals, Kerberos, X.509 LDAP Directory. Web Security: SSL Encryption, TLS, SET E-mail Security, Pretty Good Privacy (PGPs) / MIME, IP Security, Access and System Security,Intruders, Intrusion Detection and Prevention, Firewall, Hardware Firewall, Software Firewall, Application Firewall, Packet Filtering. , Packet Analysis, Proxy Servers, Firewall setting in Proxy, ACL in Proxy.

References:

1 William Stallings, "Network Security Essentials", 3rd Edition, Pearson Education, 2006

2 Edward Amoroso, "Fundamentals of Computer Security Technology", Prentice-Hall, 1999

3 Charles P. Pleeger, “Security in Computing”, Pearson Education, 5th Edition, 2001.

4 William Stallings, “Cryptography and Network Security: Principles and Standards”, Prentice Hall India, 3rd Edition, 2003.

Discipline Specific Elective

Course Code-BCACS-DSE-3 PR

Networks & Information Security Credit- 02

Networks & Information Security Lab (practical):

1. Working with Sniffers for monitoring network communication (Ethereal)

2. Understanding of cryptographic algorithms and implementation of the same in C or C++

3. Using open SSL for web server - browser communication

4. Using GNU PGP

5. Performance evaluation of various cryptographic algorithms

6. Using IP TABLES on Linux and setting the filtering rules

7. Configuring S/MIME for e-mail communication

8. Understanding the buffer overflow and format string attacks

9. Using NMAP for ports monitoring

10. Implementation of proxy based security protocols in C or C++ with features like confidentiality, integrity and authentication.

11. Socket programming

12. Exposure to Client Server concept using tcp/ip, blowfish, Pretty Good Privacy.

Discipline Specific Elective

Course Code-BCACS-DSE-4

Cloud ComputingCredit-04

Unit Contents

Overview of Computing Paradigm:Recent trends in Computing : Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing,

Introduction to Cloud Computing : Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers, Benefits and limitations of Cloud Computing,

Cloud Computing Architecture:Comparison with traditional computing architecture (client/server), Services provided at various levels, Service Models- Infrastructure as a Service(IaaS), Platform as a Service(PaaS), Software as a Service(SaaS), How Cloud Computing Works, Deployment Models- Public cloud, Private cloud, Hybrid cloud, Community cloud, Case study of NIST architecture.

Case Studies:Case study of Service model using Google App Engine, Microsoft Azure, Amazon EC2 , Eucalyptus.

Service Management in Cloud Computing:Service Level Agreements(SLAs), Billing & Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling.

Cloud Security: Infrastructure Security- Network level security, Host level security, Application level security, Data security and Storage- Data privacy and security Issues, Jurisdictional issues raised by Data location, Authentication in cloud computing.

Reference Books

1. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

2. Cloud Computing: Principles and Paradigms, Editors: RajkumarBuyya, James Broberg, Andrzej M. Goscinski, Wile, 2011

3. Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012

4. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley-India, 2010

5. GautamShroff, Enterprise Cloud Computing Technology Architecture Applications , Adobe Reader ebooks available from eBooks.com,2010

6. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach ,McGraw Hills, 2010. 7. Dimitris N. Chorafas, Cloud Computing Strategies ,CRC Press, 2010

Discipline Specific Elective

Course Code-BCACS-DSE-4 PR

Cloud Computing (Practical)Credit-02

SL. No. Program

1. Create virtual machines that access different programs on same platform.

2. Create virtual machines that access different programs on different platforms .

3. Working on tools used in cloud computing online- a) Storage b) Sharing of data c) manage your calendar, to-do lists, d) a document editing tool

4. Exploring Google cloud

5. Exploring microsoft cloud

6. Exploring amazon cloud

Discipline Specific Elective

Course Code-BCACS-DSE-5

Cyber forensicsCredit-04

Introduction to Cyber forensics: Information Security Investigations, Corporate Cyber Forensics, Scientific method in forensic analysis, investigating large scale Data breach cases. Analyzing Malicious software. Types of Computer Forensics Technology, Types of Military Computer Forensic Technology, Types of Law Enforcement: Computer Forensic Technology, Types of Business Computer Forensic Technology, Specialized Forensics Techniques, Hidden Data and How to Find It, Spyware and Adware, Encryption Methods and Vulnerabilities, Protecting Data from Being Compromised Internet Tracing Methods, Security and Wireless Technologies, Avoiding Pitfalls with Firewalls Biometric Security Systems

Types of Computer Forensics Systems: Internet Security Systems, Intrusion Detection Systems,

Firewall Security Systems, Storage Area Network Security Systems, Network Disaster Recovery

Systems, Public Key Infrastructure Systems, Wireless Network Security Systems, Satellite EncryptionSecurity Systems, Instant Messaging (IM) Security Systems, Net Privacy Systems, Identity Management Security Systems, Identity Theft, Biometric Security Systems

Ethical Hacking: Essential Terminology, Windows Hacking, Malware, Scanning, Cracking. Digital Evidence in Criminal Investigations: The Analog and Digital World, Training and Education in digital evidence, Evidence Collection and Data Seizure: Why Collect Evidence, Collection Options Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collection and Archiving, Methods of Collection, Artifacts, Collection Steps, Controlling Contamination: The Chain of Custody, Reconstructing the Attack, The digital crime scene, Investigating Cybercrime, Duties Support Functions and Competencies.

Identification of Data: Timekeeping, Forensic Identification and Analysis of Technical Surveillance Devices, Reconstructing Past Events: How to Become a Digital Detective, Useable File Formats, Unusable File Formats, Converting Files, Investigating Network Intrusions and Cyber Crime, Network Forensics and Investigating logs, Investigating network Traffic, Investigating Web attacks, Router Forensics. Cyber forensics tools and case studies.

References:

1. John R. Vacca, Computer Forensics: Computer Crime Scene Investigation, 2nd Edition, Charles River Media, 2005

2. Christof Paar, Jan Pelzl, Understanding Cryptography: A Textbook for Students and Practitioners, 2nd Edition, Springer's, 2010

3. Ali Jahangiri, Live Hacking: The Ultimate Guide to Hacking Techniques & Countermeasures for Ethical Hackers & IT Security Experts, Ali Jahangiri, 2009

4. Computer Forensics: Investigating Network Intrusions and Cyber Crime (Ec-Council Press Series: Computer Forensics), 2010.

Course Code-BCACS-DSE-5

Cyber forensics Lab (practical):Credit-02

1.Study and Analysis of Network.
2.Study of Network Related Commands (Windows)
3.Study of Network related Commands(Linux)
4.Collecting Information about given Domain
5.Crawling through Websites and Banner Grabbing
6. Using Google Search in Information Collection.
7.Network Scanning
8.Windows/ Linux Log Analysis
9.Study of Windows Registry
10.Study of Malwares
11.Remote Administration in Windows
12.Listing and Tracking Network Related Process.
13.Mobile/ Smart Phone Forensic Practical I
14.Mobile/ Smart Phone Forensic Practical II
15.Mobile/ Smart Phone Forensic Practical III

Course Code-BCACS-DSE-6 (Compulsory in Semester VI)

Dissertation / Project workCredit-06

This option 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.

Ability Enhancement Compulsory Course

Paper Code –AECC-101

English Communication Skills Credit - 02

Unit Contents

1. **Communication**

Definition, stages, barriers, types: verbal and non-verbal, Inter-personal Communication, Group Communication, Business Communication and its need.

2. **Descriptive writing**-

Expansion of an idea, Note-making, Summary and Paraphrasing, letter writing (application), Business letter formats (letters of enquiry, replies and complaints), resume writing, covering letter, Reading Strategies- close reading, skimming, scanning, Analysis and interpretation of an article, Group Discussion, Interview Skills, Translation Practice (Hindi to English and vice-versa), Dialogue.

Recommended Books-

1. Technical Communication, M.H. Rizvi, Tata McGrawhill.

2. Effective Business Communication, Asha Kaul.

3. Developing Communication Skills, Krishnamohan.

4. Functional Grammar and Spoken and Written Communication in English, Bikram K. Das, Orient Blackswan.

5. Précis, Paraphrase and Summary, P.N. Gopalkrishnan, Atuthors Press.

Communication Skills, Sanjay Kumar and Pushplata, Oxford Publication. **First Year**

Paper Code –AECC -102

Environment Studies Credit-02

Unit Contents

1. **Introduction to environmental studies**

- Multidisciplinary nature of environmental studies;
- Scope and importance; Concept of sustainability and sustainable development.

2. **Ecosystems**

- What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystem:
  - a) Forest ecosystem
  - b) Grassland ecosystem
  - c) Desert ecosystem
  - d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

3. **Natural Resources: Renewable and Non-renewable Resources**

- Land resources and landuse change; Land degradation, soil erosion and desertification.
- Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.
- Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state).

- Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

4. **Biodiversity and Conservation**

- Levels of biological diversity: genetic, species and ecosystem diversity; Biogeography zones of India; Biodiversity patterns and global biodiversity hot spots
- India as a mega-biodiversity nation; Endangered and endemic species of India
- Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasion; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

5. **Environmental Pollution**

- Definition
- Cause, effects and control measures of:-
- Air pollution
- Water pollution
- Soil pollution
- Marine pollution
- Noise pollution
- Thermal pollution
- Nuclear hazards
- Solid waste Management : Causes, effects and control measures of urban and
- Industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies.
- Disastermanagement: floods, earthquake, cyclone and landslides.

6. **Social Issues and the Environment**

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case

Studies

- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear
- Accidents and holocaust. Case Studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and control of Pollution) Act
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation.
- Public awareness.

7. **Human Population and the Environment**

- Population growth, variation among nations.
- Population explosion – Family Welfare Programme.
- Environment and human health.
- Human Rights.
- Value Education.
- HIV/AIDS.
- Women and Child Welfare.
- Role of Information Technology in Environment and human health.
- Case Studies.

8. **Field work**

- Visit to a local area to document environmental assetsriver/forest/grassland/hill/mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc.

Recommended Books-

1. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd.,

Ahmedabad – 380 013, India, Email:mapin@icenet.net (R)

2. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p

3. Dash, M.C, Fundaentals of Ecology.

Paper Code AECC-201

Online Learning Course of "SWAYAM"Credit-02

*The students will have to register themselves in the "SWAYAM" Portal and select a course of their choice. On completion students have to submit '**course completion certificate'**.

Course Code- BCACS- (SEC-101)

PHP Programming Credit-01

Unit-

I Introduction to PHP

- PHP Introduction, invention and versions, important tools and software requirement (like web Server, Database, Editors etc.)
- PHP with other technologies, scope of PHP
- Basic Syntax, PHP variables and contents
- Types of data in PHP ,Expressions, scopes of a variable (local, global)
- PHP Operators: Arithmetic, Assignment, Relational, Logical operators, Bitwise, Ternary and MOD operator.
- PHP operator precedence and associativity.

II Handling HTML form with PHP

- Capturing Form Data
- GET and POST form methods
- Dealing with multi value fields
- Redirecting a form after Submission

III PHP condition events and Loops

- PHP IF Else condition statement (Nes..... IF and Else)
- Switch case, while, for and Do While Loop
- Goto, Break, Continue and exit

IV PHP Functions

- Function, Need of Function, declaration and calling of a Function
- PHP Function with arguments, Default Argument in Function

- Function argument with call by value, call by reference
- Scope of Function Global and Local String

V Manipulation and Regular Expression

- Creating and accessing String, Searching & Replacing String
- Formatting, Joining and splitting String, String Relating Library functions
- Use and advantage of regular Expression over inbuilt function
- Use of preg_ match(), preg_replace (),Preg_split() Function in regular expression

VI Array

- Anatomy of an Array, Creating index based and associative array, Accessing array
- Looping with index based array, with associative array using each() and foreach ()
- Some useful library function.

Semester-III

Course Code- BCACS-(SEC-101-PR)

PHP Programming(Practical) Credit-01

Program

1. Create a PHP page using function for comparing three integers and print the largest number .
2. Write a function to calculate of a number (non negative integer). The function accept the number as an argument.
3. WAP to check whether the given number is prime or not.
4. Create a PHP page which accepts string from user. After submission that page displays the reverse 0f provided string.
5. Write a PHP function that checks if a string is all lower case.
6. Write a PHP script that checks whether a passed string is palindrome or not? (A palirndrome run word, phrase, or sequence that read the same backward as forward ,e.g.,madam or nurses run)
7. WAP to sort an array.
8. Write a PHP script that removes the whitespaces from a string.

   Sample string : The quick “” brown fox’

   Expected Output:Thequick“”brownfox
9. Write a PHP script that finds out the sun of First n odd number.
10. Create a long page having user name and password. On clicking submit, a welcome massage should be displayed if the user is already regised (i.e. name is present in the database) otherwise error Message should be displayed.
11. Write a PHP script that checks if a string contains another string.

12. Create a simple 'birthday countdown' script, the script will count the number of days between current day and birthday.

13. Create a scrit to construct the following pattern, using nested for loop.*

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14. Write a simple PHP program to check that emails are valid.

15. WAP to print first n even numbers.

16. $color = array ('white', green, 'red") write a PHP script which will display the colors in the following way: Output :white, green, red ?green? red ?white

17. Using switch case and dropdown list display a –Hello message depending on the language selected in drop down list.

18. Write a PHP program to print Fibonacci series using recursion.

19. Write a PHP script to replace the first 'the' of the following string with 'That'.

Sample : 'the quick brown fox jumps over the lazy dog'.

Expected Result: that quick brown fox jumps over the lazy dog.

Semester-IV

Course Code-SEC-201

Programming using MATLAB Credit-01

Unit Contents

1. Introduction to Programming: Components of a computer, working with numbers,Machine code, Software hierarchy.

2. Programming Environment: MATLAB Window, A First Program, Expressions, Constants, Variables and assignment statement, Arrays.

Graph Plots: Basic Plotting, Build in functions, Generating waveforms, Sound replay, load and save.

3. Procedures and Functions: Arguments and return values, M-files, Formatted console input-output, String handling.

4. Control Statements: Conditional statements: If, Else, Else-if, Repetition statements: While, for loop.

Manipulating Text: Writing to a text file, Reading from a text file, Reading from a text file, Randomising and sorting a list, searching a list.

5. GUI Interface: Attaching buttons to actions, Getting Input, Setting Output.

Recommended Books:

SL. No. Book Name

1. MATLAB: An Introduction with Applications, by Amos Gilat, 2nd edition, wiley, 2004, ISBN-13 978-0471694205.

2. C.B. Moler, Numerical Computing with MATLAB, SIAM, 2004. Available online at http://www.mathworks.com/moler/index_ncm.html.

Semester-IV

Course Code-SEC-201-PR

Software Lab Based on MATLABCredit-01

SL. No. Program

1. Write a program to assign the following expression to a variable A and then to print out the value of A.

   a. (3+4)/(5+6)

   b.

   c.

   d. (0.0000123+5.67*10.3)*0.4567*10-4

2. Celsius temperatures can be converted to Fahrenheit by multiplying by 9, dividing by 5, and adding 32. Assign a variable called C the value 37, and implement this formula to assign a variable F the Fahrenheit equivalent of 37 Celsius.

3. Set up a vector called N with five elements having the values: 1, 2, 3, 4, 5. Using N, create assignment statements for a vector X which will result in X having these values:

   a. 2, 4, 6, 8, 10

   b. 1/2, 1, 3/2, 2, 5/2

   c. 1, 1/2, 1/3,1/4 1/5

   d. 1, 1/4, 1/9, 1/16, 1/25

4. A supermarket conveyor belt holds an array of groceries. The price of each product (in pounds) is [0.6, 1.2, 0.5, 1.3]; while the number of each product are [3,2,1,5].

Use MATLAB to calculate the total bill.

5. The sortrows (x) function will sort a vector or matrix X into increasing row order. Use this function to a sort a list of names into alphabetical order.

6. The –identity matrix is a square matrix that has ones on the diagonal and zeros elsewhere. You can generate one with the eye() function in MATLAB. Use MATLAB to find a matrix B, such that when multiplied by matrix A=[1 2; -1 0] the identity matrix I=[1 0; 0 1] is generated. That is A*B=I.

7. Create an array of N numbers. Now find a single MATLAB statement that picks out from that array the 1,4,9,16,..., √7th entries, i.e. those numbers which have indices that are square numbers.

8. Draw a graph that joins the points (0,1), (4,3), (2,0) and (5<-2).

9. The seeds on a sunflower are distributed according to the formula below. Plot a small circle at each of first 1000 co-ordinates.

10. Calculate 10 approximate poits from the function y=2x by using the formulae:

c. xn = n

d. yn = 2n + rand – 0.5

Fit a line of best fit to these points using the function polyfit() with degree=1, and generate co-ordinates from the line of best fit using polyval() . Use the on-line help to find out how to use these functions. Plot the row data and the line of best fit.

Calculate and replay 1 second of a sinewave at 500Hz with a sampling rate of 11025Hz. Save the sound to a file called “ex35. wav”. Plot the first 100 samples.

11. Calculate and replay a 2 second chirp. That is, a sinusoid that steadily increases in frequency with time, from say 250Hz at the start to 1000Hz at the end.

12. Build a square wave by adding together 10 odd harmonics: 1f, 3f, 5f,etc. The amplitude of the nth harmonic should be 1/n. Display a graph of one cycle of the result superimposed on the individual harmonics.

13. Write a function called FtoC (ftoc .m) to convert Fahrenheit temperatures into Celsius. Make sure the program has a title command window with:

Test from the command window with:

1. FtoC(96)

2. Lookfor Fahrenheit

3. Help FtoC

14. Write a program to input 2 strings from the user and to print out.

1. The concatenation of the two strings with a space between them,

2. A line of asterisks the same length as the concatenated strings, and

3. The reversed concatenation.

For Example :

Enter string 1 : Mark

Enter String 2 : Huckvale

The Output will be

Mark Huckvale

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elavkcuH kraM

Paper Code SEC-301

Online Learning Course of “SWAYAM” or Course offered by any other University

Credit-02

*The students will have to register themselves in the “SWAYAM” Portal and select a course of their choice. On completion students have to submit ‘**course completion certificate’**.