

**Proposed Syllabus and Scheme
of Examination**

for

**B Sc. HONOURS
WITH
COMPUTER SCIENCE**

Under

Choice Based Credit System

**Department of Computer
Science
Himachal Pradesh University
Shimla**

Course Structure (Computer Science-Major)

Details of courses under B.Sc. (Honors)

Course	*Credits	
	Theory + Practical	Theory +Tutorial
I. Core Course		
(14 Papers)	14X4=56	14X5=70
Core Course Practical/Tutorial*		
(14Papers)	14X2=28	14X1=14
II. Elective Course		
(8Papers)		
A.1.DisciplineSpecificElective	4X4=16	4X5=20
(4Papers)		
A.2.DisciplineSpecificElective		
Practical/Tutorial*	4X2=8	4X1=4
(4Papers)		
B.1.GenericElective/ Interdisciplinary	4X4=16	4X5=20
(4Papers)		
B.2.GenericElective		
Practical/Tutorial*	4X2=8	4X1=4
(4Papers)		
<ul style="list-style-type: none"> • Optional Dissertation or project work in place of one Discipline Specific Elective paper (6 credits) in 6thSemester 		
III. Ability Enhancement Courses		
1.AbilityEnhancementCompulsory		
(2 Papers of 4 credit each)	2X4=8	2X4=8
Environmental Science		
English/MIL Communication		
2.AbilityEnhancementElective(Skill Based)		
(Minimum2)	2X4=8	2X4=8
(2 Papers of 4 credit each)		
Total credit	148	148
Institute should evolve a system/policy about ECA/ General Interest/Hobby/Sports/NCC/NSS/related courses on its own. *wherever there is a practical there will be no tutorial and vice-versa		

PROPOSED SCHEME FOR CHOICE BASED CREDIT SYSTEM IN
B. Sc. Honours (Computer Science)

Semes-ter	Core Course (DSC) = 14 *Credits(Core Course) Theory + Practical / Tutorial= 6 each	Ability Enhancement Course (AESCC) =2 *Credits (AECC) = 4 each	Skill Enhancement Course (SEC)=2 *Credits(SEC) Theory + Practical/ Tutorial = 4 each	Elective: Discipline Specific (DSE)=4 *Credits(DSE) Theory + Practical/ Tutorial = 6 each	Elective : Generic (GE)=4 *Credits(GE) Theory + Practical/ Tutorial = 6 each	Total No. of courses per Semester	Total Credits earned per Semester
I	C- 1. Programming Fundamentals using C/C++ (4 Theory + 4 Lab) C-II. Computer System Architecture (5 Theory + 1 Tutorial)	English			GE-1 [4 Theory + 2 lab / 5 Theory + 1 Tutorial] *[Choose Four (04) papers of anyone discipline specified in the GE list. GE-1 to GE-4]	DSC =2 AECC=1 GE =1 <hr/> 4	DSC=2*6=12 AECC=1*4=4 GE =1*6 = 06 <hr/> 22 Credits Earned through Computer Subjects=12
II	C-III. Programming in JAVA (4 Theory +4 Lab) C-IV Discrete Structures (5+ 1 Tutorial)	Environ-mental Science			GE-2 [4 Theory +2 lab / 5 Theory +1 Tutorial]	DSC = 2 AECC=1 GE = 1 <hr/> 4	DSC=2*6 = 12 AECC=1*4=04 GE = 1*6 = 06 <hr/> 22 Credits Earned through Computer Subjects=12
III	C-V. Data Structures (4 Theory + 4 Lab) C-VI. Operating Systems (4 Theory + 4 Lab) C- VII. Computer Networks (5 Theory + 1 Tutorial)		SEC -1 [3 Theory + 2 lab]		GE-3 [4 Theory +2 lab / 5 Theory + 1 Tutorial]	DSC = 3 SEC = 1 GE = 1 <hr/> 5	DSC=3*6=18 SEC=1*4=04 GE = 1*6=06 <hr/> 28 Credits Earned through Computer Subjects=22
IV	C-VIII. Design and Analysis of Algorithms (4 Theory + 4 Lab) C-IX. Software Engineering (4 Theory + 4 Lab) C-X. Database Management Systems (4 Theory + 4 Lab)		SEC -2 [3 Theory + 2 lab]		GE-4 [4 Theory +2 lab / 5 Theory + 1 Tutorial]	DSC = 3 SEC = 1 GE = 1 <hr/> 5	DSC=3*6=18 SEC=1*4= 04 GE=1*6 = 06 <hr/> 28 Credits Earned through Computer Subjects=22

V	C- XI. Internet Technologies C-XII. Theory of Computation (5 Theory + 1 Tutorial)			DSE-1. (4 Theory + 4 Lab) <i>*[Choose any Three (03) from the DSE List.</i> <i>DSE-1 to DSE-3]</i> DSE-2. (4 Theory + 4 Lab)		DSC = 2 DSE = 2 <hr/> 4	DSC = 2*6=12 DSE = 2*6=12 <hr/> 24 Credits Earned through Computer Subjects=24
VI	C-XIII. Software Testing (4 Theory + 4 Lab) XIV. Computer Graphics (4 Theory + 4 Lab)			DSE-3. (4 Theory + 4 Lab) DSE-4. Project Work (4 Theory + 4 Lab) <i>*Compulsory for all</i>		DSC = 2 DSE = 2 <hr/> 4	DSC = 2*6=12 DSE = 2*6=12 <hr/> 24 Credits Earned through Computer Subjects=24

Total credits earned in all semesters (in all subjects) =22+22+28+28+24+24=148 credits

Total credits earned through Computer Science in all semesters=12+12+22+22+24+24=116 credits

Total credits earned through Computer Science in odd semesters (I+III+V) =12+22+24=58 credits

Total credits earned through Computer Science in even semesters (II+IV+VI) = 12+22+24=58credits

=> Number of Assistant Prof. (Computer Application) required to run the course=04

- Practical / Tutorial are with every core and discipline/ Generic specific papers.
 - Whenever there is practical there will be no tutorials and vice versa.
 - No. of Practical=4 periods / week for Practical of 2 credits. No. of Tutorial=1 Period / week for Tutorial of 1 credit.
 - Credits for Core Course Paper (DSC) =
 - Theory with Practical:** Theory [4 credits] (4 Period / week) + Practical [2 credit] (4 Period / week) = Total [Six (06) credits] (Total Eight (8) periods/week).
 - Theory with Tutorial:** Theory +Tutorial [5+1credits] = Total [Six (06) credits] (Total Six (6) periods/week).
 - Size of Practical group for practical papers is recommended to be 10-15 students.
 - Project Work: Out of four (04) DSE papers to be selected in all. one of the (DSE) Elective DSE-4 Project Work is compulsory and is to be studied in VI semester. Therefore, in the Vth (2 DSE papers that is DSE-1 and DSE -2) and VIth semester (2 DSE papers, one DSE-3 is to be selected from the DSE list and DSE-4 Project Work is mandatory for all students in 6th semester. Therefore only three (3) papers are to be selected among the DSE paper list.
- For Project Work the students should work on any concepts studied in core/ elective/ skill based courses. The group size should be maximum of three (03) students. A maximum of four (04) Projects would be assigned to one teacher.
- * Total Marks distribution for each Generic Elective (GE) paper with Tutorials = Theory + Tutorial=ESE (Theory) [80] + CCA (IA) [20] = 80+20 =100
- Total Marks distribution for each GE paper with Practical
Theory= ESE (Theory) [80] +CCA (IA) [20] = 80+20 =100 and
Practical= ESE (Theory) [80] +CCA (IA)[20]= 80+20 =100

Semes-ter	Course Opted	Course Name	Cred-its	COURSE CODE	ESE (Theory)	CCA (IA)	Total Marks
I	Ability Enhancement Compulsory Course-I	English	4		80	20	100
	Core course-I	Programming Fundamentals using C/C++	4	BHCS101	80	20	100
	Core Course-I Practical	Programming Fundamentals using C/C++ Lab	2	BHCS101 (P)	80	20	100
	Core course-II	Computer System Architecture (Theory + Tutorial)	6	BHCS102	80	20	100

	GenericElective-1	GE-1	4	<i>*Select from the GE list</i>	80	20	100
	GenericElective-1 Practical		2		80	20	100
	Ability Enhancement Compulsory Course-II	Environmental Science	4		80	20	100
II	Core course-III	Programming in JAVA	4	BHCS201	80	20	100
	Core Course-III Practical	Programming in JAVA Lab	2	BHCS201(P)	80	20	100
	Core Course-IV	Discrete Structures (Theory + Tutorial)	6	BHCS202	80	20	100
	GenericElective-2	GE-2	4	<i>*Select for the GE list</i>	80	20	100
	GenericElective-2 Practical		2		80	20	100
III	Core Course-V	Data Structures	4	BHCS301	80	20	100
	Core Course-V Practical	Data Structures Lab	2	BHCS301(P)	80	20	100
	Core Course-VI	Operating Systems	4	BHCS302	80	20	100
	Core Course-VI Practical	Operating Systems Lab	2	BHCS302(P)	80	20	100
	Core Course-VII	Computer Networks (Theory+ Tutorial)	6	BHCS303	80	20	100
	Skill Enhancement Course-1	SEC-1	3	<i>*Select from the SEC list</i>	80	20	100
	Skill Enhancement Course-1 Practical	SEC-1 Practical	1		80	20	100
	GenericElective-3	GE-3	4	<i>*Select from the GE list</i>	80	20	100
	GenericElective-3 Practical		2		80	20	100
IV	Core Course-VIII	Design and Analysis of Algorithms	4	BHCS401	80	20	100
	Core Course-VIII Practical	Design and Analysis of Algorithms Lab	2	BHCS401(P)	80	20	100
	Core Course-IX	Software Engineering	4	BHCS402	80	20	100
	Core Course-IX Practical	Software Engineering Lab	2	BHCS402(P)	80	20	100
	Core Course-X	Database Management Systems	4	BHCS403	80	20	100
	Core Course-X Practical	Database Management Systems Lab	2	BHCS403(P)	80	20	100
	Skill Enhancement Course-2	SEC-2	3	<i>Select from the Sec list</i>	80	20	100
	Skill Enhancement Course-2 Practical	SEC-2 Practical	1		80	20	100
	Generic Elective-4	GE-4	4	<i>*Select for the GE list</i>	80	20	100
	GenericElective-4 Practical		2		80	20	100
V	Core Course-XI	Internet Technologies	4	BHCS501	80	20	100
	Core Course-XI Practical	Internet Technologies Lab	2	BHCS501(P)	80	20	100
	Core Course-XII	Theory of Computation (Theory+ Tutorial)	6	BHCS502	80	20	100
	Discipline Specific Elective-1	DSE-1	4	<i>Select from the DSE list</i>	80	20	100
	Discipline Specific Elective-1 Practical	DSE-1 Lab	2		80	20	100

	Discipline Specific Elective-2	DSE-2	4	<i>*Select from the DSE list</i>	80	20	100
	Discipline Specific Elective-2 Practical	DSE-2 Lab	2		80	20	100
VI	Core course-XIII	Software Testing	4	BHCS601	80	20	100
	Core course-XIII Practical	Software Testing Lab	2	BHCS601(P)	80	20	100
	Core course-XIV	Computer Graphics	4	BHCS602	80	20	100
	Core course-XIV Practical	Computer Graphics Lab	2	BHCS602(P)	80	20	100
	Discipline Specific Elective-3	DSE-3	4	<i>*Select from the DSE list</i>	80	20	100
	Discipline Specific Elective-3 Practical	DSE-3 Lab	2		80	20	100
	Discipline Specific Elective-4 Project Work <i>*(Compulsory for All)</i>	DSE-4 (Project Work)	6		80	20	100
Total Credits			148				

The passing marks for each component (ESE- Theory/ Practical and CCA- Theory/ Practical) will be 45% and the candidate has to qualify each component separately to be declared successfully qualified.

Core Papers: Discipline Specific Compulsory (DSC) in Computer Science

Core Papers (DSC): Computer Science (Credit: 06 each) (1 period / week for tutorials or 4 periods /week of practical)

S. No.	Core Course	Course Code	Course Name	No. of Periods / week
1.	Core Course-I	BHCS101 BHCS101(P)	Programming Fundamentals using C/C++	4 Theory + 4 Lab=8
2.	Core Course-II	BHCS102	Computer System Architecture	5 Theory+1 Tutorial=6
3.	Core Course-III	BHCS201 BHCS201(P)	Programming in JAVA	4 Theory + 4 Lab=8
4.	Core Course-IV	BHCS202	Discrete Structures	5 Theory+1 Tutorial=6
5.	Core Course-V	BHCS301 BHCS301(P)	Data Structures	4 Theory + 4 Lab=8
6.	Core Course-VI	BHCS302 BHCS302(P)	Operating Systems	4 Theory + 4 Lab=8
7.	Core Course-VII	BHCS303 BHCS303(P)	Computer Networks	5 Theory+1 Tutorial=6
8.	Core Course-VIII	BHCS401 BHCS401(P)	Design and Analysis of Algorithms	4 Theory + 4 Lab=8
9.	Core Course-X	BHCS401 BHCS401(P)	Software Engineering	4 Theory + 4 Lab=8
10.	Core Course-X	BHCS403 BHCS403(P)	Database Management Systems	4 Theory + 4 Lab=8
11.	Core Course-XI	BHCS501 BHCS501(P)	Internet Technologies	4 Theory + 4 Lab=8

12.	Core Course- XII	BHCS502	Theory of Computation	5 Theory+1Tutorial=6
13.	Core Course- XIII	BHCS601 BHCS601(P)	Software Testing	4 Theory + 4 Lab=8
14.	Core Course- XIV	BHCS602 BHCS602(P)	Computer Graphics	4 Theory + 4 Lab=8

List of Discipline Specific Elective (DSE) Papers:

Discipline Specific Elective Papers: (Credit: 06 each) (4 papers to be selected) – DSE-1 to DSE- 4

* DSE-4 Project Work is mandatory for all students in 6th semester.

One of the compulsory DSE papers in VI semester is DSE-4 Project Work. Therefore, from total four (04) DSE papers to be selected in total only three (3) papers are to be selected among the DSE paper list.

Therefore, in the Vth Semester (2 DSE papers that is DSE-1 and DSE -2) are to be selected from the list and out of 2 DSE papers in VIth semester one DSE-3 is to be selected from the list and the other DSE-4 Project Work is mandatory for all.

S. No.	Course Code	Course Name	No. of Periods / week
1.	BHCS DSE1 BHCS DSE1(P)	Information Security	(4 Theory + 4 Lab)
2.	BHCS DSE2 BHCS DSE2(P)	Microprocessor	(4 Theory + 4 Lab)
3.	BHCS DSE3 BHCS DSE3(P)	Digital Image Processing	(4 Theory + 4 Lab)
4.	BHCS DSE4 BHCS DSE4(P)	Cloud Computing	(4 Theory + 4 Lab)
5.	BHCS DSE5 BHCS DSE5(P)	Numerical Methods	(4 Theory + 4 Lab)
6.	BHCS DSE6 BHCS DSE6(P)	System Programming	(4 Theory + 4 Lab)
7.	BHCS DSE7 BHCS DSE7(P)	Data Mining	(4 Theory + 4 Lab)
8.	BHCS DSE8 BHCS DSE8(P)	DSE – 4 Project Work (*Compulsory for All)	(4 Theory + 4 Lab)

List of other Discipline (Four papers of anyone discipline) – GE-1 to GE-4

* Select any one discipline of importance

Elective: Generic (GE) = 4 Papers are to be selected

*Credits of each GE paper, Theory + Practical / Theory + Tutorial = 6 credits for each paper

*Total Marks distribution for each **GE paper with Tutorials** = Theory + Tutorial=ESE (Theory) [80] +CCA (IA) [20] = 80+20 =**100**

Total Marks distribution for each **GE paper with Practical**

(i) **Theory**= ESE (Theory) [80] +CCA (IA) [20] = 80+20 =**100**

(ii) **Practical**= ESE (Theory) [80] +CCA (IA) [20] = 80+20 =**100**

S. No.	Discipline	Total periods / week for Papers with Tutorial [5 Theory +1 Tutorial] credits= 6 credits	Total periods / week for Papers with Practical [4 Theory +2 Lab] credits= 6 credits
1.	Mathematics	5 Periods (Theory) +1 Period (Tutorial)= 6 Periods / week	4 Periods (Theory)+4 Periods (Lab)= 8 Periods / week
2.	Statistics	5 Periods (Theory) +1 Period (Tutorial)= 6 Periods / week	4 Periods (Theory)+4 Periods (Lab)= 8 Periods / week
3.	Operational Research	5 Periods (Theory) +1 Period (Tutorial)= 6 Periods / week	4 Periods (Theory)+4 Periods (Lab)= 8 Periods / week
4.	Physics	5 Periods (Theory) +1 Period (Tutorial)= 6 Periods / week	4 Periods (Theory)+4 Periods (Lab)= Periods / week

5.	Electronics	5 Periods (Theory) +1 Period (Tutorial)= 6 Periods / week	4 Periods (Theory)+4 Periods (Lab)= 8 Periods / week
6.	Commerce	5 Periods (Theory) +1 Period (Tutorial)= 6 Periods / week	4 Periods (Theory)+4 Periods (Lab)= 8 Periods / week
7.	Economics	5 Periods (Theory) +1 Period (Tutorial)= 6 Periods / week	4 Periods (Theory)+4 Periods (Lab)= 8 Periods / week

List of Skill Enhancement Courses (02 papers) (Credit: 04 each) – SEC1 to SEC2

Skill Enhancement Courses (02 papers)

S. No.	Course Code	Course Name	No. of Periods / week
1.	BHCSSEC1 BHCSSEC1(P)	Android Programming	(3 Theory + 2 Lab)
2.	BHCSSEC2 BHCSSEC2(P)	Programming in MATLAB	(3 Theory + 2 Lab)
3.	BHCSSEC3 BHCSSEC3(P)	HTML Programming	(3 Theory + 2 Lab)
4.	BHCSSEC4 BHCSSEC4(P)	Oracle (SQL/PL-SQL)	(3 Theory + 2 Lab)
5.	BHCSSEC5 BHCSSEC5(P)	PHP Programming	(3 Theory + 2 Lab)
6.	BHCSSEC6 BHCSSEC6(P)	UNIX/LINUX Fundamentals using C/C++	(3 Theory + 2 Lab)

List of Generic Elective Papers (GE)

(Minor – Computer Science)

(Choose any four) for other Departments/Disciplines: (Credit: 06 each)

S. No.	Course Code	Course Name	No. of Periods / week
1.	BHCSGE1 BHCSGE1(P)	Computer Fundamentals	(4 Theory + 4 Lab)
2.	BHCSGE2 BHCSGE2(P)	Introduction to Database Systems	(4 Theory + 4 Lab)
3.	BHCSGE3 BHCSGE3(P)	Introduction to Programming Data Structures	(4 Theory + 4 Lab)
4.	BHCSGE4 BHCSGE4(P)	Computer Networks and Internet Technologies	(4 Theory + 4 Lab)
5.	BHCSGE5 BHCSGE5(P)	Multimedia and Applications	(4 Theory + 4 Lab)
6.	BHCSGE6 BHCSGE6(P)	Software Engineering	(4 Theory + 4 Lab)
7.	BHCSGE7 BHCSGE7(P)	Information Security and Cyber Laws	(4 Theory + 4 Lab)
8.	BHCSGE8 BHCSGE8(P)	Web and E-Commerce Technologies	(4 Theory + 4 Lab)

CORE COURSES (HONOURS IN COMPUTER SCIENCE)

COMPUTER SCIENCE (C-I)

Programming Fundamentals using C/C++

Theory: 60 Lectures

UNIT-1

Basics (4 Lectures): Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putchar etc), Formatted and Console I/O (printf(), scanf(), cin, cout), Using Basic Header Files (stdio.h, iostream.h, conio.h etc).

Expressions, Conditional Statements and Iterative Statements (5 Lectures): Simple Expressions in C++ (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operators

Introduction to C and C++ (3 Lectures): History of C and C++, Overview of Procedural Programming and Object-Orientation Programming, Using main () function, Compiling and Executing Simple Programs in C++.

Data Types, Variables, Constants, Operators and Basic I/O (3 Lectures): Declaring, Defining and Initializing Precedence in Expressions, Conditional Statements (if construct, switch-case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative)

UNIT-2

Functions and Arrays (10 Lectures): Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Inline Functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Command Line Arguments/Parameters in Functions, Functions with variable number of Arguments.

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

Derived Data Types (Structures and Unions) (5 Lectures): Understanding utility of structures and unions, Declaring, initializing and using simple structures and unions, Manipulating individual members of structures and unions.

UNIT-3

Pointers and References in C++(7 Lectures):Understanding a Pointer Variable, Simple use of Pointers (Declaring and Dereferencing Pointers to simple variables), Pointers to Pointers, Pointers to structures, Problems with Pointers, Passing pointers as function arguments, Returning a pointer from a function, using arrays as pointers, Passing arrays to functions. Pointers vs References, Declaring and initializing references.

Memory Allocation in C++(3 Lectures):Differentiating between static and dynamic memory allocation, use of malloc, calloc and free functions, use of new and delete operators, storage of variables in static and dynamic memory allocation

File I/O, Preprocessor Directives(5 Lectures): Opening and closing a file (use of fstream header file, ifstream, ofstream and fstream classes), Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files, Understanding the Preprocessor Directives (#include, #define, #error, #if, #else, #elif, #endif, #ifdef, #ifndef and #undef), Macros

UNIT-4

Using Classes in C++ (5 Lectures):Principles of Object-Oriented Programming, Defining & Using Classes, Class Constructors, Constructor Overloading, Function overloading in classes, Class Variables &Functions, Objects as parameters, Specifying the Protected and Private Access, Copy Constructors.

Overview of Function Overloading and Operator Overloading(5 Lectures): Need of Overloading functions and operators, Overloading functions by number and type of arguments, Looking at an operator as a function call, Overloading Operators (including assignment operators, unary operators)

Inheritance, Polymorphism and Exception handling (5 Lectures): Introduction to Inheritance (Multi-Level Inheritance, Multiple Inheritance), Polymorphism (Virtual Functions, Pure Virtual Functions), Basics Exceptional Handling (using catch and throw, multiple catch statements).

Reference Books:

1. HerbtzSchildt, "C++: The Complete Reference", Fourth Edition, McGraw Hill.2003
2. BjarneStroustrup, "The C++ Programming Language", 4th Edition, Addison-Wesley, 2013.
3. BjarneStroustrup, "Programming -- Principles and Practice using C++", 2nd Edition, Addison-Wesley 2014.
4. E Balaguruswamy, "Object Oriented Programming with C++", Tata McGraw-Hill Education, 2008.
- 5.Paul Deitel, Harvey Deitel, "C++ How to Program", 8th Edition, Prentice Hall, 2011.
6. John R. Hubbard, "Programming with C++", Schaum's Series, 2nd Edition, 2000.
7. Andrew Koeni, Barbara, E. Moo, "Accelerated C++", Published by Addison-Wesley , 2000.
8. Scott Meyers, "Effective C++", 3rd Edition, Published by Addison-Wesley, 2005.
9. Harry, H. Chaudhary, "Head First C++ Programming: The Definitive Beginner's Guide", First Create space Inc, O-D Publishing, LLC USA.2014
- 10.Walter Savitch, "Problem Solving with C++", Pearson Education, 2007.
11. Stanley B. Lippman, JoseeLajoie, Barbara E. Moo, "C++ Primer", Published by Addison-Wesley, 5th Edition, 2012

**COMPUTER SCIENCE LAB (C-I):
Programming Fundamentals using C/C++ Lab**

Practical: 60 Lectures

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 numbers less than 100.
7. WAP to compute the factors of a given number.
8. Write a macro that swaps two numbers. WAP to use it.
9. WAP to print a triangle of stars as follows (take number of lines from user):
*

10. WAP to perform following actions on an array entered by the user:
i) Print the even-valued elements

- ii) Print the odd-valued elements
- iii) Calculate and print the sum and average of the elements of array
- iv) Print the maximum and minimum element of array
- v) Remove the duplicates from the array
- vi) Print the array in reverse order

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

11. WAP that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.
12. Write a program that swaps two numbers using pointers.
13. Write a program in which a function is passed address of two variables and then alter its contents.
14. Write a program which takes the radius of a circle as input from the user, passes it to another function that computes the area and the circumference of the circle and displays the value of area and circumference from the main() function.
15. Write a program to find sum of n elements entered by the user. To write this program, allocate memory dynamically using malloc() / calloc() functions or new operator.
16. Write a menu driven program to perform following operations on strings:
 - a) Show address of each character in string
 - b) Concatenate two strings without using strcat function.
 - c) Concatenate two strings using strcat function.
 - d) Compare two strings
 - e) Calculate length of the string (use pointers)
 - f) Convert all lowercase characters to uppercase
 - g) Convert all uppercase characters to lowercase
 - h) Calculate number of vowels
 - i) Reverse the string
17. Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered array.
18. WAP to display Fibonacci series (i) using recursion, (ii) using iteration
19. WAP to calculate Factorial of a number (i) using recursion, (ii) using iteration
20. WAP to calculate GCD of two numbers (i) with recursion (ii) without recursion.
21. Create Matrix class using templates. Write a menu-driven program to perform following Matrix operations (2-D array implementation):
 - a) Sum b) Difference c) Product d) Transpose
22. 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.
23. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
24. Write a program to retrieve the student information from file created in previous question and print it in following format:

Roll No. Name Marks
25. Copy the contents of one text file to another file, after removing all whitespaces.

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

COMPUTER SCIENCE (C-II)

Computer System Architecture

Theory: 60 Lectures

UNIT-1

Introduction (5 lectures): Logic gates, boolean algebra, combinational circuits, circuit simplification, flip-flops and sequential circuits, decoders, multiplexers, registers, counters and memory units.

Data Representation and Basic Computer Arithmetic (10 lectures): Number systems, complements, fixed and floating point representation, character representation, addition, subtraction, magnitude comparison, multiplication and division algorithms for integers

UNIT-2

Basic Computer Organization and Design (15 lectures): Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference, input -output and interrupt, Interconnection Structures, Bus Interconnection design of basic computer.

UNIT-3

Central Processing Unit (15 lectures): Register organization, arithmetic and logical micro-operations, stack organization, micro programmed control. Instruction formats, addressing modes, instruction codes, machine language, assembly language, input output programming, RISC, CISC architectures, pipelining and parallel architecture.

UNIT-4

Memory Organization (6 lectures): Cache memory, Associative memory, mapping.

Input-Output Organization (9 lectures): Input / Output: External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels.

Reference Books:

1. M. Mano, Computer System Architecture, Pearson Education 1992
2. A. J. Dos Reis, Assembly Language and Computer Architecture using C++ and JAVA, Course Technology, 2004
3. W. Stallings, Computer Organization and Architecture Designing for Performance, 8th Edition, Prentice Hall of India, 2009
4. M.M. Mano , Digital Design, Pearson Education Asia, 2013
5. Carl Hamacher, Computer Organization, Fifth edition, McGrawHill, 2012.

COMPUTER SCIENCE Tutorial (C-II): Tutorial

Computer System Architecture

Tutorial: 15 lectures

COMPUTER SCIENCE (C-III)

Programming in Java

Theory: 60 Lectures

UNIT-1

Introduction to Java(15 Lectures): 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)

UNIT-2

Arrays, Strings and I/O (9 Lectures): 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 Strings To & From Methods, String Buffer Classes, Simple I/O using System.out and the Scanner class, Byte and Character streams, Reading/Writing from console and files.

Object-Oriented Programming Overview (6 Lectures):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.

UNIT-3

Inheritance, Interfaces, Packages, Enumerations, Autoboxing and Metadata (15 lectures)

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 (util, lang, io, net), Wrapper Classes, Autoboxing/Unboxing, Enumerations and Metadata.

UNIT-4

Exception Handling, Threading, Networking and Database Connectivity (08 Lectures)

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.

Applets and Event Handling 07 Lectures): Java Applets: Introduction to Applets, Writing Java Applets, Swing components of Java Foundation Classes such as labels, buttons, text fields, layout managers, menus, events and listeners.

Reference Books

1. Ken Arnold, James Gosling, David Homes, "The Java Programming Language", 4th Edition, 2005.
2. James Gosling, Bill Joy, Guy L Steele Jr, GiladBracha, Alex Buckley" The Java Language Specification, Java SE 8 Edition (Java Series)", Published by Addison Wesley, 2014.
3. Joshua Bloch, "Effective Java" 2nd Edition,Publisher: Addison-Wesley, 2008.
4. Cay S. Horstmann, GaryCornell, "Core Java 2 Volume 1, 9th Edition,Printice Hall.2012
5. Cay S. Horstmann, Gary Cornell, "Core Java 2 Volume 2 - Advanced Features)", 9th Edition, Printice Hall.2013
6. Bruce Eckel, "Thinking in Java", 3rd Edition, PHI, 2002.
7. E. Balaguruswamy, "Programming with Java", 4th Edition, McGraw Hill.2009.
8. Paul Deitel, Harvey Deitel, "Java: How to Program", 10th Edition, Prentice Hall, 2011.
9. "Head First Java", Orielly Media Inc. 2nd Edition, 2005.
10. David J. Eck, "Introduction to Programming Using Java", Published by CreateSpace Independent Publishing Platform, 2009.
11. John R. Hubbard, "Programming with JAVA", Schaum's Series, 2nd Edition, 2004.

COMPUTER SCIENCE LAB (C-III)

Programming in Java Lab

Practical: 60 Lectures

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 argument
8. Write a program that show working of different functions of String and String Buffer class like setCharAt(), setLength(), 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 object 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 —Divide By Zeroll that takes two numbers a and b as input, computes a/b, and invokes Arithmetic Exception to generate a message when the denominator is zero.
17. Write a program to show the use of nested try statements that emphasizes the sequence of checking for catch handler statements.
18. 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).
19. Write a program to demonstrate priorities among multiple threads.

COMPUTER SCIENCE (C-IV)

Discrete Structures

Theory 60 Lectures

UNIT-1

Introduction (15 Lectures): Sets - finite and Infinite sets, uncountably Infinite Sets; functions, relations, Properties of Binary Relations, Closure, Partial Ordering Relations; counting - Pigeonhole Principle, Permutation and Combination; Mathematical Induction, Principle of Inclusion and Exclusion.

UNIT-2

Growth of Functions (8 Lectures): Asymptotic Notations, Summation formulas and properties
Recurrences (07Lectures): Recurrence Relations, generating functions

UNIT-3

Graph Theory (15 Lectures): Basic Terminology, Models and Types, multigraphs and weighted graphs, Graph Representation, Graph Isomorphism, Connectivity, Euler and Hamiltonian Paths and Circuits, Planar Graphs, Graph Coloring, Trees, Basic Terminology and properties of Trees, Introduction to Spanning Trees

UNIT-4

Propositional Logic (15 Lectures): Logical Connectives, Well-formed Formulas, Tautologies, Equivalences, Inference Theory

Reference Books:

1. C.L. Liu , D.P. Mahopatra, Elements of Discrete mathematics, 2nd Edition , Tata McGraw Hill, 1985,
2. Kenneth Rosen, Discrete Mathematics and Its Applications, Sixth Edition ,McGraw Hill 2006
3. T.H. Cormen, C.E. Leiserson, R. L. Rivest, Introduction to algorithms, 3rd edition Prentice Hall on India, 2009
4. M. O. Albertson and J. P. Hutchinson, Discrete Mathematics with Algorithms , John wiley Publication, 1988
5. J. L. Hein, Discrete Structures, Logic, and Computability, 3rd Edition, Jones and Bartlett Publishers, 2009
6. D.J. Hunter, Essentials of Discrete Mathematics, Jones and Bartlett Publishers, 2008

COMPUTER SCIENCE LAB (C-IV):

Discrete Structures Tutorial

Tutorial: 15

COMPUTER SCIENCE (C-V):

Data Structures

Theory: 60 Lectures

UNIT-1

Arrays(5 Lectures)

Single and Multi-dimensional Arrays, Sparse Matrices (Array and Linked Representation)

Stacks (10 Lectures)

Implementing single / multiple stack/s in an Array; Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another; Applications of stack; Limitations of Array representation of stack

UNIT-2

Linked Lists:

Singly, Doubly and Circular Lists (Array and Linked representation); Normal and Circular representation of Stack in Lists Queues (**10 Lectures**)

Array and Linked representation of queue, De-queue, Priority Queues, Array and Linked representation of Queue, De-queue, Priority Queues (**5 Lectures**)

UNIT-3

Trees (8 Lectures) Introduction to Tree as a data structure; Binary Trees (Insertion, Deletion , Recursive and Iterative Traversals on Binary Search Trees); Threaded Binary Trees (Insertion, Deletion, Traversals); Height-Balanced Trees (Various operations on AVL Trees).

UNIT-4

Searching and Sorting (10 Lectures): Linear Search, Binary Search, Comparison of Linear and Binary Search, Selection Sort,

Insertion Sort, Insertion Sort, Shell Sort, Comparison of Sorting Techniques

Hashing(5 Lectures): Introduction to Hashing, Deleting from Hash Table, Efficiency of Rehash Methods, Hash Table Reordering.

Reference Books:

1. Adam Drozdek, "Data Structures and algorithm in C++", Third Edition, Cengage Learning, 2012.
2. SartajSahni, Data Structures, "Algorithms and applications in C++", Second Edition, Universities Press, 2011.

3. Aaron M. Tenenbaum, Moshe J. Augenstein, Yedidya Langsam, "Data Structures Using C and C++", Second edition, PHI, 2009.
 4. Robert L. Kruse, "Data Structures and Program Design in C++", Pearson, 1999.
 5. D.S Malik, Data Structure using C++, Second edition, Cengage Learning, 2010.
 6. Mark Allen Weiss, "Data Structures and Algorithms Analysis in Java", Pearson Education, 3rd edition, 2011
 7. Aaron M. Tenenbaum, Moshe J. Augenstein, Yedidya Langsam, "Data Structures Using Java, 2003.
 8. Robert Lafore, "Data Structures and Algorithms in Java, 2/E", Pearson/ Macmillan Computer Pub, 2003
 9. John Hubbard, "Data Structures with JAVA", McGraw Hill Education (India) Private Limited; 2 edition, 2009
 10. Goodrich, M. and Tamassia, R. "Data Structures and Algorithms Analysis in Java", 4th Edition, Wiley, 2013
 11. Herbert Schildt, "Java The Complete Reference (English) 9th Edition Paperback", Tata McGraw Hill, 2014.
 12. D. S. Malik, P.S. Nair, "Data Structures Using Java", Course Technology, 2003.
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COMPUTER SCIENCE LAB (C-V): Data Structures Lab

Practical: 60 Lectures

1. Write a program to search an element from a list. Give user the option to perform Linear or Binary search. Use Template functions.
2. WAP using templates to sort a list of elements. Give user the option to perform sorting using Insertion sort, Bubble sort or Selection sort.
3. Implement Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list and concatenate two linked lists (include a function and also overload operator +).
4. Implement Doubly Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
5. Implement Circular Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
6. Perform Stack operations using Linked List implementation.
7. Perform Stack operations using Array implementation. Use Templates.
8. Perform Queues operations using Circular Array implementation. Use Templates.
9. Create and perform different operations on Double-ended Queues using Linked List implementation.
10. WAP to scan a polynomial using linked list and add two polynomial.
11. WAP to calculate factorial and to compute the factors of a given no. (i) using recursion, (ii) using iteration
12. (ii) WAP to display fibonacci series (i) using recursion, (ii) using iteration
13. WAP to calculate GCD of 2 number (i) with recursion (ii) without recursion
14. WAP to create a Binary Search Tree and include following operations in tree:
 - (a) Insertion (Recursive and Iterative Implementation)
 - (b) Deletion by copying
 - (c) Deletion by Merging
 - (d) Search a no. in BST
 - (e) Display its preorder, post order and in order traversals Recursively
 - (f) Display its preorder, post order and in order traversals Iteratively
 - (g) Display its level-by-level traversals
 - (h) Count the non-leaf nodes and leaf nodes
 - (i) Display height of tree
 - (j) Create a mirror image of tree
 - (k) Check whether two BSTs are equal or not
15. WAP to convert the Sparse Matrix into non-zero form and vice-versa.
16. WAP to reverse the order of the elements in the stack using additional stack.
17. WAP to reverse the order of the elements in the stack using additional Queue.
18. WAP to implement Diagonal Matrix using one-dimensional array.

19. WAP to implement Lower Triangular Matrix using one-dimensional array.
20. WAP to implement Upper Triangular Matrix using one-dimensional array.
21. WAP to implement Symmetric Matrix using one-dimensional array.
22. WAP to create a Threaded Binary Tree as per inorder traversal, and implement operations like finding the successor / predecessor of an element, insert an element, inorder traversal.

COMPUTER SCIENCE (C-VI)

Operating Systems

Theory: 60 Lectures

UNIT-1

Introduction (10 Lectures): Basic OS functions, resource abstraction, types of operating systems– multiprogramming systems, batch systems, time sharing systems; operating systems for personal computers & workstations, process control & real time systems.

Operating System Organization (05 Lectures): Processor and user modes, kernels, system calls and system programs.

UNIT-2

Process Management (15 Lectures)

System view of the process and resources, process abstraction, Process Scheduling, non-pre-emptive and pre-emptive scheduling algorithms; concurrent and processes, critical section, semaphores, methods for inter-process communication; deadlocks.

UNIT-3

Memory Management (15 Lectures)

Physical and virtual address space; memory allocation strategies –fixed and variable partition paging, segmentation, virtual memory

UNIT-4

File and I/O Management (10 Lectures): Directory structure, file operations, file allocation methods, device management.

Protection and Security (5 Lectures): Policy mechanism, Authentication, Internal access Authorization.

Reference Books:

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

COMPUTER SCIENCE LAB (C-VI):

Operating Systems Lab

Practical: 60 Lectures

C/ C++ programs

1. WRITE A PROGRAM (using *fork()* and/or *exec()* commands) where parent and child execute:
 - a) same program, same code.
 - b) same program, different code.
 - c) before terminating, the parent waits for the child to finish its task.
2. WRITE A PROGRAM to report behavior of Linux kernel including information on configured memory, amount of free and used memory. (memory information)

3. WRITE A PROGRAM to print file details including owner access permissions, file access time, where file name is given as argument.
 4. WRITE A PROGRAM to copy files using system calls.
 5. Write program to implement FCFS scheduling algorithm.
 6. Write program to implement Round Robin scheduling algorithm.
 7. Write program to implement SJF scheduling algorithm.
 8. Write program to implement non-preemptive priority based scheduling algorithm.
 9. Write program to implement preemptive priority based scheduling algorithm.
 10. Write program to implement SRJF scheduling
 11. Write program to calculate sum of n numbers using *thread* library.
 12. Write a program to implement first-fit, best-fit and worst-fit allocation strategies.
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COMPUTER SCIENCE (C-VII)

Computer Networks Theory

60 Lectures

UNIT-1

Introduction to Computer Networks (08 Lectures): Network definition; network topologies; network classifications; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite.

Data Communication Fundamentals and Techniques (07 Lectures): Analog and digital signal; 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.

UNIT-2

Networks Switching Techniques and Access mechanisms (08 Lectures)

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

Data Link Layer Functions and Protocol (07 Lectures)

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

UNIT-3

Multiple Access Protocol and Networks (08 Lectures)

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

Networks Layer Functions and Protocols (07 Lectures)

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

UNIT-4

Transport Layer Functions and Protocols (08 Lectures)

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

Overview of Application layer protocol (07 Lectures)

Overview of DNS protocol, overview of WWW & HTTP protocol

Reference Books

1. B. A. Forouzan: Data Communications and Networking, Fourth edition, THM, 2007.
2. A. S. Tanenbaum: Computer Networks, Fourth edition, PHI , 2002

COMPUTER SCIENCE Tutorial (C-VII): Computer Networks

Tutorial: 15 Lectures

COMPUTER SCIENCE (C-VIII): Design and Analysis of Algorithms

Theory: 60 Lectures

UNIT-1

Introduction (7 Lectures)

Basic Design and Analysis techniques of Algorithms, Correctness of Algorithm

Algorithm Design Techniques

Iterative techniques, Divide and Conquer, Dynamic Programming, Greedy Algorithms **(8 Lectures)**

UNIT-2

Sorting and Searching Techniques (15 Lectures)

Elementary sorting techniques–Bubble Sort, Insertion Sort, Merge Sort, Advanced Sorting techniques - Heap Sort, Quick Sort, Sorting in Linear Time - Bucket Sort, Radix Sort and Count Sort, Searching Techniques, Medians & Order Statistics, complexity analysis;

UNIT-3

Lower Bounding Techniques (5 Lectures)

Decision Trees

Balanced Trees

Red-Black Trees

Advanced Analysis Technique **(5 Lectures)**

Amortized analysis **(5 Lectures)**

UNIT-4

Graphs (09 Lectures)

Graph Algorithms–Breadth First Search, Depth First Search and its Applications, Minimum Spanning Trees

String processing String Matching **(06 Lectures)**

Reference Books:

1. T.H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein Introduction to Algorithms, PHI, 3rd Edition 2009
2. Sarabasse& A.V. Gelder Computer Algorithm – Introduction to Design and Analysis, Publisher – Pearson 3rd Edition 1999

COMPUTER SCIENCE LAB (C-VIII):

Design and Analysis of Algorithms

Lab Practical: 60 Lectures

1. i. Implement Insertion Sort (The program should report the number of comparisons)
ii. Implement Merge Sort (The program should report the number of comparisons)

2. Implement Heap Sort(The program should report the number of comparisons)
3. Implement Randomized Quick sort (The program should report the number of comparisons)
4. Implement Radix Sort
5. Create a Red-Black Tree and perform following operations on it:
 - i. Insert a node
 - ii. Delete a node
 - iii. Search for a number & also report the color of the node containing this number.
6. Write a program to determine the LCS of two given sequences
7. Implement Breadth-First Search in a graph
8. Implement Depth-First Search in a graph

COMPUTER SCIENCE (C-IX)

Software Engineering

Theory: 60 Lectures

Unit 1

Introduction to Software Engineering, Software Engineering as a Layered Technology, Software Life Cycle Models **(15 Lectures)**

Unit 2

Software Requirements: Analysis and Specifications, Software Requirement Analysis, Initiating Requirement Engineering Process, Requirement Analysis and Modeling Techniques, Flow Oriented Modeling, Need for SRS, Characteristics and Components of SRS. **(15 Lectures)**

Unit 3

Software Project Planning and Design: Estimation in Project Planning Process, Project Scheduling, Design Concepts, Architectural Design Elements, Software Architecture, Data Design at the Architectural Level and Component Level, Mapping of Data Flow into Software Architecture, Modeling Component Level Design **(15 Lectures)**

Unit 4

Software Metrics, Software Testing, Software Testing Fundamentals, Strategic Approach to Software Testing, Test Strategies for Conventional Software, Validation Testing, System testing, Black-Box Testing, White-Box Testing and their type, Basis Path Testing. Software Maintenance, Software Certification **(15 Lectures)**

Reference Books:

1. K.K. Aggarwal and Y. Singh, Software Engineering (2nd Edition), New Age International Publishers.
2. Yogesh Singh, Software Testing, Cambridge University Press.2011.
3. R.S. Pressman, Software Engineering: A Practitioner's Approach (7th Edition), McGraw-Hill, 2009.

COMPUTER SCIENCE LAB (C-IX):

Software Engineering Lab

Practical: 60 Lectures

S. No	Practical Title
1.	• Problem Statement, • Process Model

2. Requirement Analysis:
 - Creating a Data Flow
 - Data Dictionary, Use Cases
3. Project Management:

	<ul style="list-style-type: none"> • Computing FP • Effort • Schedule, Risk Table, Timeline chart
4.	Design Engineering: <ul style="list-style-type: none"> • Architectural Design • Data Design, Component Level Design
5.	Testing: <ul style="list-style-type: none"> • Basis Path Testing

Sample Projects:

1. **Criminal Record Management:** Implement a criminal record management system for jailers, 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

COMPUTER SCIENCE (C-X): Database Management Systems

Theory: 60 Lectures

UNIT-1

Introduction (15 Lectures)

Characteristics of database approach, data models, database system architecture and data independence

UNIT-2

Entity Relationship(ER) Modelling (5 Lectures)

Entity types, relationships, constraints. (5 Lectures)

Relation data model (5 Lectures)

UNIT-3

Mapping ER/EER model to relational database, functional dependencies, Lossless decomposition, Normal forms (upto BCNF).

Transaction Processing
ACID properties, concurrency control (15 Lectures)

UNIT-4

File Structure and Indexing (15 Lectures)

Operations on files, File of Unordered and ordered records, overview of File organizations, Indexing structures for files (Primary index, secondary index, clustering index).

Reference Books:

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

COMPUTER SCIENCE LAB (C-X):

Database Management Systems Lab

Practical: 60 Lectures

Create and use the following database schema to answer the given queries.

EMPLOYEE Schema

Field	Type	NULL	KEY	DEFAULT
Eno	Char(3)	NO	PRI	NIL
Enam	Varchar(50)	NO		NIL
Job_type	Varchar(50)	NO		NIL
Manager	Char(3)	Yes	FK	NIL
Hire_date	Date	NO		NIL
Dno	Integer	YES	FK	NIL
Commission	Decimal(10,2)	YES		NIL
Salary	Decimal(7,2)	NO		NIL

DEPARTMENT Schema

Field	Type	Null Key	DEFAULT
Dno	Integer	No PRI	NULL
Dname	Varchar (50)	Yes	NULL
Location	Varchar (50)	Yes	New Delhi

Query List

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 all 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 employees 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 employees in Dept 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 employment.

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 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, Department No. 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 functions.
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 names and salaries of all employees who report to King.
37. Query to display the department no, name and job for all employees in the Sales department.

COMPUTER SCIENCE (C-XI): Internet Technologies

Theory: 60 Lectures

UNIT-1

Java (15 lectures)

Use of Objects, Array and ArrayList class

UNIT-2

JavaScript (15 lectures)

Data types, operators, functions, control structures, events and event handling.

UNIT-3

JDBC (05 lectures)

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

JSP (10 lectures)

Introduction to JavaServer Pages, HTTP and Servlet Basics, The Problem with Servlets, The Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment, Implicit JSP Objects, Conditional Processing, Displaying Values, Using an expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing Data Between JSP Pages, Requests, and Users, Database Access.

UNIT-4

Java Beans (15 lectures)

Java Beans Fundamentals, JAR files, Introspection, Developing a simple Bean, Connecting to DB

Reference Books:

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

COMPUTER SCIENCE LAB (C-XI):

Internet Technologies Lab

Practical: 60 Lectures

Create event driven program for following:

1. Print a table of numbers from 5 to 15 and their squares and cubes using alert.
2. Print the largest of three numbers.
3. Find the factorial of a number n.
4. Enter a list of positive numbers terminated by Zero. Find the sum and average of these numbers.
5. A person deposits Rs 1000 in a fixed account yielding 5% interest. Compute the amount in the account at the end of each year for n years.

Read n numbers. Count the number of negative numbers, positive numbers and zeros in the list.

COMPUTER SCIENCE (C-XII):

Theory of Computation

Theory: 60 Lectures

UNIT-1

Languages (15 Lectures)

Alphabets, string, language, Basic Operations on language, Concatenation, KleeneStar

UNIT-2

Finite Automata and Regular Languages (15 Lectures)

Regular Expressions, Transition Graphs, Deterministics and non-deterministic finite automata, NFA to DFA Conversion, Regular languages and their relationship with finite automata, Pumping lemma and closure properties of regular languages.

UNIT-3

Context free languages (15 Lectures)

Context free grammars, parse trees, ambiguities in grammars and languages, Pushdown automata (Deterministic and Non-deterministic), Pumping Lemma, Properties of context free languages, normal forms.

UNIT-4

Turing Machines and Models of Computations

RAM, Turing Machine as a model of computation, Universal Turing Machine (15 Lectures)

Reference Books:

1. Daniel I.A. Cohen, Introduction to computer theory, John Wiley, 1996
 2. Lewis & Papadimitriou, Elements of the theory of computation, PHI 1997.
 3. Hopcroft, Aho, Ullman, Introduction to Automata theory, Language & Computation –3rd Edition, Pearson Education. 2006
 4. P. Linz, An Introduction to Formal Language and Automata 4th edition Publication Jones Bartlett, 2006
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COMPUTER SCIENCE LAB (C-XII):

Theory of Computation

Tutorial: 15 Lectures

COMPUTER SCIENCE (C-XIII)

Software Testing

Theory: 60 Lectures

Software Testing:

Unit-1

Introduction software crisis, Limitations of testing, Strategic Approach to Software Testing, Test Strategies for Conventional Software, Test Strategies for Conventional Software, Validation Testing, System Testing, Basic Terminologies, V Shaped Software Lifecycle Model (15L)

Unit-2

Functional Testing\ Black-box Testing: Types of Functional testing techniques, Boundary Value Analysis, , Equivalence Class Testing, Decision Table Based Testing
Robustness Testing, Worst- case Testing, Robust Worst- case Testing ,Equivalence class testing, Cause effect Validation Testing, System Testing, Basic Terminologies (15L)

Unit-3

Structural Testing\ White-box Testing: Essentials of graph theory,Structural testing: Control flow based and data flow based testing, loop testing, mutation testing, load, stress and performance testing, software testing strategies: unit testing, integration testing, System testing, Alpha and Beta testing, debugging.
Basis Path Testing: Graph, DD Path graph, Cyclomatic Complexity, Flow Testing: Statement Coverage, Branch Coverage, Condition Coverage, Path Coverage
Metrics, Control Flow Testing: Statement Coverage, Branch Coverage, Condition Coverage, Path Coverage (15L)

Unit -4

Static Testing: Formal Technical Reviews, Walk Through, Code Inspection.
Software Maintenance: Types of Maintenance, Maintenance Process, Maintenance characteristics, Object Oriented Testing , testing web applications,
Reverse Engineering, Software Re-engineering (15L)

Reference Books:

1. Yogesh Singh, Software Testing, Cambridge University Press.2011
2. K.K. Aggarwal and Y. Singh, Software Engineering (3rd Edition), New Age International Publishers
3. Roger S. Pressman, Software Engineering: A Practitioner's Approach, Seventh Edition, Mc Graw Hill Education.2009

COMPUTER SCIENCE LAB (C-XIII): Software Testing Lab

Practical: 60 Lectures

1. Write a program that take three inputs (a,b &c) that represent the sides of a triangle, and the output is one of the below four:
 - a. Not a triangle
 - b. Scalene triangle
 - c. Isosceles triangle
 - d. Equilateral triangle
 - 1.1 Generate test cases using Boundary Value Analysis, Equivalence Class Partitioning and Decision Table Testing.
 - 1.2 Generate test cases using Basis path testing.
 - 1.3 Run code coverage tool.
2. Write a program that determines the nature of roots of a quadratic equation. Output should be one of the following:-
 - Not a quadratic equation.
 - Complex roots
 - Real roots
 - Single roots
 - I. Generate test cases using Boundary Value Analysis, Equivalence Class Partitioning and Decision Table Testing.
 - II. Generate test cases using Basis path testing.

III. Run code coverage tool

3. Write a program that checks whether the number is even or odd. Run code coverage tool and find the amount of code being covered.
4. Write a program that dynamically allocates memory to 10 integers using malloc() or calloc() and
 - Do not free memory leading to memory leaks. Verify the same using Valgrind.
 - Now, free memory using free() at the end of the program to avoid memory leaks. Verify the same using Valgrind.
5. Use LoadUI load testing tool to test the web application performance.

COMPUTER SCIENCE LAB (C-XIV): Computer Graphics

Theory: 60 Lectures

UNIT-1

Introduction (7 Lectures)

Basic elements of Computer graphics, Applications of Computer Graphics.

Graphics Hardware (8 Lectures)

Architecture of Raster and Random scan display devices, input/output devices.

UNIT-2

Fundamental Techniques in Graphics (15 Lectures)

Raster scan line, circle and ellipse drawing, thick primitives, Polygon filling, line and polygon clipping algorithms, 2D and 3D Geometric Transformations, 2D and 3D Viewing Transformations (Projections- Parallel and Perspective), Vanishing points.

UNIT-3

Geometric Modeling (15 Lectures)

Representing curves & Surfaces

UNIT-4

Visible Surface determination (08 Lectures)

Hidden surface elimination

Surface rendering (07 Lectures)

Illumination and shading models, Basic color models

Reference Books

1. J.D.Foley, A. Van Dam, van Dam, S. K. Van Dam, Computer Graphics Principles & Practice 2nd edition Publication Addison Wesley 1990.
2. D. Hearn, Baker: Computer Graphics, Prentice Hall of India 2008.
3. D.F.Rogers Procedural Elements for Computer Graphics, McGraw Hill 1997.
4. D.F.Rogers, Adams Mathematical Elements for Computer Graphics, McGraw Hill 2nd edition 1989.

COMPUTER SCIENCE LAB (C-XIV): Computer Graphics Lab

Practical: 60 Lectures

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 apply various 2D transformations on a 2D object (use homogenous coordinates).
6. Write a program to apply various 3D transformations on a 3D object and then apply parallel and perspective projection on it.

Discipline Specific Elective Papers COMPUTER SCIENCE: (Credit: 06 each) – DSE 1 - 4

(Total 4 papers to be selected) – DSE-1 –DSE-4

Information Security

Theory: 60 Lectures

UNIT-1

Introduction (06 Lectures)

Security, Attacks, Computer Criminals, Security Services, Security Mechanisms

Cryptography (09 Lectures)

Substitution ciphers, Transpositions Cipher, Confusion, diffusion, Symmetric, Asymmetric Encryption. DES, Modes of DES, Uses of Encryption, Hash function, key exchange, Digital Signatures, Digital Certificates.

UNIT-2

Program Security (15 Lectures)

Secure programs, Non malicious Program errors, Malicious codes virus, Trap doors, Salami attacks, Covert channels, Control against program

UNIT-3

Threats (15 Lectures)

Protection in OS: Memory and Address Protection, Access control, File Protection, User Authentication.

Database Security

Requirements, Reliability, Integrity, Sensitive data Inference, Multilevel Security

UNIT-4

Security in Networks (5 Lectures)

Threats in Networks, Security Controls, firewalls, Intrusion detection systems, Secure e-mails

Administrating Security (10 Lectures)

Security Planning, Risk Analysis, Organisational Security Policy, Physical Security, Ethical issues in Security: Protecting Programs and data. Information and law

Reference Books:

1. C. P. Pfleeger, S. L. Pfleeger; Security in Computing, Prentice Hall of India, 2006
2. W. Stallings; Network Security Essentials: Applications and Standards, 4/E, 2010

Information Security Lab

Practical: 60 lectures

1. Demonstrate the use of Network tools: ping, ipconfig, ifconfig, 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 steganography tools.
11. Demonstrate use of gpg utility for signing and encrypting purposes.

II. Microprocessor

Theory: 60 Lectures

UNIT-1

Microprocessor architecture: Internal architecture, system bus architecture, memory and I/O interfaces. **(15 Lectures)**

UNIT-2

Microprocessor programming: Register Organization, instruction formats, assembly language programming **(15 Lectures)**

UNIT-3

Interfacing: Memory address decoding, cache memory and cache controllers, I/O interface, keyboard, display, timer, interrupt controller **(15 Lectures)**

UNIT-4

DMA controller, video controllers, communication interfaces **(15 Lectures)**

Reference Books:

1. Barry B. Brey: The Intel Microprocessors: Architecture, Programming and Interfacing. Pearson Education, Sixth Edition, 2009.
2. riel, Avtar Singh; The 8088 and 8086 Microprocessors Programming, Interfacing, Software, Hardware, and Applications. PHI, Fourth Edition 2005.

Microprocessor Lab

Practical: 60 Lectures

ASSEMBLY LANGUAGE PROGRAMMING

1. Write a program for 32-bit binary division and multiplication
2. Write a program for 32-bit BCD addition and subtraction
3. Write a program for Linear search and binary search.
4. Write a program to add and subtract two arrays
5. Write a program for binary to ascii conversion
6. Write a program for ascii to binary conversion

III. Digital Image Processing

Theory: 60 Lectures

UNIT-1

Introduction (6 Lectures)

Light, Brightness adaption and discrimination, Pixels, coordinate conventions, Imaging Geometry, Perspective Projection, Spatial Domain Filtering, sampling and quantization

Spatial Domain Filtering (9 Lectures)

Intensity transformations, contrast stretching, histogram equalization, Correlation and convolution, Smoothing filters, sharpening filters, gradient and Laplacian

UNIT-2

Filtering in the Frequency domain (7 Lectures)

Hotelling Transform, Fourier Transforms and properties, FFT (Decimation in Frequency and Decimation in Time Techniques), Convolution, Correlation, 2-D sampling

Image Restoration (8 Lectures)

Basic Framework, Interactive Restoration, Image deformation and geometric transformations, image morphing, Restoration techniques, Noise characterization, Noise restoration filters, Adaptive filters, Linear, Position invariant degradations, Estimation of Degradation functions, Restoration from projections.

UNIT-3

Image Compression (10 Lectures)

Encoder-Decoder model, Types of redundancies, Lossy and Lossless compression, Entropy of an information source, Shannon's 1st Theorem, Huffman Coding, Arithmetic Coding, Golomb Coding, LZW coding, Transform Coding, Sub-image size selection, blocking artifacts, DCT implementation using FFT, Run length coding, FAX compression (CCITT Group-3 and Group-4), Symbol-based coding, JBIG-2, Bit-plane encoding, Bit-allocation, Zonal Coding, Threshold Coding, JPEG, Lossless predictive coding, Lossy predictive coding

Wavelet based Image Compression (5 Lectures)

Expansion of functions, Multi-resolution analysis, Scaling functions, MRA refinement equation, Wavelet series expansion, Discrete Wavelet Transform (DWT), Continuous Wavelet Transform, Fast Wavelet Transform, 2-D wavelet Transform, JPEG-2000 encoding, Digital Image Watermarking.

UNIT-4

Morphological Image Processing (6 Lectures)

Basics, SE, Erosion, Dilation, Opening, Closing, Hit-or-Miss Transform, Boundary Detection, Hole filling, Connected components, convex hull, thinning, thickening, skeletons, pruning, Geodesic Dilation, Erosion, Reconstruction by dilation and erosion.

Image Segmentation (9 Lectures)

Boundary detection based techniques, Point, line detection, Edge detection, Edge linking, local processing, regional processing

Reference Books

1. R C Gonzalez , R E Woods, Digital Image Processing, 3rd Edition, Pearson Education.2008.
2. A K Jain, Fundamentals of Digital image Processing, Prentice Hall of India.1989.
3. K R Castleman, Digital Image Processing, Pearson Education.1996
4. Schalkoff, Digital Image Processing and Computer Vision, John Wiley and Sons.1989.
5. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins,' Digital Image Processing using MATLAB', Pearson Education, Inc., 2004.

Digital Image Processing Lab

Practical: 60 Lectures

1. Write program to read and display digital image using MATLAB or SCILAB
 - a. Become familiar with SCILAB/MATLAB Basic commands

- b. Read and display image in SCILAB/MATLAB
 - c. Resize given image
 - d. Convert given color image into gray-scale image
 - e. Convert given color/gray-scale image into black & white image
 - f. Draw image profile
 - g. Separate color image in three R G & B planes
 - h. Create color image using R, G and B three separate planes
 - i. Flow control and LOOP in SCILAB
 - j. Write given 2-D data in image file
2. To write and execute programs for image arithmetic operations
 - a. Addition of two images
 - b. Subtract one image from other image
 - c. Calculate mean value of image
 - d. Different Brightness by changing mean value
 3. To write and execute programs for image logical operations
 - a. AND operation between two images
 - b. OR operation between two images
 - c. Calculate intersection of two images
 - d. Water Marking using EX-OR operation
 - e. NOT operation (Negative image)
 4. To write a program for histogram calculation and equalization using
 - a. Standard MATLAB function
 - b. Program without using standard MATLAB functions
 - c. C Program
 5. To write and execute program for geometric transformation of image
 - a. Translation
 - b. Scaling
 - c. Rotation
 - d. Shrinking
 - e. Zooming
 6. To understand various image noise models and to write programs for
 - a. image restoration
 - b. Remove Salt and Pepper Noise
 - c. Minimize Gaussian noise
 - d. Median filter and Weiner filter
 7. Write and execute programs to remove noise using spatial filters
 - a. Understand 1-D and 2-D convolution process
 - b. Use 3x3 Mask for low pass filter and high pass filter
 8. Write and execute programs for image frequency domain filtering
 - a. Apply FFT on given image
 - b. Perform low pass and high pass filtering in frequency domain
 - c. Apply IFFT to reconstruct image
 9. Write a program in C and MATLAB/SCILAB for edge detection using different edge detection mask.

IV. Cloud Computing

UNIT-1

Overview of Computing Paradigm (8 lectures)

Recent trends in Computing: Grid Computing, Cluster Computing, Distributed Computing,

Utility Computing, Cloud Computing,

Introduction to Cloud Computing (7 lectures)

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

UNIT-2

Cloud Computing Architecture (15 lectures) 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

UNIT-3

Case Studies (8 lectures)

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

Service Management in Cloud Computing (7 lectures)

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

UNIT-4

Cloud Security (15 lectures)

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: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley, 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.Gautam Shroff, 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

Cloud Computing Lab

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

V. Numerical Methods

Theory: 60 Lectures

UNIT-1

Floating point representation and computer arithmetic, Significant digits, Errors: Round-off error, Local truncation error, Global truncation error, Order of a method, Convergence and terminal conditions, Efficient computations **(15 Lectures)**

UNIT-2

Bisection method, Secant method, Regula–Falsi method
Newton–Raphson method, Newton’s method for solving nonlinear systems, Gauss elimination method (with row pivoting) and Gauss–Jordan method, Gauss Thomas method for tridiagonal systems **(15 Lectures)**

UNIT-3

Iterative methods: Jacobi and Gauss-Seidel iterative methods Interpolation: Lagrange’s form and Newton’s form
Finite difference operators, Gregory Newton forward and backward differences Interpolation Piecewise polynomial interpolation: Linear interpolation **(15 Lectures)**

UNIT-4

Numerical integration: Trapezoid rule, Simpson’s rule (only method), Newton–Cotes open formulas
Extrapolation methods: Romberg integration, Gaussian quadrature, Ordinary differential equation: Euler’s method, Modified Euler’s methods: Heun method and Mid-point method, Runge-Kutta second methods **(15 Lectures)**

REFERNCE BOOKS:

- [1] Laurence V. Fausett, Applied Numerical Analysis, Using MATLAB, Pearson, 2/e (2012)
- [2] M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publisher, 6/e (2012)
- [3] Steven C Chapra, Applied Numerical Methods with MATLAB for Engineers and Scientists, Tata McGraw Hill, 2/e (2010)

Numerical Methods Lab

Practical: 60 lectures

1. Find the roots of the equation by bisection method.
2. Find the roots of the equation by secant/Regula–Falsi method.
3. Find the roots of the equation by Newton’s method.
4. Find the solution of a system of nonlinear equation using Newton’s method.
5. Find the solution of tridiagonal system using Gauss Thomas method.
6. Find the solution of system of equations using Jacobi/Gauss-Seidel method.
7. Find the cubic spline interpolating function.
8. Evaluate the approximate value of finite integrals using Gaussian/Romberg integration.
9. Solve the boundary value problem using finite difference method.

Note: Programming is to be done in any one of Computer Algebra Systems:

VI. Systems Programming

Theory: 60 lectures

UNIT-1

Assemblers & Loaders, Linkers (15 Lectures):

One pass and two pass assembler, design of an assembler, Absolute loader, relocation and linking concepts, relocating loader and Dynamic Linking.

UNIT-2

Introduction (5 Lectures):

Overview of compilation, Phases of a compiler

Lexical Analysis (10 Lectures):

Role of a Lexical analyzer, Specification and recognition of tokens, Symbol table, lex

UNIT-3

Parsing (7 Lectures):

Bottom up parsing- LR parser, yacc.

Intermediate representations (8 Lectures)

Three address code generation, syntax directed translation, translation of types, control statements

UNIT-4

Storage organization (07 Lectures):

Activation records, stack allocation

Code Generation (08 Lectures):

Object code generation

Reference Books

1. Santanu Chattopadhyaya, Systems Programming, PHI, 2011.
2. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Compilers: Principles, Techniques, and Tools, 2nd edition, Prentice Hall, 2006.
3. D. M. Dhamdhare, Systems Programming, Tata McGraw Hill, 2011.
4. Leland Beck, D. Manjula, System Software: An Introduction to System Programming, 3rd edition, Pearson Education, 2008.
5. Grune D, Van Reeuwijk . K, Bal H. E, Jacobs C J H, Langendoen K, Modern Compiler Design, 2nd edition, Springer, 2012

SYSTEMS PROGRAMMING LAB

Practical: 60 lectures

[1] To implement an assembler for a hypothetical language.

[2] To get familiar with lex: write a program to recognize numbers, identifiers.

VII. Data Mining

Theory: 60 lectures

UNIT-1

Overview: Predictive and descriptive data mining techniques, supervised and unsupervised learning techniques
(15 Lectures)

UNIT-2

Process of knowledge discovery in databases, pre-processing methods **(15 Lectures)**

UNIT-3

Data Mining Techniques: Association Rule Mining, classification and regression techniques **(15 Lectures)**

UNIT-4

Clustering, Scalability and data management issues in data mining algorithms, measures of interestingness **(15 Lectures)**

Reference Books:

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson Education.2005.
2. Richard Roiger, Michael Geatz, Data Mining: A Tutorial Based Primer, Pearson Education 2003.
3. G.K. Gupta, Introduction to Data Mining with Case Studies, PHI,2006.
- 4.Soman K P, Diwakar Shyam, Ajay V Insight Into Data Mining: Theory And Practice, , PHI, 2006

Data Mining Lab

Practical: 60 lectures

Practical exercises based on concepts listed in theory.

VIII. Discipline Specific Elective: Project work (DSE-4)

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.

Skill Enhancement Courses (any two) (Credit: 04 each) – SEC1 to SEC2

Theory: 03, Labs: 02

1. Android Programming

UNIT-1

Introduction: History of Android, Introduction to Android Operating Systems, Android Development Tools, Android Architecture. **(11 Lectures)**

UNIT-2

Overview of object oriented programming using Java: OOPs Concepts: Inheritance, Polymorphism, Interfaces, Abstract class, Threads, Overloading and Overriding, Java Virtual Machine. **(11 Lectures)**

UNIT-3

Development Tools: Installing and using Eclipse with ADT plug-in, Installing Virtual machine for Android sandwich/Jelly bean (Emulator), configuring the installed tools, creating a android project – Hello Word, run on emulator, Deploy it on USB-connected Android device. **(11 Lectures)**

UNIT-4

User Interface Architecture: Application context, intents, Activity life cycle, multiple screen sizes.

User Interface Design: Form widgets, Text Fields, Layouts, Button control, toggle buttons, Spinners(Combo boxes), Images, Menu, Dialog **(12 Lectures)**

Reference Book:

1. Android application development for java programmers. By James C. Sheusi. Publisher: Cengage Learning, 2013.

ONLINE READING / SUPPORTING MATERIAL:

1. <http://www.developer.android.com>
2. <http://developer.android.com/about/versions/index.html>
3. <http://developer.android.com/training/basics/firstapp/index.html>
4. <http://docs.oracle.com/javase/tutorial/index.htm> (Available in the form of free downloadable ebooks also).
5. <http://developer.android.com/guide/components/activities.html>
6. <http://developer.android.com/guide/components/fundamentals.html>
7. <http://developer.android.com/guide/components/intents-filters.html>
8. <http://developer.android.com/training/multiscreen/screensizes.html>
9. <http://developer.android.com/guide/topics/ui/controls.html>
10. <http://developer.android.com/guide/topics/ui/declaring-layout.html>
11. <http://developer.android.com/training/basics/data-storage/databases.html>

Software Lab Based on Android Programming:

1. Create —Hello World! application. That will display —Hello World! in the middle of the screen in the emulator. Also display —Hello World! in the middle of the screen in the Android Phone.
2. Create an application with login module. (Check username and password).
3. Create spinner with strings taken from resource folder (res >> value folder) and on changing the spinner value, Image will change.
4. Create a menu with 5 options and selected option should appear in text box.
5. Create a list of all courses in your college and on selecting a particular course teacher-in-charge of that course should appear at the bottom of the screen.
6. Create an application with three option buttons, on selecting a button colour of the screen will change.
7. Create and Login application as above. On successful login, pop up the message.
8. Create an application to Create, Insert, update, Delete and retrieve operation on the database.

2. Programming in MATLAB

(3+2Labs)

Unit-1

Introduction to Programming: Components of a computer, working with numbers, Machine code, Software hierarchy.(11 Lectures)

Unit- 2

Programming Environment: MATLAB, Windows, A First Program, Expressions, Constants, Variables and assignment statement, Arrays.(11 lectures)
Graph Plots: Basic plotting, Built in functions, Generating waveforms, Sound replay, load and save

Unit -3

Procedures and Functions: Arguments and return values, M-files, Formatted console input-output, String handling.
Control Statements: Conditional statements: If, Else, Else-if, Repetition statements: While, for loop (11 Lectures)

Unit 4

Manipulating Text: Writing to a text file, Reading from a text file, Randomising and sorting a list, searching a list
GUI Interface: Attaching buttons to actions, Getting Input, Setting Output.(12 Lectures)

Reference Books:

- 1.MATLAB: An Introduction with Applications, by Amos Gilat, 2nd edition, Wiley, 2004,
- 2.C.B. Moler, Numerical Computing with MATLAB, SIAM, 2004.

Software Lab Based on MatLab

1. Write a program to assign the following expressions to a variable A and then to print out the value of A.
 - a. $(3+4)/(5+6)$
 - b. $2\pi^2$
 - c. $\sqrt{2}$
 - d. $(0.0000123 + 5.67 \times 10^{-3}) \times 0.4567 \times 10^{-4}$
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 numbers 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 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, ..., \sqrt{N} th 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. 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.
10. 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.
11. 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 numbers of each product are [3, 2, 1, 5]. Use MATLAB to calculate the total bill.
12. The sortrows(x) function will sort a vector or matrix X into increasing row order. Use this function to sort a list of names into alphabetical order.
13. Write a function called FtoC (ftoc.m) to convert Fahrenheit temperatures into Celsius. Make sure the program has a title comment and a help page. Test from the command window with:
 - i. FtoC(96)
 - ii. lookfor Fahrenheit
 - iii. help FtoC
14. Write a program to input 2 strings from the user and to print out (i) the concatenation of the two strings with a space between them, (ii) a line of asterisks the same length as the concatenated strings, and (iii) the reversed concatenation. For example:
 - iv. Enter string 1: Mark
 - v. Enter string 2: Huckvale
 - vi. Mark Huckvale
 - vii. *****
 - viii. elavkcuH kraM

3 HTML Programming

(3+2 Lab)

Unit-1

HTML Programming Introduction (3L)

The Basics

- o The Head, the Body
- o Colors, Attributes
 - Lists, ordered and unordered (8L)
 -

Unit-II

Links

- o Introduction
- o Relative Links, Absolute Links
- o Link Attributes
- o Using the ID Attribute to Link Within a Document (11L)

Unit-III

Images

- o Putting an Image on a Page
- o Using Images as Links
- o Putting an Image in the Background (4L)

Tables

- o Creating a Table
- o Table Headers
- o Captions
- o Spanning Multiple Columns
- o Styling Table (7L)

Unit VI

Forms

- o Basic Input and Attributes
- o Other Kinds of Inputs
 - Styling forms with CS
 - Where To Go From Here (12L)

Reference Books:

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

Software Lab Based on HTML:

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

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

Q.2 Create HTML documents (having multiple frames) in the following three formats:

Frame1
Frame2

Frame 1	
Frame 2	Frame 3

Q.3 Create an HTML document which implements Internal linking as well as External linking.

Q.4 Create a table using HTML which consists of columns for Roll No., Student's name and grade. Result Roll No. Name Grade

Result		
Roll No.	Name	Grade

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

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

Subscribe to XYZ News Magazine and Emails

Interested in receiving daily small updates of all latest News? Well, now you can. And best of all, it is free! Just fill out this form and submit it by clicking the "send it In" button. We will put you on our mailing list and you will receive your first email in 3-5 days.

Please fill the following boxes to help us send the emails and our news letter:

First Name:

Last Name:

Business:

We must have a correct e-mail address to send you the news letter:

Email:

How did you hear about XYZ News Magazine and Emails?


Here on the Web In a magazine Television Other

Would you like to be on our regular mailing list?

Yes, we love junk emails

Q.6 Create an HTML document which consists of:

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



XYZ Ltd's Update

1. Introduction
2. Company Financial Update
 - o First Quarter
 - o Second Quarter
 - o Third Quarter
 - o Fourth Quarter
3. Advertising Update
 - o Result of Newspaper Campaign
 - o Additions to staff
 - o New Thoughts on Television
4. Human Resources Update

- A. Safety Considerations
 1. Body substance isolation
 2. Sense safety
 3. Initial size-up
- B. Initial Patient Assessment
 1. General Impression
 2. Unresponsiveness
 - i. Alert to person, place and time
 - ii. Verbal response to audible stimuli
 - iii. Pain evokes verbal or physical response
 - iv. Unresponsive to all stimuli
- C. Patient Critical Needs
 1. Airway
 2. Breathing
 - i. Use oxygen if indicated
 - ii. Consider use of assisting with bag value mask
 3. Circulation
 4. Bleeding

4. Oracle (SQL/PL-SQL)

(3+2 Lab)

UNIT-1

Introduction to Oracle as RDBMS

SQL Vs SQL * Plus:

SQL Commands and Data types, Operators and Expressions, Introduction to SQL * Plus. (11L)

UNIT-2

Managing Tables and Data:

- Creating and Altering Tables (Including constraints)
- Data Manipulation Command like Insert, update, delete
- SELECT statement with WHERE, GROUP BY and HAVING, ORDER BY, DISTINCT, Special operator like IN, ANY, ALL BETWEEN, EXISTS, LIKE Join, Built in functions (11L)

UNIT-3

•

Other Database Objects (3L)

- View
- Synonyms, Index

UNIT-4

Transaction Control Statements (4 L)

- Commit, Rollback, Savepoint

Introduction to PL/SQL

- SQL v/s PL/SQL
- PL/SQL Block Structure (3 L)

Reference Books:

1. Ivan Bayross, "SQL, PL/SQL the Programming Language of Oracle Paperback", BPB Publicatins, 2010.
2. Steven Feuerstein, Bill Pribyl , "Oracle PL/SQL Programming", 6th Edition, O'Reilly Media, 2014.
3. Rajeeb C. Chatterjee, "Learning Oracle SQL and PL/SQL: A simplified Guide", PHI, 2012.
4. Ron Hardman, Michael McLaughlin, "Expert Oracle PL/SQL", Oracle Press, 2005.
5. Michael McLaughlin, "Oracle Database 11g PL/SQL Programming", Oracle Press, 2008.
6. John Watson, Roopesh Ramklass, "OCA Oracle Database11g SQL Fundamentals I Exam Guide", Oracle Press, 2008.

Software Lab Based on SQL/PL-SQL:

[SQL COMMANDS]

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

[SQL FUNCTION]

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

- 9) To make views of a table.
- 10) To make indexes of a table.

[PL/SQL]

- 11) To understand working with PL/SQL

5. PHP Programming

(3+2 Lab)

UNIT-1

Introduction to PHP: (6L)

- PHP introduction, inventions and versions, important tools and software requirements (like Web Server, Database Editors etc.)
- PHP with other technologies, scope of PHP
- Basic Syntax, PHP variables and constants
- Types of data in PHP , Expressions, scopes of a variable (local, global) **(5L)**
- PHP Operators: Arithmetic, Assignment, Relational, Logical operators, Bitwise, ternary and MOD operator.
- PHP operator Precedence and associativity
-

UNIT-2

Handling HTML form with PHP: (11L)

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

UNIT-3

Loops: (6L)

- PHP IF Else conditional statements (Nested IF and Else)
- Switch case, while ,For and Do While Loop
- Goto, Break ,Continue and exit

PHP Functions:(5L)

- Function, Need of Function , declaration and calling of a function
- PHP Function with arguments, Default Arguments in Function
- Function argument with call by value, call by reference
- Scope of Function Global and Local

UNIT-4

String Manipulation and Regular Expression: (7L)

- Creating and accessing String , Searching & Replacing String
- Formatting, joining and splitting String , String Related Library functions
- Use and advantage of regular expression over inbuilt function

Array: (5L)

- Anatomy of an Array ,Creating index based and Associative array ,Accessing array

Reference Books:

1. Steven Holzner, "PHP: The Complete Reference Paperback", McGraw Hill Education (India), 2007.
2. Timothy Boronczyk, Martin E. Psinas, "PHP and MYSQL (Create-Modify-Reuse)", Wiley India Private Limited, 2008.

3. Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5", 3rd Edition Paperback, O'reilly, 2014.
4. Luke Welling, Laura Thompson, "PHP and MySQL Web Development", 4th Edition, Addition Paperback, Addison-Wesley Professional, 2008.
5. David Sklar, Adam Trachtenberg, "PHP Cookbook: Solutions & Examples for PHP Programmers", 2014.

Software Lab Based on PHP:

1. Create a PHP page using functions for comparing three integers and print the largest number.
2. Write a function to calculate the factorial 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 of 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 palindrome is word, phrase, or sequence that reads 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 : The quick""brownfox
9. Write a PHP script that finds out the sum of first n odd numbers.
10. Create a login page having user name and password. On clicking submit, a welcome message should be displayed if the user is already registered (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 birth day.
13. Create a script to construct the following pattern, using nested for loop.

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

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.

6. Linux / Unix Programming Syllabus

(3+2 Labs)

UNIT-1

Introduction (11L)

- What is linux/unix Operating systems
- Difference between linux/unix and other operating systems

- Features and Architecture

UNIT-2

- Various Distributions available in the market(11L)
- Installation, Booting and shutdown process
- System processes (an overview)
- External and internal commands
- Creation of partitions in OS

UNIT-3

User Management and the File System(11L)

- 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)

□

UNIT-4

Shell introduction and Shell

Scripting (12L)

- 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
- Pipes 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)

Reference Books:

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

Software Lab Based on Linux:

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

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

General Elective Papers (GE) (Minor – Computer Science) (any four) for other Departments/Disciplines: (Credit: 06 each)

1. Computer Fundamentals

Theory: 60 lectures

UNIT-1

Introduction: Introduction to computer system, uses, types. **6L**

Data Representation: Number systems and character representation, binary Arithmetic **9L**

UNIT-2

Human Computer Interface: Types of software, Operating system as user interface, utility programs

Devices: Input and output devices (with connections and practical demo), keyboard, mouse, joystick, scanner, OCR, OMR, bar code reader, web camera, monitor, printer, plotter **(15L)**

UNIT-3

Memory: Primary, secondary, auxiliary memory, RAM, ROM, cache memory, hard disks, optical disks **(7L)**

Computer Organisation and Architecture: C.P.U., registers, system bus, main memory unit, cache memory, Inside a computer, SMPS, Motherboard, Ports and Interfaces, expansion cards, ribbon cables, memory chips, processors. **(8L)**

UNIT-4

Overview of Emerging Technologies: Bluetooth, cloud computing, big data, data mining, mobile computing and embedded systems. **(15L)**

Reference Books:

1. A. Goel, Computer Fundamentals, Pearson Education, 2010.
2. P. Aksoy, L. DeNardis, Introduction to Information Technology, Cengage Learning, 2006
3. P. K.Sinha, P. Sinha, Fundamentals of Computers, BPB Publishers, 2007

Computer Fundamentals Lab Practical: 60 Lectures

Practical exercises based on MS Office/ Open Office tools using document preparation and spreadsheet handling packages.

MS Word

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

- Font specifications for Title (Grocery List): 14-point Arial font in bold and italics.
 - The headings of the columns should be in 12-point and bold.
 - The rest of the document should be in 10-point Times New Roman.
 - Leave a gap of 12-points after the title.
2. Create a **telephone directory**.
- The heading should be 16-point Arial Font in bold
 - The rest of the document should use 10-point font size
 - Other headings should use 10-point Courier New Font.
 - The footer should show the page number as well as the date last updated.
3. Design a **time-table form** for your college.
- The first line should mention the name of the college in 16-point Arial Font and should be bold.
 - The second line should give the course name/teacher's name and the department in 14-point Arial.
 - Leave a gap of 12-points.
 - The rest of the document should use 10-point Times New Roman font.
 - The footer should contain your specifications as the designer and date of creation.
4. BPB Publications plans to release a new book designed as per your syllabus. Design the **first page of the book** as per the given specifications.
- The title of the book should appear in bold using 20-point Arial font.
 - The name of the author and his qualifications should be in the center of the page in 16-point Arial font.
 - At the bottom of the document should be the name of the publisher and address in 16-point Times New Roman.
 - The details of the offices of the publisher (only location) should appear in the footer.
5. Create the following one page documents.
- a. Compose a note inviting friends to a get-together at your house, Including a list of things to bring with them.
 - b. Design a certificate in landscape orientation with a border around the document.
 - c. Design a Garage Sale sign.
 - d. Make a sign outlining your rules for your bedroom at home, using a numbered list.
6. Create the following documents:
- (a) A newsletter with a headline and 2 columns in portrait orientation, including at least one image surrounded by text.
 - (b) Use a newsletter format to promote upcoming projects or events in your classroom or college.
7. Convert following text to a table, using comma as delimiter

Type the following as shown (do not bold)

Color, Style, Item

Blue, A980, Van

Red, X023, Car

Green, YL724, Truck

Name, Age, Sex

Bob, 23, M

Linda, 46, F

Tom, 29, M

9. Enter the following data into a table given on the next page.

Salesperson	Dolls	Trucks	Puzzles
Kennedy, Sally	1327	1423	1193
White, Pete	1421	3863	2934
Pillar, James	5214	3247	5467
York, George	2190	1278	1928
Banks, Jennifer	1201	2528	1203
Atwater, Kelly	4098	3079	2067

Pillar, James	5214	3247	5467
York, George	2190	1278	1928
Banks, Jennifer	1201	2528	1203
Atwater, Kelly	4098	3079	2067

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

In this exercise, you will add a new row to your table, place the word "Total" at the bottom of the Salesperson column, and sum the Dolls, Trucks, and Puzzles columns.

10. Wrapping of text around the image.

11. Following features of menu option must be covered

FILE	Complete menu
EDIT	Complete menu
VIEW	Complete menu
INSERT	Complete menu
FORMAT	Complete menu
TABLE	Complete menu
WINDOW	Complete menu
HELP	Complete menu
TOOLS	All options except Online collaboration, Tools on Macro, Templates

MS Excel

1. Enter the Following data in Excel Sheet

REGIONAL SALES PROJECTION

State	Qtr1	Qtr2	Qtr3	QTR4	Qtr Total	Rate Amount
Delhi	2020	2400	2100	3000	15	
Punjab	1100	1300	1500	1400	20	
U.P.	3000	3200	2600	2800	17	
Haryana	1800	2000	2200	2700	15	
Rajasthan	2100	2000	1800	2 200	20	

**TOTAL
AVERAGE**

(a) Apply Formatting as follow:

I. Title in TIMES NEW ROMAN

ii. Font Size - 14

iii. Remaining text - ARIAL, Font Size -10

iv. State names and Qtr. Heading Bold, Italic with Gray Fill Color.

v. Numbers in two decimal places.

vi. Qtr. Heading in center Alignment.

vii. Apply Border to whole data.

(b) Calculate State and Qtr. Total

(c) Calculate Average for each quarter

(d) Calculate Amount = Rate * Total.

2. Given the following worksheet

	A	B	C	D
1	Roll No.	Name	Marks	Grade
2	1001	Sachin	99	
3	1002	Sehwag	65	
4	1003	Rahul	41	
5	1004	Sourav	89	
			56	
6	1005	Har Bhajan		

Calculate the grade of these students on the basis of following guidelines:

If Marks	Then Grade
>= 80	A+
>= 60 < 80	A
>= 50 < 60	B
< 50	F

3. Given the following worksheet

	A	B	C	D	E	F	G
1	Salesman		Sales in (Rs.)				
2	No.	Qtr1	Qtr2	Qtr3	Qtr4	Total	Commission
3	S001	5000	8500	12000	9000		

4	S002	7000	4000	7500	11000
5	S003	4000	9000	6500	8200
6	S004	5500	6900	4500	10500
7	S005	7400	8500	9200	8300
8	S006	5300	7600	9800	6100

Calculate the commission earned by the salesmen on the basis of following Candidates:

If Total Sales	Commission
< 20000	0% of sales
> 20000 and < 25000	4% of sales
> 25000 and < 30000	5.5% of sales
> 30000 and < 35000	8% of sales
>= 35000	11% of sales

The total sales is sum of sales of all the four quarters.

4. A company XYZ Ltd. pays a monthly salary to its employees which consists of basic salary, allowances & deductions. The details of allowances and deductions are as follows:

Allowances

- HRA Dependent on Basic

30% of Basic if Basic <=1000

25% of Basic if Basic >1000 & Basic <=3000

20% of Basic if Basic >3000

- DA Fixed for all employees, 30% of Basic

- Conveyance Allowance Rs. 50/- if Basic is <=1000 Rs. 75/- if Basic >1000 & Basic <=2000
Rs. 100 if Basic >2000

- Entertainment Allowance NIL if Basic is <=1000 Rs. 100/- if Basic > 1000

Deductions

- Provident Fund 6% of Basic

- Group Insurance Premium Rs. 40/- if Basic is <=1500

Rs. 60/- if Basic > 1500 & Basic <=3000

Rs. 80/- if Basic >3000

Calculate the following:

Gross Salary = Basic + HRA + DA + Conveyance + Entertainment

Total deduction = Provident Fund + Group Insurance Premium

Net Salary = Gross Salary – Total Deduction

5. Create Payment Table for a fixed Principal amount, variable rate of interests and time in the format below:

No. of Instalments	5%	6%	7%	8%	9%
3	XX	XX	XX	XX	XX
4	XX	XX	XX	XX	XX
5	XX	XX	XX	XX	XX
6	XX	XX	XX	XX	XX

6. Use an array formula to calculate Simple Interest for given principal amounts given the rate of Interest and time

Rate of Interest 8%

Time	5 Years
Principal	Simple Interest
1000	?
18000	?
5200	?

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

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

- (a) Calculate total sale year wise.
 (b) Calculate the net sale made by each salesman
 (c) Calculate the maximum sale made by the salesman
 (d) Calculate the commission for each salesman under the condition.
 (i) If total sales >4,00,000 give 5% commission on total sale made by the salesman.
 (ii) Otherwise give 2% commission.
 (e) Draw a bar graph representing the sale made by each salesman. (f) Draw a pie graph representing the sale made by salesman in 2000.

8. Enter the following data in Excel Sheet
PERSONAL BUDGET FOR FIRST QUARTER

Monthly Income (Net): 1,475

EXPENSES	JAN	FEB	MARCH QUARTER TOTAL	QUARTER AVERAGE
Rent	600.00	600.00		
Telephone	48.25	43.50	60.00	
Utilities	67.27	110.00	70.00	
Credit Card	200.00	110.00	70.00	
Oil	100.00	150.00	90.00	
AV to Insurance	150.00			
Cable TV	40.75	40.75	40.75	

Monthly Total

Calculate Quarter total and Quarter average.

- (a) Calculate Monthly total.
 (b) Surplus = Monthly income - Monthly total.
 (c) What would be total surplus if monthly income is 1500.
 (d) How much does telephone expense for March differ from quarter average.
 (e) Create a 3D column graph for telephone and utilities.
 (f) Create a pie chart for monthly expenses.

9. Generate 25 random numbers between 0 & 100 and find their sum, average and count. How many no. are in range 50-60

2. Introduction to Database System

Theory: 60 lectures

UNIT-1

Database: Introduction to database, relational data model, DBMS architecture, data independence(15L)

UNIT-2

DBA, database users, end users, front end tools

E-R Modeling: Entity types, entity set, attribute and key, relationships, relation types, E- R diagrams, database design using ER diagrams (15L)

UNIT-3

Relational Data Model: Relational model concepts, relational constraints, primary and foreign key, normalization: 1NF, 2NF, 3NF (15L)

UNIT-4

Structured Query Language: SQL queries, create a database table, create relationships between database tables, modify and manage tables, queries, forms, reports, modify, filter and view data. (15L)

Reference Books:

1. P. Rob, C. Coronel, Database System Concepts by, Cengage Learning India, 2008
2. R. Elmasri, S. Navathe Fundamentals of Database Systems, Pearson Education, Fifth Edition, 2007
3. MySQL : Reference Manual

Introduction to Database System Lab

Practical: 60 lectures

1) Create a database having two tables with the specified fields, to computerize a library system of a Delhi University College.

Library Books (Accession number, Title, Author, Department, PurchaseDate, Price) IssuedBooks (Accession number, Borrower)

- a) Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.
- b) Delete the record of book titled —Database System Concepts|.
- c) Change the Department of the book titled —Discrete Maths| to —CS|.
- d) List all books that belong to —CS| department.
- e) List all books that belong to —CS| department and are written by author —Navathel.
- f) List all computer (Department=|CS|) that have been issued.
- g) List all books which have a price less than 500 or purchased between —01/01/1999| and —01/01/2004|.

2) Create a database having three tables to store the details of students of Computer Department in your college.

Personal information about Student (College roll number, Name of student, Date of birth, Address, Marks(rounded off to whole number) in percentage at 10 + 2, Phone number) Paper Details (Paper code, Name of the Paper)

Student's Academic and Attendance details (College roll number, Paper code, Attendance, Marks in home examination)

- a) Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.
- b) Design a query that will return the records (from the second table) along with the name of student from the first table, related to students who have more than 75% attendance and more than 60% marks in paper 2.
- c) List all students who live in —Delhil and have marks greater than 60 in paper 1.

- d) Find the total attendance and total marks obtained by each student.
- e) List the name of student who has got the highest marks in paper 2.

3) Create the following tables and answer the queries given below:

Customer (CustID, email, Name, Phone, ReferrerID) Bicycle (BicycleID, DatePurchased, Color, CustID, ModelNo) BicycleModel (ModelNo, Manufacturer, Style) Service (StartDate, BicycleID, EndDate)

- a) Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.
- b) List all the customers who have the bicycles manufactured by manufacturer —Hondal.
- c) List the bicycles purchased by the customers who have been referred by customer —C11.
- d) List the manufacturer of red colored bicycles.
- e) List the models of the bicycles given for service.

4) Create the following tables, enter at least 5 records in each table and answer the queries given below.

EMPLOYEE (Person_Name, Street, City) WORKS (Person_Name, Company_Name, Salary)

COMPANY (Company_Name, City)

MANAGES (Person_Name, Manager_Name)

- a) Identify primary and foreign keys.
- b) Alter table employee, add a column —email of type varchar(20).
- c) Find the name of all managers who work for both Samba Bank and NCB Bank.
- d) Find the names, street address and cities of residence and salary of all employees who work for —Samba Bank and earn more than \$10,000.
- e) Find the names of all employees who live in the same city as the company for which they work.
- f) Find the highest salary, lowest salary and average salary paid by each company.
- g) Find the sum of salary and number of employees in each company.
- h) Find the name of the company that pays highest salary.

5) Create the following tables, enter at least 5 records in each table and answer the queries given below.

Suppliers (SNo, Sname, Status, SCity)

Parts (PNo, Pname, Colour, Weight,

City) Project (JNo, Jname, Jcity)

Shipment (Sno, Pno, Jno, Qunatity)

- a) Identify primary and foreign keys.
- b) Get supplier numbers for suppliers in Paris with status>20.
- c) Get suppliers details for suppliers who supply part P2. Display the supplier list in increasing order of supplier numbers.
- d) Get suppliers names for suppliers who do not supply part P2.
- e) For each shipment get full shipment details, including total shipment weights.
- f) Get all the shipments where the quantity is in the range 300 to 750 inclusive.
- g) Get part nos. for parts that either weigh more than 16 pounds or are supplied by suppliers S2, or both.
- h) Get the names of cities that store more than five red parts.
- i) Get full details of parts supplied by a supplier in London.
- j) Get part numbers for part supplied by a supplier in London to a project in London.
- k) Get the total number of project supplied by a supplier (say, S1).
- l) Get the total quantity of a part (say, P1) supplied by a supplier (say, S1).

3. Introduction to Programming

Theory: 60 lectures

UNIT-1

Introduction to C and C++

History of C and C++, Overview of Procedural Programming and Object-Oriented Programming, Using main() function, Compiling and Executing Simple Programs in C++. **(5 Lectures)**

Data Types, Variables, Constants, Operators and Basic

I/O

Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants,

Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putchar), Formatted and Console I/O (printf(), scanf(), cin, cout), Using Basic Header Files (stdio.h, iostream.h, conio.h). **(10 Lectures)**

UNIT-2

Expressions, Conditional Statements and Iterative Statements (8 Lectures)

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

Functions and Arrays (7 Lectures)

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

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

UNIT-3

Derived Data Types (Structures and Unions) (15 Lectures)

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

UNIT-4

File I/O, Preprocessor Directives

(6 Lectures)

Opening and closing a file (use of fstream header file, ifstream, ofstream and fstream classes), Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files, Understanding the Preprocessor Directives (#include, #define, #error, #if, #else, #elif, #endif, #ifdef, #ifndef and #undef), Macros

Using Classes in C++ (7 Lectures)

Principles of Object-Oriented Programming, Defining & Using Classes, Class Constructors, Constructor Overloading, Function overloading in classes, Class Variables & Functions, Objects as parameters, Specifying the Protected and Private Access, Copy Constructors, Overview of Template classes and their use.

Inheritance and Polymorphism

Introduction to Inheritance and Polymorphism **(2 Lectures)**

Reference Books:

1. HerbtzSchildt, "C++: The Complete Reference", Fourth Edition, McGraw Hill.2003
2. BjarneStroustrup, "The C++ Programming Language", 4th Edition, Addison-Wesley, 2013.
3. BjarneStroustrup, "Programming -- Principles and Practice using C++", 2nd Edition, Addison-Wesley 2014.
4. E Balaguruswamy, "Object Oriented Programming with C++", Tata McGraw-Hill Education, 2008
5. Paul Deitel, Harvey Deitel, "C++ How to Program", 8th Edition, Prentice Hall, 2011
6. John R. Hubbard, "Programming with C++", Schaum's Series, 2nd Edition, 2000
7. Andrew Koeni, Barbara, E. Moo, "Accelerated C++", Published by Addison-Wesley , 2000
8. Scott Meyers, "Effective C++", 3rd Edition, Published by Addison-Wesley, 2005.
9. Harry, H. Chaudhary, "Head First C++ Programming: The Definitive Beginner's Guide", First Create space Inc, O-D Publishing, LLC USA.2014
10. Walter Savitch, "Problem Solving with C++", Pearson Education, 2007
11. Stanley B. Lippman, JoseeLajoie, Barbara E. Moo, "C++ Primer", Published by Addison-Wesley, 5th Edition, 2012

Introduction to c/c++ Programming Lab

Practical: 60 lectures

1. Write a program to find greatest of three numbers.
2. Write a program to find gross salary of a person
3. Write a program to find grade of a student given his marks.
4. Write a program to find divisor or factorial of a given number.
5. Write a program to print first ten natural numbers.
6. Write a program to print first ten even and odd numbers.
7. Write a program to find grade of a list of students given their marks.
8. Create Matrix class. Write a menu-driven program to perform following Matrix operations (2-D array implementation):
a) Sum b) Difference c) Product d) Transpose

4. Computer Networks and Internet Technologies

Theory: 60 lectures

UNIT-1

Computer Networks: Introduction to computernetwork, data communication , components of data communication, data transmission mode, data communication measurement, LAN, MAN, WAN, wireless LAN, internet, intranet, extranet **7L**

Network Models: Client/ server network and Peer-to-peer network, OSI, TCP/IP, layers and functionalities **8L**

UNIT-2

Transmission Media: Introduction, Guided Media: Twisted pair, Coaxial cable, Optical fiber. Unguided media: Microwave, Radio frequency propagation, Satellite.
LAN Topologies: Ring, bus, star, mesh and tree topologies **15L**

UNIT-3

Network Devices: NIC, repeaters, hub, bridge, switch, gateway and router. **5L**

Internet Terms: Web page, Home page, website, internet browsers, URL, Hypertext, ISP, Web server, download and upload, online and offline. **5L**

Internet Applications: www, telnet, ftp, e-mail, social networks, search engines, Video Conferencing, e-Commerce, m-Commerce, VOIP, blogs. **5L**

UNIT-4

Introduction to Web Design: Introduction to hypertext markup language (html) Document type definition, creating web pages, lists, hyperlinks, tables, web forms, inserting images, frames, hosting options and domain name registration. Customized Features: Cascading style sheet (css) for text formatting and other manipulations. **9L**

JavaScript Fundamentals: Data types and variables, functions, methods and events, controlling program flow, JavaScript object model, built-in objects and operators. **6L**

Reference Books:

1. Andrew S. Tanenbaum, David J. Wetherall Computer Networks (5th Edition), PHI, 2010
2. B. A. Forouzan, Data Communication and Networking, TMH, 2003.
3. D.R. Brooks, An Introduction to HTML and Javascript for Scientists and Engineers, Springer W. Willard, 2009
4. HTML A Beginner's Guide, Tata McGraw-Hill Education, 2009.
5. J. A. Ramalho, Learn Advanced HTML 4.0 with DHTML, BPB Publications, 2007

Computer Networks and Internet Technologies Lab

Practical: 60 lectures

Practical exercises based on concepts listed in theory using HTML.

1. Create HTML document with following formatting – Bold, Italics, Underline, Colors, Headings, Title, Font and Font Width, Background, Paragraph, Line Brakes, Horizontal Line, Blinking text as well as marquee text.
2. Create HTML document with Ordered and Unordered lists, Inserting Images, Internal and External linking
3. Create HTML document with Table:

			Some image here	

4. Create Form with Input Type, Select and Text Area in HTML.
5. Create an HTML containing Roll No., student's name and Grades in a tabular form.
6. Create an HTML document (having two frames) which will appear as follows:

<p>About</p> <p>Department 1</p> <p>Department 2</p> <p>Department 3</p>	<p>This frame would show the contents according to the link clicked by the user on the left frame.</p>
--	--

7. Create an HTML document containing horizontal frames as follows:

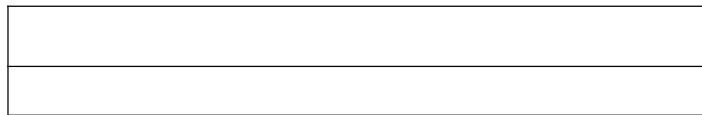
Department Names (could be along with Logos)

Contents according to the Link clicked

8. Create a website of 6 – 7 pages with different effects as mentioned in above problems.

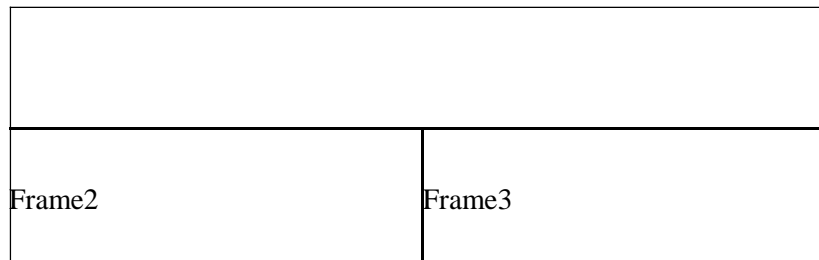
9. Create HTML documents (having multiple frames) in the following three formats:

Frame1



Frame2

Frame1



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

- V. Text Box
- VI. Option/radio buttons
- VII. Check boxes
- VIII. Reset and Submit buttons

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Yes, we love junk emails

List of Practical using JavaScript :

Create event driven program for following:

7. Print a table of numbers from 5 to 15 and their squares and cubes using alert.
8. Print the largest of three numbers.
9. Find the factorial of a number n.
10. Enter a list of positive numbers terminated by Zero. Find the sum and average of these numbers.
11. A person deposits Rs 1000 in a fixed account yielding 5% interest. Compute the amount in the account at the end of each year for n years.
12. Read n numbers. Count the number of negative numbers, positive numbers and zeros in the list.

5. Multimedia and Applications

Theory: 60 lectures

UNIT-1

Multimedia: Introduction to multimedia, components, uses of multimedia, multimedia applications, virtual reality **15L**

UNIT-2

Text: Fonts & Faces, Using Text in Multimedia, Font Editing & Design Tools, Hypermedia & Hypertext. **9L**

Images: Still Images – bitmaps, vector drawing, 3D drawing & rendering, natural light & colors, computerized colors, color palettes, image file formats **6L**

UNIT-3

Sound: Digital Audio, MIDI Audio, MIDI vs Digital Audio, Audio File Formats **5L**

Video: How video works, analog video, digital video, video file formats, video shooting and editing. **5L**

Animation: Principle of animations, animation techniques, animation file formats. **5L**

UNIT-4

Internet and Multimedia: www and HTML, multimedia on the web – web servers, web browsers, web page makers and site builders. **5L**

Making Multimedia: Stages of a multimedia project, Requirements to make good multimedia, Multimedia Hardware - Macintosh and Windows production Platforms, Hardware peripherals - Connections, Memory and storage devices, Multimedia software and Authoring tools **15L**

References:

1. Tay Vaughan, —Multimedia: Making it workl, TMH, Eighth edition.2011
2. Ralf Steinmetz and KlaraNaharstedt, —Multimedia: Computing, Communications Applicationsl, Pearson.2012
3. Keyes, —Multimedia Handbookl, TMH,2000.
4. K. Andleigh and K. Thakkar, —Multimedia System Designl, PHI.2013

Multimedia and Applications Lab Practical: 60 lectures

Practical exercises based on concepts listed in theory using Flash/ GIMP/ PhotoShop/ Animation Tools/ Image Editors/ Video Editors.

Optional

Implement the followings using Flash-

1. Create an animation using the tools panel and the properties panel to draw the following – Line, pe , oval, circle, rectangle , square, pencil , brush , lasso tool
2. Create an animation using text tool to set the font, size, color etc.
3. Create an animation using **Free transform tool** that should use followings-Move Objects Skew Objects Stretch Objects Rotate Objects Stretch Objects while maintaining proportion Rotate Objects after relocating the center dot
4. Create an animation using layers having following features-Insert layer, Delete layer, guide layer, Mask layer.
5. Modify the document (changing background color etc.)using the following tools
Eraser tool Hand tool Ink bottle tool Zoom tool
Paint Bucket tool Eyedropper tool
6. Create an animation for bus car race in which both starts from the same point and car wins the race.
7. Create an animation in which text Hello gets converted into GoodBye (using motion/shape tweening).
8. Create an animation having five images having fade-in fade-out effect.
9. Create an scene to show the sunrise (using multiple layers and motion tweening)
10. Create an animation to show the ripple effect.
11. Create an animation (using Shape tweening and shape hints) for transforming one shape into another.
12. Create an animation for bouncing ball (you may use motion guide layer).

6. Software Engineering

Theory: 60 Lectures

Unit 1

Introduction to Software Engineering, Software Engineering as a Layered Technology, Software Life Cycle Models (**15 Lectures**)

Unit 2

Software Requirements: Analysis and Specifications, Software Requirement Analysis, Initiating Requirement Engineering Process, Requirement Analysis and Modeling Techniques, Flow Oriented Modeling, Need for SRS, Characteristics and Components of SRS. **(15 Lectures)**

Unit 3

Software Project Planning and Design: Estimation in Project Planning Process, Project Scheduling, Design Concepts, Architectural Design Elements, Software Architecture, Data Design at the Architectural Level and Component Level, Mapping of Data Flow into Software Architecture, Modeling Component Level Design **(15 Lectures)**

Unit 4

Software Metrics, Software Testing, Software Testing Fundamentals, Strategic Approach to Software Testing, Test Strategies for Conventional Software, Validation Testing, System testing, Black-Box Testing, White-Box Testing and their type, Basis Path Testing. Software Maintenance, Software Certification **(15 Lectures)**

Reference books:

1. K.K. Aggarwal and Y. Singh, Software Engineering (2nd Edition), New Age International Publishers.
2. Yogesh Singh, Software Testing, Cambridge University Press.2011
3. R.S. Pressman, Software Engineering: A Practitioner's Approach (7th Edition), McGraw-Hill, 2009.

COMPUTER SCIENCE LAB: Software Engineering Lab

Software Engineering Lab

Practical:

60

Practical Title

Problem Statement,

Process Model

Requirement Analysis

Creating a Data Flow

Data Dictionary,

Use Cases

Project Management

Computing FP

Effort

Schedule, Risk Table, Timeline chart

Design Engineering

(a) Architectural Design

(b) Data Design, Component Level Design

Testing

Basis Path Testing Sample Projects

DTC Route Information: Online information about the bus routes and their frequency and fares

Car Pooling: To maintain a web based intranet application that enables the corporate employees within an organization to avail the facility of carpooling effectively.

Patient Appointment and Prescription Management System

Organized Retail Shopping Management Software

Parking Allocation System

Wholesale Management System

7. Information Security and Cyber Laws

Theory: 60 lectures

UNIT-1

Course Introduction: Computer network as a threat, hardware vulnerability, software vulnerability, importance of data security. **15L**

UNIT-2

Digital Crime: Overview of digital crime, criminology of computer crime. **5L**

Information Gathering Techniques: Tools of the attacker, information and cyber warfare, scanning and spoofing, password cracking, malicious software, session Hijacking **10L**

UNIT-3

Risk Analysis and Threat: Risk analysis, process, key principles of conventional computer security, security policies, authentication, data protection, access control, internal vs external threat, security assurance, passwords, authentication, and access control, computer forensics and incident response **10L**

Introduction to Cryptography and Applications : Important terms, Threat, Flaw, Vulnerability, Exploit, Attack, Ciphers, Codes, Caesar Cipher, Rail-Fence Cipher, Public key cryptography (Definitions only), Private key cryptography (Definition and Example) **5L**

UNIT-4

Safety Tools and Issues: Firewalls, logging and intrusion detection systems, Windows and windows XP / NT security, Unix/Linux security, ethics of hacking and cracking **5L**

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 66C] Punishment for identity theft
- [Section 66D] Punishment for cheating personation by using computer resource
- [Section 66E] Punishment for violation of privacy
- [Section 66F] Punishment for cyber terrorism
- [Section 67] Punishment for publishing or transmitting obscene material in electronic form
- [Section 67A] Punishment for publishing or transmitting of material containing sexually explicit act, etc. in electronic form [Section 67B] Punishment for publishing or transmitting of material depicting children in sexually explicit act, etc. in electronic form
- [Section 72] Breach of confidentiality and privacy **10L**

Reference Books:

1. M. Merkow, J. Breithaupt, Information Security Principles and Practices, Pearson Education.2005
2. G.R.F. Snyder, T. Pardoe, Network Security, Cengage Learning, 2010
3. A. Basta, W.Halton, Computer Security: Concepts, Issues and Implementation, Cengage Learning India, 2008

Information Security and Cyber Laws Lab

Practical: 60 lectures

1. Demonstrate the use of Network tools: ping, ipconfig, ifconfig, 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 steganography tools.

8. Web and E-Commerce Technologies

Theory: 60 Lectures

UNIT 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 disadvantages of E-Commerce, Scope of E-Commerce, Electronic Commerce Applications, 9 Electronic Commerce and Electronic

Business(C2C)(C2G,G2G, B2G, B2P, B2A, P2P, B2A, C2A, B2B, B2C) (10L)

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(5L)

UNIT 2

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, Authorisation and Authentication, Firewall, Digital Signature(How it Works) (15L)

UNIT 3

Electronic Data Exchange: Introduction, Concepts of EDI and Limitation, Applications of EDI, Disadvantage EDI model, **Electronic Payment System:** Introduction, Types of Electronic Payment System, Payment Ty Exchange System, Credit Card System, Electronic Fund Transfer, Paperless bill, Modern Payment Cash, Cash(15L)

UNIT 4

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
Internet Marketing: The PROS and CONS of online shopping, The cor Internet business, Internet marketing techniques, The E-cycle of Intern commerce. (15L)

Recommended Books:

1. G.S.V. Murthy, E-Commerce Concepts, Models, Strategies- :- Himalaya Publishing House, 2011.
2. Kamlesh K Bajaj and Debjani Nag, E- Commerce, 2005.
3. Gray P. Schneider , Electronic commerce, International Student Edition, 2011,
4. HENRY CHAN, RAYMOND LEE, THARAM DILLON, ELIZABETH CHANG
E-COMMERCE, FUNDAMENTALS AND APPLICATIONS, Wiley Student Edition, 2011

Web and E-Commerce Technologies Lab**Practical: 60 Lectures****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 forms.

Cascading Style Sheets (CSS): embedding/linking; HTML element selectors; classes; ID selectors, text manipulation; background; borders and spacing; layout; context selectors and grouping, pseudo-classes; pseudo-elements.

JavaScript : writing 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

Perl/CGI 10: sample Perl operations; random numbers; lists; dealing four poker hands; time manipulation; subroutines, hash tables; files; string matching, CGI; registration lists; surveys.

SQL and regular expressions: Regular expressions: select; where; order by; insert; update; delete, like; aggregate functions; create table; alter table; drop deterministic functions; non-deterministic functions.
