

FOUR YEAR UNDERGRADUATE PROGRAMME IN COMPUTER SCIENCE

UNIVERSITY OF DELHI

DEPARTMENT OF COMPUTER SCIENCE

FOUR YEAR UNDERGRADUATE PROGRAMME

(Courses effective from Academic Year 2013-14)



SYLLABUS OF COURSES TO BE OFFERED

Discipline Courses I, Discipline Courses II

& Applied Courses

Note: The courses are uploaded as sent by the Department concerned. The scheme of marks will be determined by the University and will be corrected in the syllabus accordingly. Editing, typographical changes and formatting will be undertaken further.

Four Year Undergraduate Programme Secretariat
fouryearprog@gmail.com

FOUR YEAR UNDERGRADUATE PROGRAMME IN COMPUTER SCIENCE

FOUR YEAR UNDERGRADUATE PROGRAMME OF COMPUTER SCIENCE FOLLOWING MULTIPLE DEGREE OPTIONS:

- Diploma in Computer Science on exit after 2 years.
- Bachelor in Computer Science on exit after 3 years.
- B. Tech. (Computer Science) on exit after 4 years.

**FOUR YEAR UNDERGRADUATE PROGRAMME IN COMPUTER SCIENCE
COURSE STRUCTURE FOR FOUR YEAR UG PROGRAMME IN
COMPUTER SCIENCE**

- 1. For all Practical Classes of DC-I, DC-II and AC courses, there shall be 20 students per Batch.**
- 2. For the subsequent Course Structure Tables of DC-I, DC-II and AC courses, the following notations shall be followed:**
 - i. L: Lecture Periods/Week.**
 - ii. P: Student's Presentation Periods/Week.**
 - iii. T: Tutorial Periods/Week.**
 - iv. LB: Laboratory Periods / Student / week.**

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DISCIPLINE COURSE – I (DC-I)

The broad objectives of DC-I course of 4-Year Undergraduate Programme in Computer Science are to provide necessary theoretical background and practical experience to the Undergraduate Computer Science students. In order to fulfill the requirements of education in Computer Science, there are Eighteen main DC-I papers and two Research and Project oriented papers. Out of first Eighteen main papers, there are two papers of Mathematics, namely “Linear Algebra for Computer Science” and “Probability Theory and Statistical Computing”. These papers are indispensable for the Computer Science students to enhance their Mathematical abilities in terms of computational skills and performance analysis. The remaining sixteen main papers are core Computer Science papers which touch all gamut of computer Science and Engineering. No Computer Science Programme goes successful without adequate hands on practical components. Accordingly, depending on the course requirements, there are requisite numbers of practical hours. Keeping in mind, the practical requirements of papers and also that the work-loads of students do not increase beyond their bearable limits, the practical periods for DC-I papers are kept zero/two/ four periods per student per week. To give impetus to research in Computer Science and to develop the research skills of the students, two papers relating to Research work have been included in the Fourth year of the curriculum. In the “Research Methodology and Project Work” paper of seventh semester, the students shall be taught about the necessary theoretical aspects of carrying out research along with a minor project work to apply the aforesaid research principles in practice. In the “Research” paper of eighth semester, the students shall carry out a major project to apply the knowledge gained through the DC-I papers. The DC-I course in Computer Science aims to develop core competence in Computer Science and application and prepare the students to carry out application development in almost every field of Computer Science and Engineering as well as in inter-disciplinary areas. The students shall also learn how to carry research.

The courses in DC-I have been ordered semester wise not only based on pre-requisites but also keeping in mind the exit points. On exit after two years, a student will become a skilled work force for Information Technology field and be equipped with sufficient knowledge to get an entry level job in IT, like jobs of data entry operators, laboratory attendant etc. On exit after three years, a student will be having sufficient theoretical knowledge and practical experience in Computer Science and will be fit for middle level industrial jobs in IT field, like programmer, Computer maintenance and system administrators. On exit after four years, a student will become a professional in IT and will become fit for all types of jobs in IT field like software Developer, Analyst, Manager and Researcher.

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**COURSE STRUCTURE TABLE
DISCIPLINE COURSE – I (DC-I)**

Theory Marks: 100 Marks (75 Marks in End Semester Examination and 25 Marks in Internal Assessment).

Practical Marks as listed in the Table Below.

CODING	TITLE	L – P – T – LB	Marks	
			Theory	Practical
CSDC1-101	Programming Fundamentals	4 – 1– 0 – 4	100	50
CSDC1-102	Computer Systems Architecture	4 – 1– 0 – 4	100	50
CSDC1-201	Linear Algebra for Computer Science	4 – 1– 0 – 2	100	50
CSDC1-202	Data Structures	4 – 1– 0 – 4	100	50
CSDC1-301	Discrete Structures	4 – 1– 1 – 0	100	00
CSDC1-302	Operating Systems	4 – 1– 0 – 4	100	50
CSDC1-401	Data Communications and Computer Networks	4 – 1 – 0 – 2	100	50
CSDC1-402	Database Systems	4 – 1– 0 – 2	100	50

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CODING	TITLE	L – P – T – LB	Marks	
			Theory	Practical
CSDC1-501	Design and Analysis of Algorithms	4 – 1– 0 – 2	100	50
CSDC1-502	Probability Theory and Statistical Computing	4 – 1– 0 – 2	100	50
CSDC1-503	Microprocessors	4 – 1– 0 – 2	100	50
CSDC1-601	Theory of Computation	4 – 1– 1 – 0	100	00
CSDC1-602	Computer Graphics	4 – 1– 0 – 2	100	50
CSDC1-603	Software Engineering	4 – 1– 0 – 2	100	50
CSDC1-701	Systems Programming and Compiler Design	4 – 1– 0 – 2	100	50
CSDC1-702	Network Programming	4 – 1– 0 – 4	100	50
CSDC1-703	Research Methodology and Project work	2 – 1– 0 – 4	50	100 (Minor Project)
CSDC1-801	Artificial Intelligence	4 – 1– 0 – 4	100	50
CSDC1-802	Information Security	4 – 1– 0 – 4	100	50
CSDC1-803	Research	0 – 1– 0 – 4	00	150 (Major Project)

DISCIPLINE COURSE – II (DC-II)

Six papers of DC - II in Computer Science, spread over six semesters, have been designed to provide necessary and useful theoretical knowledge in Computer Science and programming skills along with rigorous practical training in several useful and popular areas of Computer Science with adequate exposure to contemporary IT software and tools. This feature is expected to make DC-II papers of in Computer Science very useful and fascinating to the students of other disciplines without any prior knowledge of Computer Science. While the rigor has not been compromised, care has been taken that the knowledge of Computer Science is effectively leveraged by the students of disciplines other than Computer Science. The theoretical and practical knowledge imparted through the DC-II courses in Computer Science will enable the students of other disciplines to make efficient use of Information Technology in their respective disciplines. These courses are also important and useful from the Industrial point of view and are likely to enhance the placement avenues of the students of non-computer science discipline in Computer Industry. Keeping this objectives in mind, papers like “Computer Networks and Internet Technology”, “Database Systems and Applications”, “Operating Systems and Open Source Softwares” and “Information security and E-Governance” have been incorporated in DC-II curriculum of Computer Science. Also ,the students opting for all six DC-II in Computer Science will have sufficient knowledge of Computer science and be eligible for the future Master’s degree Programmes in Computer Science of the University of Delhi.

**COURSE STRUCTURE TABLE
DISCIPLINE COURSE – II (DC-II)**

Theory Marks: 100 Marks (75 Marks in End Semester Examination and 25 Marks in Internal Assessment).

Practical Marks: 50

CODING	TITLE	L – P – T – LB	Marks	
			Theory	Practical
CSDC2-301	Fundamentals of Computer Systems	4 – 1– 0 – 4	100	50
CSDC2-401	Computer Networks and Internet Technology	4 – 1– 0 – 4	100	50
CSDC2-501	Database Systems and Applications	4 – 1– 0 – 4	100	50
CSDC2-601	Operating Systems and Open Source Softwares	4 – 1– 0 – 4	100	50
CSDC2-701	Programming Fundamentals and Data Structures	4 – 1– 0 – 4	100	50
CSDC2-801	Information Security and E-Governance	4 – 1– 0 – 4	100	50

APPLIED COURSES (AC)

The primary objective of the four Applied Courses (AC) in Computer Science, spread over four semesters is to supplement the knowledge of Discipline Course – I (DC-I) of Computer Science with further professional and practical skills in several useful and state of the art application areas of Computer Science like “Geo-informatics”, “Mobile Applications on Android Platform”, “Web Technology” and “Embedded Systems”. These Applied Courses will expose the students to various open source software tools and will equip them with required programming skills and problem solving attitude to apply their theoretical and practical grooming in developing softwares to cater to the day to day real-life needs of our modern society and also to satisfy the requirements of business enterprises. Unlike the DC-I and DC-II courses, the lectures imparted by the teachers in AC papers will be totally practical and skill oriented. The AC courses offered by the Department of Computer Science can be opted by the students of Computer Science and non-computer Science disciplines. The professional and practical skills acquired through the AC courses will appreciably enhance the placement avenues of students of Computer Science and non-computer science backgrounds.

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**COURSE STRUCTURE TABLE
APPLIED COURSES (AC)**

CODING	TITLE	L – P – T – LB	Marks
			Theory and Practical
CSAC-301	Geo- informatics	2 – 1– 0 – 2	75
CSAC-401	Mobile Applications on Android Platform	2 – 1– 0 – 2	75
CSAC-501	Web Technology	2 – 1– 0 – 2	75
CSAC-601	Embedded Systems	2 – 1– 0 – 2	75

D. SYLLABI CONTENTS FOR FOUR YEAR UG PROGRAM

I. DISCIPLINE COURSES -I (DC-I)

CSDC1-101: Programming Fundamentals

Introduction: Programming constructs Basic data types, Constants and variables	3L
[1] Chap. 2 (2.1 - 2.8)	
Control structures in conditionals, Arithmetic and logical expressions, Assignment	6 L
[1] Chap. 3 (3.1 to 3.6)	
Looping: for, while, repeat structures	6 L
[1] Chap. 5 (5.1 to 5.3)	
Functions: Parameter passing by value/reference	4L
[1] Chap.6 (6.1 to 6.7)	
Arrays, Command line arguments,	3L
[1] , Chap. 4 (4.1 – 4.4,4.6)	
Files: File handling functions.	4L
Chap. 8 (8.1 to 8.4)	
Strings: string as a composite data structure, functions to manipulate strings	4L
[1], Chap. 7 (7.1 – 7.6)	

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Object oriented Programming: Abstraction and Encapsulation, Procedural abstractions, Objects and classes

[1], Chap. 10 (10.1 – 10.5), Chap. 11 (11.3), Chap. 14 (14.1 – 14.5) 6L

Inheritance, polymorphism 6L

[1] Chap. 12 (12.1 – 12.6)

Exception Handling: raising exception, exception processing 6L

[1] Chap.15 (15.1 – 15.3)

Recommended Reading Material

Text Book:

1. A. B. Forouzan, Richard F. Gilberg *Computer Science: A structured Approach using C++*, 2nd edition, Cengage Learning, 2010.

LIST OF PRACTICALS OF CSDC1-101: Programming Fundamentals

1. Write a Program to print the sum and product of digits of an integer.
2. Write a program to reverse a number.
3. Write a program to compute the sum of n terms of the following series

$$S = 1 + 1/2 + 1/3 + 1/4 + \dots$$

4. Write a program to compute the sum of n terms of the following series

$$S = 1 - 2 + 3 - 4 + \dots$$

5. Write a program using iteration

- a) Display Fibonacci Series
- b) Calculate Factorial of a number.
- c) Calculate GCD of two numbers.

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6. Write a function to find whether a given no. is Prime or not. Use the same to generate prime numbers less than 100.

7. Write a program to compute the factors of a given number.

8. Write a program to print the triangle of stars as follows (take number of lines from user)

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

9. Write a function that checks whether a given string is a palindrome or not. Use this function to find whether the string entered by user is palindrome or not.

10. Sort the list of numbers using selection sort.

11. Write a menu driven program to perform following operations on strings (using String class, functions):

- a) Concatenate two strings
- b) Compare two strings.
- c) Calculate the length of the string
- d) Calculate the number of vowels.

12. Write a program to perform following actions on an array entered by the user:

- a) Print the even-valued elements.
- b) Print the odd-valued elements.
- c) Calculate and print the sum and average of the elements of user.

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- d) Print the maximum and minimum elements of array.
- e) Remove the duplicates from an array.
- f) 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 and to quit the program.

13. Write a program that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.

14. Create a file that contains records of 5 employees. Each record contains an employee's salary details. Print the information retrieved from the file in the following format:

```
EId Name Basic HRA DA ExtraAllowances
```

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

16. Count characters and Lines in a text file.

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

18. Create class Box containing length, breadth and height . Write the following functions:

- a) Calculate Volume
- b) Overload + operator (to add two boxes length, breadth and height)
- c) Overload operator == (to check equality of two boxes), as a friend function
- d) Overload Assignment operator
- e) Check if its a cube or cuboid

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19. To the class Box (created in Q 18) add overloaded constructors to enable the creation of a Box without passing any arguments, creation of a cube with a single argument, and a cuboid with three arguments.
20. To the class Box (created in Q 18) add a copy constructor that provides for initialising a Box using another Box
21. Create a class Person. Create some objects of this class (by taking information from the user). Inherit the class Person to create two classes Teacher and Student class. Maintain respective information in the classes and create, display and delete objects of these two classes. (Use Run Time Polymorphism).

CSDC1-102: Computer Systems Architecture

Digital Logic Gates: 6L

Boolean algebra, Logic Gates

[1] (Pages 1-12)

Digital Circuits: 7L

Flip-flops and counters, Combinational circuits, Decoders, Multiplexers, Flip-flops, Sequential circuits.

[1] Pages (2.2, 2.3,.43-50)

Basic Computer Organization and Design: 7 L

Computer registers, Common bus system, Instruction set, Control and Timing, Instruction cycle, Instruction formats and Types of instructions, Interrupt cycle.

[1] Pages(.125-158)

Micro programmed Organization: 7L

Micro programmed control, Instruction formats, Arithmetic and logical micro-operations

[1] Pages (215-232)

Central Processing Unit: 7L

Register organization, , Stack organization, Instruction format, Addressing modes.

[1] Pages (243-268)

Memory Organization: 7 L

Random Access Memory, ROM, EPROM, Associative memory, Cache memory. [1]

[1] Pages (447-471)

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Input-output Organization:

7 L

Input / Output: External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels.

[2] Pages(.202- 216,221- 227, .227-229).

Recommended Reading Material

Text Books:

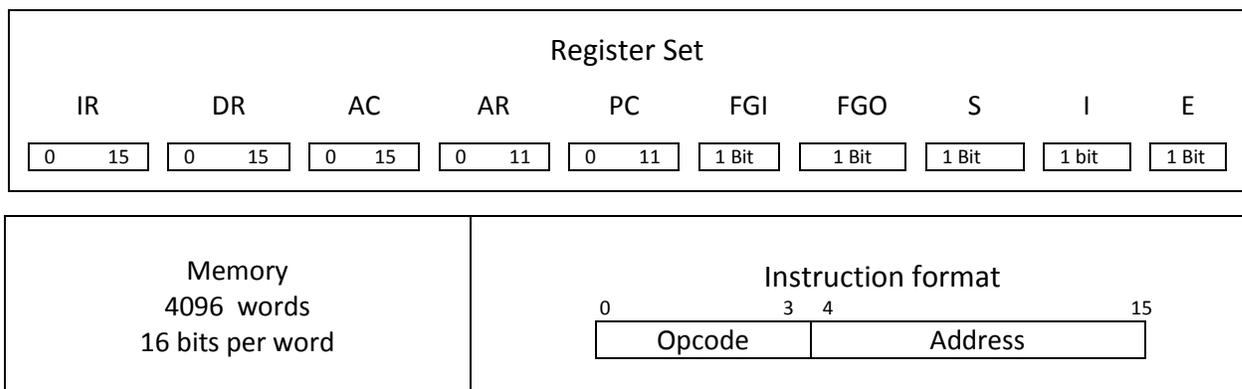
1. M. M. Mano, *Computer System Architecture*, 3rd Edition, Prentice Hall of India, 2008.
2. W. Stallings, *Computer Organization and Architecture- Designing for Performance*, 7th Edition, Pearson Education/PHI, Inc., 2008.

Reference Books

3. J. P. Hayes, *Computer Architecture and Organization*, 3rd Edition, Tata McGraw-Hill, 2012.
4. A. S. Tanenbaum, *Structured Computer Organization*, 5th Edition, Pearson Education, Inc., 2006.

Practical List of CSDC1-102: Computer System Architecture

1. Create a machine based on the following architecture:



Basic Computer Instructions

Memory Reference	Register Reference	Input-Output
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Symbol	Hex		Symbol	Hex	Symbol	Hex
AND	0xxx	Direct Addressing	CLA	E800	INP	F800
ADD	2xxx		CLE	E400	OUT	F400
LDA	4xxx		CMA	E200	SKI	F200
STA	6xxx		CME	E100	SKO	F100
BUN	8xxx		CIR	E080	ION	F080
BSA	Axxx		CIL	E040	IOF	F040
ISZ	Cxxx		INC	E020		
AND_I	1xxx	Indirect Addressing	SPA	E010		
ADD_I	3xxx		SNA	E008		
LDA_I	5xxx		SZA	E004		
STA_I	7xxx		SZE	E002		
BUN_I	9xxx		HLT	E001		
BSA_I	Bxxx					
ISZ_I	Dxxx					

Optional

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

2. Create the micro operations and associate with instructions as given in the chapter (except interrupts). Design the register set, memory and the instruction set. Use this machine for the assignments of this section.
3. Create a Fetch routine of the instruction cycle.
4. Simulate the machine to determine the contents of AC, E, PC, AR and IR registers in hexadecimal after the execution of each of following register reference instructions:

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

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

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

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

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

Instruction format



- a. The instruction format contains a 3-bit opcode, a 1-bit addressing mode and a 12-bit address. There are only two addressing modes, $I = 0$ (direct addressing) and $I = 1$ (indirect addressing).
- b. Create a new register I of 1 bit.
- c. Create two new microinstructions as follows :
 - i. Check the opcode of instruction to determine type of instruction (Memory Reference/Register Reference/Input-Output) and then jump accordingly.
 - ii. Check the I bit to determine the addressing mode and then jump accordingly.

CSDC1-201: Linear Algebra for Computer Science

Determinants 3L

Determinants, Cofactors, Evaluation and properties of determinants

[1]: [chap 4: 4.1 - 4.4]

Matrices & System of Linear Equations 10 L

Introduction, Matrix Algebra, Transpose of a Matrix, Elementary row operations on a Matrix, Echelon form of a Matrix, Rank of a Matrix, Inverse of a matrix, Solution of System of Homogeneous & Non-Homogeneous Equations: Gauss elimination, Cramer's rule. Numerical Methods: Gauss Jordan, Jacobi and Gauss Sidel Methods.

[1]: [chap 1: 1.1 - 1.6, ch2: 2.2]

[2]: [chap 1: 1.2, 1.6]

Vector Spaces 7L

Definition of a Vector Space, Sub-spaces, Linear Combinations, Linear Span, Convex Sets, Linear Independence/Dependence, Basis & Dimension, Application to Graphs and Networks

[1]: [chap 2: 2.1, 2.3, 2.4, 2.5]

[2]: [chap 2: 2.1-2.6]

Linear Transformation 7 L

Linear transformation on finite dimensional vector spaces, Kernel & Image of a Linear transformation, Matrix and coordinates of a Linear transformation with respect to an ordered basis, Similar matrices.

[1]: [chap 2: 2.6]

[2]: [chap 3.1-3.4, 3.7]

Inner Product Spaces

6 L

Inner Product, Definition & examples, Parallelogram Law, Schwarz Inequality, Gram-Schmidt Orthogonalization Process, Orthonormal Basis

[1]: [chap 3: 3.1 - 3.4]

[2]: [chap 8: 8.1, 8.2]

Eigen Values & Eigen Vectors of linear transformations and matrices 7L

Definition of Eigen Value and Eigen Vector, Characteristic Polynomial, Eigen spaces, Diagonalization, Cayley Hamilton Theorem, Applications to Markov Matrices and Economic Models.

[1]: [chap 5: 5.1 - 5.3]

[2]: [chap 6: 6.1, 6.2]

Positive Definite Matrices

3L

Positive Definite Matrices, Singular Value Decomposition.

[1]: [chap 6: 6.1 - 6.3]

Applications to Linear Programming

5L

LU Factorization, Linear Inequalities, Feasible Set and the cost function, Graphical Method, Simplex Method -.

[1]: [chap 8: 8.1, 8.2]

Recommended Reading Material

Text Books

1. Gilbert Strang, Wellesey, *Introduction to Linear Algebra*, Fourth Edition, , Cambridge Press/Cengage Learning, 2009
2. K Hoffman & R Kunze, *Linear Algebra* 2/e, PHI, 2000

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Reference Books

1. I N Herstein: Topics in Algebra, 2nd Edition, John Wiley and son ,2006

Online Reading/Supporting Material

3. MIT Open Courseware Linear Algebra by Gilbert Strang:
<http://ocw.mit.edu/courses/mathematics/18-06-linear-algebra-spring-2010/index.htm>

LIST OF PRACTICALS BASED ON CSDC1-201 :LINEAR ALGEBRA FOR COMPUTER SCIENCE

S. No.	Practical Title
1.	Create and transform vectors and matrices (the <i>transpose</i> vector (matrix)& <i>conjugate transpose</i> of a vector (matrix))
2.	Solve system of Homogeneous and non homogeneous equations using Gauss elimination, Cramer's rule.
3.	Generate the matrix into echelon form and find its rank .
4.	Generate the LU decomposition of a matrix. Find cofactors, determinant, adjoint and inverse of a matrix
5.	Generate basis of column space, null space, row space and left null space of a matrix space
6.	Solution of system of equations using numerical methods
7.	Check the linear dependency of vectors . Generate a linear combination of given vectors of R^n / matrices of same size and find the transition matrix of given matrix space
8	Find the orthonormal basis of a given vector space using Gram-Schmidt orthogonalization process

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9.	Check the diagonalizable property of matrices and find the corresponding eigen value and verify the Cayley- Hamilton theorem
10.	Problems on LU factorization
11.	Application of Linear algebra: Coding and decoding of messages using non singular matrices. eg <u>code “Linear Algebra is a fun” and then decode it</u>
12.	Solve Linear programming problem (graphical and simplex method)

Software to be used : MATLAB/ MATHEMATICA etc.

CSDC1-202: Data Structures

- Single and Multidimensional arrays, Sequential Allocation, Address Calculations, Sparse matrices and their efficient representation. 6L
[2]: [chap 7: 7.1, 7.3,7.4.1, 7.4.2 up to Pg 256, 7.4.3 (up to pg. 261)]
- Recursion, Application of stacks to recursion problems. 5L
[1]: [chap 5: 5.1 to 5.9]
- Singly & Double Linked Lists, Operations on all these structures and applications of these structures. 6L
[1]: [chap 3: 3.1, 3.2]
- Circular Linked Lists , Self Organizing Lists 4L
[1]: [chap 3: 3.3, 3.5]
- Stacks, Applications of stacks eg.: Infix to Postfix. Queues, Overview of priority queue 6L
[1]: [chap 4: 4.1 to 4.3]
- Trees, Binary Trees, Complete Binary trees and almost complete Binary trees, BST, Tree traversal algorithms, Searching in Binary Search Tree. Introduction to Threaded Trees. 5L
[1]: [chap 6: 6.1 to 6.4.3 upto pg 235]
- BST Insertion & Deletion 3L
[1]: [chap 6: 6.5(pg 241-242), 6.6 (pg 244-250)]
- Sorting Techniques (without efficiency): Bubble Sort, Selection Sort, Insertion Sort. 4L
[3]: [chap 6: 6.2(pg 339-341), 6.3(pg 352-353), 6.4(upto pg 365)]
- Searching Techniques (without efficiency): Linear search, Binary search, Hashing with Collision handling methods. 5L
[3]: [chap 7: 7.1(pg 384-390, 394-396), Ref. [1]: [ch10: 10.1 to 10.3 (pg 525-538)]
- Multiway trees – B-Tree, B+ Tree. 4L
[1]: [chap 7 : (pg 301-316)]

Recommended Reading Material

Text Books

1. Adam Drozdek, *Data Structures and algorithm in C++*, Third Edition, Cengage Learning, 2012.
2. Sartaj Sahni, *Data Structures, Algorithms and applications in C++*, Second Edition, Universities Press, 2011.
3. Aaron M. Tenenbaum, Moshe J. Augenstein, Yedidyah Langsam, *Data Structures Using C and C++*, Second edition, PHI, 2009.

Reference Books

4. D.S Malik, *Data Structure using C++*, Second edition, Cengage Learning, 2010.

Online Reading/Supporting Material

4. <http://nptel.iitm.ac.in/video.php?subjectId=106102064>

List of Practicals based on CSDC1 202 Data Structures

S. No.	Practical Title
1.	Write a menu driven program to implement the following sparse matrices using one-dimensional array: a) Diagonal Matrix b) Lower Triangular Matrix c) Upper Triangular Matrix d) Symmetric Matrix
2.	I. Write a program to compute b^r using recursion where b represent base and r represents power. II. Write a program to reverse a user entered string using recursion.
3.	Write a program to perform the following Queue operations using Circular Array implementation (Use Templates): a) Enqueue b) Dequeue
4.	I. Write a program to add two large integers using stack. II. Write a program to evaluate postfix expression using stack.
5.	Write a program to 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 +).

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6.	<p>I. Write a program to perform the following Stack operations using linked list . Push Pop Clear</p> <p>II. Write a program to create and perform the following operations on Queues using linked list: a.Enqueue b.Dequeue</p>
7.	Write a program to implement Doubly Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
8.	Write a program to implement Circular Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
9.	Write a program to add two polynomials using linked list representation.
10.	Write a menu driven program to implement the following operations in an ordered linked list: a) Insertion b) Deletion c) Merging
11.	Write a Program to reverse elements of a Stack using an additional Stack.
12.	Write a Program to reverse elements of a Stack using an additional Queue.
13.	Write a menu driven program to implement the following operations in a Binary Search Tree: a) Insertion. b) Deletion by copying or by merging. c) Search a number in BST. d) Display the contents in one of preorder, postorder and inorder traversals using recursion. e) Display the contents by level-by-level traversal. f) Count the leaf and non-leaf nodes of the tree. g) Display the height of the tree. h) Create the mirror image of the tree.
14.	Write a menu driven program to implement the following sorting and searching algorithms: a) Insertion Sort b) Binary Search c) Bubble Sort d) Selection Sort

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15.	Write a program to create a Hash Table that allows insertion, deletion and searching for an element.
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CSDC1-301: Discrete Structures

Introduction to Sets, Finite and Infinite Sets, Unaccountably Infinite Sets. Introduction to Functions and relations, Properties of Binary relations, Closure, Partial Ordering Relations.	6 L
[1] : [1.1 to 1.4, 3.1, 3.3, 3.4, 3.7(excluding lattices)], [2] : [2.3]	
Pigeonhole Principle, Permutation and Combinations, Mathematical Induction, Principle of Inclusion and Exclusion.	4 L
[1] : [1.5, 1.6, 2.1 to 2.4] [2] : [5.2(Introduction only)]	
Asymptotic Notations, Summation formulas and properties, Bounding Summations, Approximation by Integrals.	8 L
[2] : [3.1(excluding Greedy & Halting problem),3.2] [3] : [Appendix A]	
Recurrence Relations, Generating Functions, Linear Recurrence Relations with constant coefficients and their solution.	6 L
[1] : [8.1, 8.2,8.4, 9.1 to 9.6]	
Substitution Method, Recurrence Trees, Master Theorem.	6 L
[3] : [4.3 to 4.5]	
Basic Terminology of Graphs, Models and Types, Multigraphs, Weighted Graphs, Graph Representation. Graph Isomorphism Graph Connectivity, Euler and Hamiltonian Paths and Circuits	6 L
[2] : [8.1 to 8.5]	

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Planar Graphs, Graph Coloring, Basic Terminology of Trees, Properties of Trees, Spanning Trees. 6 L

[2]: [8.7 to 8.8, 9.1, 9.4]

Logical Connectives, Well Formed Formulas, Tautologies, Equivalence, Inference Theory. 6 L

[1]: [1.8 to 1.14]

Recommended Reading Material

Text Books

1. C. L. Liu and D.P. Mohapatra, *Elements of Discrete Mathematics*, Third Edition, Tata McGraw Hill , 2008.
2. K. Rosen, *Discrete Mathematics and Its Applications*, Sixth Edition, Tata McGraw Hill, 2007.
3. T.H. Cormen, C.E. Leiserson, R.L. Rivest, *Introduction to Algorithms*, Third Edition, Prentice Hall of India,2010.

Reference Books

4. J.P. Trembley, R. Manohar, *Discrete Mathematical Structures with Application to Computer Science*, First Edition, Tata McGraw Hill, 2001.

Online Reading/Supporting Material

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

CSDC1 – 302: Operating Systems

Introduction: 6 L

Operating Systems functions, Types of operating systems, Multiprogramming systems, Batch systems, Time-sharing systems, Operating system operations, Special purpose operating systems, Distributed systems, Different computing environments.

[1] Page 03 to 12, Page 18 to 23, Page 31 to 36,

Operating System Organization: 5 L

Processor and user modes, user operating system interface, Kernels, System calls and its types, System programs, Operating system structures, Virtual machines.

[1] Page 49 to 55, Page 58 to 67, Page 70 to 74, Page 76 to 78

Process Management: 12 L

Process states, Process Scheduling, Process hierarchy, Threads, Threading issues, Multi-threading models, Non-pre-emptive and pre-emptive scheduling algorithms, Concurrent processes, Critical section, Semaphores, methods for inter-process communication, Deadlocks.

[1] Page 101 to 113, Page 115 to 122, Page 153 to 161, Page 166 , Page 183 to 190,

Page 192 to 198, Page 225 to 228, Page 234 to 235, Page 283 to 290.

Memory Management: 12 L

Physical and virtual address space, Memory allocation strategies, Paging, Segmentation, Virtual memory and Demand paging, Page replacement algorithms.

[1] Page 315 to 317, Page 319 to 320, Page 322 to 336,

Page 342 to 344, Page 357 to 367, Page 369 to 380

File and I/O Management: 8 L

Directory structure, File operations, Files system mounting, File allocation methods, Device management, Disk scheduling algorithms.

[1] Page 421 to 445, Page 461 to 466, Page 470 to 477, Page 479 to 481,

Page 505 to 507, Page 511 to 515

Protection and Security:

5 L

Policy mechanism, Program, network and system threats, Authentication.

[1] Page 591 to 595, Page 621 to 626, Page 630 to 634, Page 649 to 653

Recommended Reading Material

Text Books

1. A Silberschatz, P.B. Galvin, G. Gagne, *Operating Systems Concepts*, 8th edition, John Wiley Publications ,2008.

Reference Books

1. G. Nutt, *Operating Systems: A Modern Perspective*, 2nd edition Pearson Education ,1997.
2. A.S. Tanenbaum, *Modern Operating Systems*, 3rd edition, Pearson Education ,2007.
3. W. Stallings, *Operating Systems, Internals & Design Principles*, 5th edition, Prentice Hall of India, 2008.

LIST OF PRACTICALS OF CSDC1 – 302: OPERATING SYSTEMS

BASIC UNIX COMMANDS

1. File Manipulation functions
 - creat,
 - open,
 - read,
 - write,
 - close,
 - mv,
 - cp,
 - rm.
2. Directory Manipulation functions such as mkdir, rmdir, cd, pwd.
3. ls with options such as -l, -s, etc
4. wc
5. diff
6. cmp
7. chmod

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8. who
9. who am i
10. passwd
11. du
12. date
13. cal
14. grep
15. cat
16. sort and tail

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 behaviour of Linux kernel including kernel version, CPU type and model. (CPU information)
3. WRITE A PROGRAM to report behaviour of Linux kernel including information on configured memory, amount of free and used memory. (memory information)
4. WRITE A PROGRAM to print file details including owner access permissions, file access time, where file name is given as argument.
5. WRITE A PROGRAM to copy files using system calls.
6. Write program to implement FCFS scheduling algorithm.
7. Write program to implement Round Robin scheduling algorithm.
8. Write program to implement SJF scheduling algorithm.
9. Write program to calculate sum of n numbers using *thread* library.
10. Write program to calculate factorial of number n using *thread* library.
11. Write program to calculate sum of n even numbers using *thread* library.

CSDC1-401: Data Communications and Computer Networks

Introduction: 4 L

Network definition, Network topologies, Network classifications, Layered network architecture, protocol and interface, Overview of ISO-OSI reference model, Overview of TCP/IP protocol suite.

[1]: [1.1 to 1.4, 2.1 to 2.4]

Data Communication Fundamentals and Techniques: 8 L

Analog and digital signal, Data-rate limits, Digital to digital line encoding schemes, Pulse code modulation, Digital to analog modulation- ASK, FSK, PSK, QAM, multiplexing techniques- FDM, TDM, WDM, transmission media.

[1]: [3.1, 3.5, 4.1 (up to bipolar scheme), 4.2 (up to encoding), 5.1, 6.1 (up to multiplexing process), pg. 170, 7.1, 7.2]:

Networks Switching Techniques and Access mechanisms: 3 L

Circuit switching; Packet switching- Connectionless datagram switching, Connection-oriented virtual circuit switching.

[1]: [8.1 to 8.3]

[2]: [2.2.5]

Data Link Layer Functions and Protocol: 8 L

Error detection and error correction techniques, Data-link control- framing and flow control, Error recovery protocols- Stop and wait ARQ, Go-back-n ARQ, Selective repeat ARQ, Point to Point Protocol on Internet.

[1]: [3.1.2, 3.1.4, , 3.2 up to 3.2.2, 3.3, 3.4, 3.6.2]

Multiple Access Protocol and Networks: 7 L

ALOHA, CSMA/CD protocols, Ethernet LANs, connecting LAN and back-bone networks- Repeaters, Hubs, Switches, Bridges, Router and Gateways.

[2]: [4.2.1, 4.2.2, 4.3 up to 4.3.4, 4.7.5]

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Networks Layer Functions and Protocols: 8 L

Routing, Routing algorithms, Network layer protocol of Internet- IP protocol, Internet control protocols.

[2]: [5.1, 5.2 (up to 5.2.4), 5.6 (up to subnet), 5.6.3]

Transport Layer Functions and Protocols : 6 L

Transport services, Berkeley socket interface overview, Transport layer protocol of Internet-UDP and TCP.

[2]: [6.1 (up to 6.1.3), 6.4 (up to 6.4.2), 6.5 (up to 6.5.6)]

Overview of Application layer protocol: 4 L

Overview of DNS protocol, Overview of WWW & HTTP protocol.

[1]: [25.1 to 25.5, 27.1 to 27.3]

Recommended Reading Material

Text Books

1. B. A. Forouzan: *Data Communications and Networking*, 4th edition, Tata McGraw Hill Education Private Ltd., 2007.
2. A. S. Tanenbaum: *Computer Networks*, 4th edition, PEARSON, 2003.

Reference Books:

3. D. E. Comer, M.S.Narayanan, *Computer Networks and Internets with applications*, Fourth Edition, PEARSON, 2008.

LIST OF PRACTICALS CSDC1-401: DATA COMMUNICATIONS AND COMPUTER NETWORKS

S. No.	Practical Title
1	SIMULATE CYCLIC REDUNDANCY CHECK (CRC) ERROR DETECTION ALGORITHM (CRC) for Noisy channel.
2	SIMULATE AND IMPLEMENT Stop and Wait Protocol for Noisy Channel.

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3.	SIMULATE AND IMPLEMENT GO BACK N SLIDING WINDOW PROTOCOL.
4	SIMULATE AND IMPLEMENT SELECTIVE REPEAT SLIDING WINDOW PROTOCOL.
5.	SIMULATE AND IMPLEMENT DISTANCE VECTOR ROUTING ALGORITHM.
6.	SIMULATE AND IMPLEMENT DIJKESHTRRA ALGORITHM FOR SHORTEST PATH ROUTING.

CSDC1-402: Database Systems

Introduction:

Database concepts, characteristics of database approach, data models, data independence, database users, and database system architecture. 5L

[1]: [1.1 to 1.8, 2.1 to 2.6]

Relational Data Model:

Relational model concepts, relational database constraints. 6L

[1]: [3.1 to 3.4]

The Relational Algebra and Relational Calculus 6L

[1]: [6.1 to 6.5]

SQL Programming: 8L

Data Definition Language, Data Manipulation Language, basics of SQL, query designing in SQL using aggregate functions and nested queries.

[1]: [4.1 to 4.5]

Entity Relationship (ER) Modeling:

Entity types, entity set, attribute and key, relationships, relation types, entity relationship, ER modeling, ER diagrams, database design using ER diagrams. 5L

[1]: [7.1 to 7.7]:

Enhanced Entity-Relationship (EER) model. 5L

[1]: [8.1 to 8.5]

Database Design:

Relational database design by ER and EER-to-Relational Mapping. 3L

[1]: [9.1 to 9.2]

Functional dependencies, Normal forms. 8L

[1]: [15.1 to 15.7]

Transaction Processing:

2L

Introduction to Transaction Processing Concepts and Theory.

[1]: [21.1 to 21.3]

Recommended Reading Material

Text Books

1. R. Elmasri, S.B. Navathe, *Fundamentals of Database Systems*, 6th edition, Pearson Education, 2010.

Reference Books

2. A. Silberschatz, H. Korth and S. Sudarshan, *Database System Concepts*, 5th Edition, McGraw Hill, 2010.
3. R. Ramakrishnan, J. Gehrke, *Database Management Systems*, 3rd edition, McGraw Hill International Edition, 2007.

PRACTICAL LIST OF CSDC1-402: DATABASE SYSTEMS

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

EMPLOYEE Scheme

Field	Type	NULL	KEY	DEFAULT
Eno	Char(3)	NO	PRI	NIL
Ename	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

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EMPLOYEE State

Eno	Ename	Job_type	Manager	Hire_date	Dno	Commission	Salary
765	Martin	Sales_man	198	1981-04-22	30	1400.00	1250.00
756	Jones	Manager	783	1981-04-02	20	0.00	2300.00
752	Ward	Sales_man	769	1981-02-22	30	500.00	1300.00
749	Allan	Sales_man	769	1981-02-20	30	300.00	2000.00
736	Smith	Clerk	790	1980-12-17	20	0.00	1000.00
793	Miller	Clerk	788	1982-01-23	40	0.00	1300.00
792	Ford	Analyst	756	1981-12-03	20	0.00	2600.00
790	James	Clerk	769	1981-12-03	30	0.00	950.00
787	Adams	Clerk	778	1983-01-12	20	0.00	1150.00
784	Turner	Sales_man	769	1981-09-08	30	0.00	1450.00
783	King	President	NULL	1981-11-17	10	0.00	2950.00
788	Scott	Analyst	756	1982-12-09	20	0.00	2850.00
778	Clark	Manager	783	1981-06-09	10	0.00	2900.00
769	Blake	Manager	783	1981-05-01	30	0.00	2870.00

DEPARTMENT Scheme

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

DEPARTMENT State

Dno	Dname	Location
10	Accounting	New York
20	Research	Dallas
30	Sales	Chicago
40	Operation	Boston
50	Marketing	New Delhi

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Query List

S. No.	Query
1.	Query to display Employee Name, Job, Hire Date, Employee Number; for each employee with the Employee Number appearing first.
2.	Query to display unique Jobs from the Employee Table.
3.	Query to display the Employee Name concatenated by a Job separated by a comma.
4.	Query to display 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. Sort the data in descending order of Salary and Commission.
12.	Query to display Name of all the employees where the third letter of their name is 'A'.
13.	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.
14.	Query to display Name, Salary and Commission for all employees whose Commission Amount is greater than their Salary increased by 5%.
15.	Query to display the Current Date.
16.	Query to display Name, Hire Date and Salary Review Date which is the 1 st Monday after six months of employment.
17.	Query to display Name and calculate the number of months between today and the date each employee was hired.
18.	Query to display the following for each employee:- <E-Name> earns < Salary> monthly but wants < 3 * Current Salary >. Label the Column as Dream Salary.
19.	Query to display Name with the 1 st 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'.
20.	Query to display Name, Hire Date and Day of the week on which the employee started.
21.	Query to display Name, Department Name and Department No for all the employees.
22.	Query to display Unique Listing of all Jobs that are in Department # 30.
23.	Query to display Name, Dept Name of all employees who have an 'A' in their name.

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24.	Query to display Name, Job, Department No. And Department Name for all the employees working at the Dallas location.
25.	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.
26.	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.
27.	Query to display Name and Salaries represented by asterisks, where each asterisk (*) signifies \$100.
28.	Query to display the Highest, Lowest, Sum and Average Salaries of all the employees
29.	Query to display the number of employees performing the same Job type functions.
30.	Query to display the no. Of managers without listing their names.
31.	Query to display the Department Name, Location Name, No. Of Employees and the average salary for all employees in that department.
32.	Query to display Name and Hire Date for all employees in the same dept. As Blake.
33.	Query to display the Employee No. And Name for all employees who earn more than the average salary.
34.	Query to display Employee Number and Name for all employees who work in a department with any employee whose name contains a 'T'.
35.	Query to display the names and salaries of all employees who report to King.
36.	Query to display the department no, name and job for all employees in the Sales department.

CSDC1-501: Design and Analysis of Algorithms

Iterative Techniques: 8L
Sequential search, insertion sort, bubble sort, selection sort, merging two sorted arrays, correctness and analysis.

[1]: [chap 3: 3.5 up to 3.5.3]:

[2]: [chap 2: Sec. 2.1 up to p20, p24-p28, p31-p33]:

Divide and Conquer: 8L
Binary search, Merge sort, quick sort, Heap sort, correctness and analysis.

[1]: [chap 3: 3.5.7]:

[2]: [chap 2 :p34-p37, chap 6: 6.1-6.4, chap 7: 7.1-7.4]:

Dynamic Programming and Greedy algorithms: 8L
Fractional knapsack problem, 0-1 knapsack problem, activity selection problem, rod cutting, longest common subsequence.

[2]: [chap 15: 15.1, 15.4, ch16: 16.1, 16.2]:

Linear time Sorting and Searching techniques: 6L
Count sort, radix sort, bucket sort, finding minimum and maximum, order statistic in expected linear time, their analysis.

[2]: [chap 8: 8.2-8.4, ch9: 9.1,9.2]:

String Matching: 4L
Brute force method, KMP Algorithm: computing fail links, analysis.

[1]: [chap 11: 11.1-11.3]:

Height Balanced Trees: 4L
Red Black Trees: rotation, insertion, deletion, analysis of operations

[2]: [chap 13: 13.1-13.4]:

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Graph Traversal Algorithms: 6L

Representation of graphs, breadth first search, depth first search, analysis of traversal methods, applications.

[2]: [chap 22: 22.1-22.5]:

Minimum Spanning Tree and shortest path: 4L

Prim's algorithms, Kruskal's algorithm, Dijkstra's algorithm, analysis of these algorithms.

[2]: [chap 23: 23.1,23.2, ch24: 24.3]:

Recommended Reading Material

Text Books

1. Sara Baase, *Computer Algorithms: Introduction to design and analysis*, Third Edition, Pearson, 2002.
2. T.H.Cormen, C.E. Leiserson, R.L.Rivest, C.Stein, *Introduction to Algorithms*, Third Edition, Prentice Hall of India, 2010.

Reference Books

3. J.Kleinberg and E.Tardos, *Algorithm Design*, First Edition, Pearson, 2012.
4. S.Dasgupta, C.Papadimitriou, U.Vazirani, *Algorithms*, First Edition, Tata McGraw Hill, 2013.

Online Reading/Supporting Material

5. <http://nptel.iitm.ac.in/video.php?subjectId=106102064>

LIST OF PRACTICALS BASED ON CSDC1 501: DESIGN AND ANALYSIS OF ALGORITHMS

S. No.	Practical Title
1.	<ol style="list-style-type: none">i. Implement Insertion Sort (The program should report the number of comparisons)ii. Implement Merge Sort(The program should report the number of comparisons)

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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
9.	Write a program to determine the minimum spanning tree of a graph

For the algorithms at S.No 1 to 3 test run the algorithm on 100 different inputs of sizes varying from 30 to 1000. Count the number of comparisons and draw the graph. Compare it with a graph of $n \log n$.

- For the algorithms at S.No 4 test run the algorithm on 100 different inputs of sizes varying from 30 to 1000. Count the number of operations and draw the graph.
- For plotting the above mentioned graphs, on x axis plot different values of n (input size) and on y axis plot corresponding number of comparisons.

CSDC1-502: Probability Theory and Statistical Computing

- Introduction to the notion of probability, Random experiment, Sample space & Events, Probability defined on events, Algebra of events, Conditional probabilities, Independent events, Bayes' theorem. 5L
[1]: [chap 1: 1.1 - 1.6]
- Random Variables, cumulative distribution functions, probability mass/density functions, Discrete Random Variables (Binomial, Poisson and Geometric). 4L
[1]: [chap 2: 2.1, 2.2]
- Continuous Random Variables (Normal, Exponential, Uniform and Gamma). 2L
[1]: [chap 2: 2.3]
- Expectation of a Random Variable (Discrete & Continuous cases). Expectation of Function of a Random Variable. Variance of a Random Variable. 2L
[1]: [chap 2: 2.4]
- Jointly distributed Random Variables, Joint distribution functions, Independent Random Variables, Co-variance of Random Variables. Joint probability Distribution of Function of Random Variables, Moment Generating Functions. 8 L
[1]: [chap 2: 2.5, 2.6]
- Introduction to Conditional Probability – Discrete and Continuous, Conditional Expectation, Matching Rounds Problem, Quicksort 5L
[1]: [chap 3: 3.1 - 3.4 upto pg117]
- Conditional Variance, Variance in Matching Rounds Problem, Best Prize Problem 2L
[1]: [chap 3: 3.4.1, 3.5]
- Some more Applications: List Model, Random Graphs, Left Skip free random walks 4L
[1]: [chap 3: 3.6.1, 3.6.2, 3.6.6]

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Limits and bounds : Markov inequality, Chebyshev's inequality, Chernoff's bound, Central Limit Theorem, Strong Law of Large Numbers. 3L

[1]: [chap 2: 2.8]

Markov Chains: Introduction to stochastic processes, Chapman–Kolmogorov equations, classification of states, Limiting and Stationary probabilities. 7L

[1]: [chap 4: 4.1-4.5.2]

Statistical Analysis: Simple Linear Regression Model, Linear Probabilistic Model, Estimating Model Parameters, Sample Correlation Coefficient, Inferences about the Population Correlation Coefficient. 6L

[2]: [chap 12: 12.1, 12.2, 12.5]

Recommended Reading Material

Text Books

1. Sheldon Ross, *Introduction to Probability Models*, Tenth Edition, Academic Press/Elsevier, 2012.
2. Jay L. Devore, *Probability and Statistics for Engineering and the Sciences*, Eighth Edition, Cengage Learning, 2012.

Reference Books

3. K.S. Trivedi, *Probability and Statistics with Reliability, Queuing and Computer Science Applications*, Second Edition, Wiley, 2013.
4. James L. Johnson, *Probability and Statistics for Computer Science*, Wiley, 2008.
5. Jane Horgan, *Probability with R: An Introduction with Computer Science Applications*, Wiley, 2008.

Online Reading/Supporting Material

1. www.openintro.org/stat/down/OpenIntroStatFirst.pdf

LIST OF PRACTICALS OF CSDC1-502: Probability Theory and Statistical Computing

The goal of this lab is to develop data interpretation skills. Following exercises are designed to enable students to understand data characteristics either by visualization or by interpreting computed measures. All the exercises are to be completed using MS Excel functions and graphs. At the end of each exercise, the student should be able to draw a conclusion and state in a concise manner.

Teachers are expected to guide students to obtain real data available through internet for the following exercises. Some suggested sites are:

<http://www.censusindia.gov.in/>

<http://www.visualizing.org/data/browse>

http://www.who.int/gho/publications/world_health_statistics/2012/en/index.html

S.No.	Practicals
1.	Fitting of binomial distribution and graphical representation of probabilities.
2.	Fitting of Poisson distribution and graphical representation of probabilities.
3.	Calculation of cumulative distribution functions for normal distribution.
4.	Application problems based on the Binomial distribution.
5.	Application problems based on the Poisson distribution.
6.	Application problems based on the Normal distribution.
7.	Presentation of bivariate data through scatter-plot diagram and calculations of covariance.
08.	Calculation of Karl Pearson's correlation coefficients.
09.	To find the correlation coefficient for a bivariate frequency distribution.
10.	Calculation of Spearman's rank correlation coefficients.
11.	Fitting of simple linear regression.

CSDC1-503: Microprocessors

Microprocessor architecture: 2 L

Internal architecture, Programming model

[1] Article 2.1 Page 51 to 58

Memory Addressing: 6L

Real mode and protected mode operation, Program invisible register

[1] Article 2.2-2.3 Page 58 to 68

Addressing modes: 5 L

Data addressing modes, Program memory addressing modes and Stack memory addressing modes

[1] Article 3.1-3.3 Page 78 to 105

Microprocessor programming: 8L

Machine language, Instruction formats, String data transfer instructions, Program control instructions, Assembly language programming

[1] Article 4.1-4.5, 6.1-6.3 Page 112 to 142, 192 to 212

8088/8086 Hardware Specifications : 6L

Pin-outs and pin functions, Clock generator, Bus buffering and latching, bus timing

[1] Article 9.1-9.5 Page 302 to 322

Memory Interfacing: 6L

Memory address decoding, 8-bit and 16-bit memory interfacing.

[1] Article 10.2-10.4 Page 340 to 363

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I/O interfacing: 7L

Introduction to I/O interface, address decoding, Programmable Peripheral Interface, Timer

[1] Article 11.1 (Up to page 380), 11.2, 11.3, 11.4 Page 377 to 379, 387-398, 414- 420, 423-428

Interrupts & Direct Memory Access 8L

Interrupt controller, DMA controller

[1]Article 12.1- 12.2, 13.1-13.2 (Up to page 516) Page 451 to 465, 490 to 506

Recommended Reading Material

Text Books

1. Barry B. Brey, *The Intel Microprocessors : Architecture, Programming and Interfacing*. 8th edition, Pearson Education, 2009.

Reference Books

2. Walter A Triebel, Avtar Singh; *The 8088 and 8086 Microprocessors Programming, Interfacing, Software, Hardware, and Applications*. 4th edition PHI, 2005.
3. Liu Gibson, *Microprocessor Systems: The 8086/8088 family Architecture, Programming & Design*, PHI, 1999.

LIST OF PRACTICALS CSDC1-503: MICROPROCESSORS

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

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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

CSDC1-601: Theory of Computation

Finite Automata:

Languages: Alphabets, String, Language, Basic Operations on language, Concatenation, Kleene Star 04L

[1]: [chap. 2 p7-18]

Regular Expressions, Finite Automata and Regular languages, Deterministic and Nondeterministic Finite Automata 10L

[1]: [chap. 4 p31-48], [Ch. 5p52-71], [Ch. 7 p135-141], [Ch. 9 p169-185]

Pumping Lemma, Closure properties of Regular Languages 06L

[1]: [chap.. 10 (pumping lemma) p190-195]

[3]: [§4.2 p122-135]

Context Free languages:

Context free grammars, Parse Trees, Ambiguities in grammars and languages, Pushdown automata 10L

[1]: [chap.. 12 p224-254][Ch. 14 p289-311]

Chomsky's Normal Form, Pumping Lemma, Properties of Context free languages. 06L

[1]: [chap.. 13(CNF only) p278-282][Ch. 16 p351-364]

[3]: [§7.3 p264-273]

Computability:

Turing Machines: Turing machine as a model of Computation 06L

[2]:[§4.1 p179-190,§4.2 p194-200]

Universal Turing machine, Language Acceptability, Decidability, Halting Problem. 06L

[2]:[§5.2 , §5.3, §5.4 p247-256]

Reading Recommended Material

Text Books

1. Daniel I.A.Cohen, *Introduction to Computer Theory*, Second edition, John Wiley,1997.
2. Harry R. Lewis, Christos H. Papadimitriou, *Elements of the Theory of Computation*, 2nd edition, Pearson Education, 1998.
3. John E. Hopcroft, Rajeev Motwani, Jeffery D. Ullman, *Introduction to Automata Theory, Languages and Computation*, 3rd Edition Pearson Education, 2007.

Reference Books

4. P. Linz, *An Introduction to Formal Languages and Automata*, 5th Edition Jones Barlett, 2011.
5. John C. Martin, *Introduction to Languages and the Theory of Computation*, 4th edition, Tata McGraw Hill, 2011.

CSDC1-602: Computer Graphics

Introduction

Basic elements of Computer graphics, Applications of computer graphics.

[2] (Pages 23-54 (contain mostly figures)) (3L)

Graphics Hardware:

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

[2] (Pages 57-94) (5L)

Drawing Primitives:

(12 L)

Raster scan line, circle and ellipse drawing algorithms, Polygon filling, line clipping and polygon clipping algorithms

[1] (Pages 91-102, 105-109,112-114,116-123,128-133,134-141)

Transformation and Viewing:

(12 L)

2D and 3D Geometric Transformations, 2D and 3D Viewing Transformations , Vanishing points.

[3] (Pages 61-99,101-180)(this book size is small and contain many figures and examples)

Geometric Modeling:

(5 L)

Representing curves(Hermite and Bezier).

[1] (Pages 497-499,502-515)

Visible Surface determination:

(5 L)

Z-buffer algorithm, List-priority algorithm and area subdivision algorithm.

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[1] (Pages 692-699,710-713)

Surface rendering:

(6 L)

Color Models,

[2] (Pages 591-597)

Illumination and shading models

[2] (Pages 516-531,536-545)

Computer Animation

[2] (Pages 604-616)

Reading Recommended Material

Text Books

1. Computer Graphics: Principles and Practice in C (2nd Edition) James D. Foley , Andries van Dam, Steven K. Feiner , John F. Hughes , Addison-Wesley Professional, 1995.
2. D.Hearn, Baker: Computer Graphics, (2nd Edition) Prentice Hall of India, 2008.
3. D.F.Rogers, Adams Mathematical Elements for Computer Graphics, McGraw Hill 2nd edition , 1989.

PRACTICAL LIST BASED ON CSDC1-602: COMPUTER GRAPHICS

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

CSDC1-603: Software Engineering

Introduction: 08 L

The Evolving Role of Software, Software Characteristics, Changing Nature of Software, Software Engineering as a Layered Technology, Software Process Framework, Framework and Umbrella Activities, Process Models, Capability Maturity Model Integration (CMMI)

[1]: [1.1, 1.3, 1.4, up to 2.1.2, 2.3 – up to 2.3.3, 3.1 – 3.3 (before 3.3.1), 30.3]

Requirement Analysis: 6 L

Software Requirement Analysis, Initiating Requirement Engineering Process, Requirement Analysis and Modeling Techniques.

[2]: [3.1.2 (pg: 72-75), 3.2 up to 3.2.2 (pg: 75-87), 3.3 up to 3.3.2]

Design Engineering: 5 L

Design Concepts, Architectural Design Elements, Software Architecture, Data Design at the Architectural Level and Component Level, Mapping of Data Flow into Software Architecture.

[2]: [up to 6.2],

[1]: [9.1.1, 9.6 up to 9.6.1].

Quality Management: 3 L

Quality Concepts, Software Quality Assurance, Software Reviews, Metrics for Process and Projects.

[1]: [14.4, up to 15.2, up to 16.2]

Software Metrics: 8 L

Product Metrics, Measures, Metrics and Indicators, Function Based Metrics, Process and Project Metrics, Software Measurements, and Metrics for software quality

[1]: [up to 23.1.1, 23.2- up to 23.2.1, up to 25.2.3, 25.3]

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Estimations and Scheduling: 07 L

Estimations for Software Projects, Empirical Estimation Models, Project Scheduling.

[1]: [26.5, 26.6- up to 26.6.6, 26.7.2, 26.7.3, 27.5- up to 27.5.1]

Testing Strategies & Tactics: 07 L

Software Testing Fundamentals, Strategic Approach to Software Testing, Test Strategies for Conventional Software, Black-Box Testing, White-Box Testing, Basis Path Testing.

[1]: [up to 17.1.3, 17.3, 17.6, 17.7, 18.2-18.4, 18.6 up to 18.6.3(exclude 18.6.1)]

Risk Management: 4 L

Software Risks, Risk Identification, Risk Projection and Risk Refinement, Risk Mitigation, Monitoring and Management.

[1]: [up to 28.6]

Recommended Reading Material

Text Books

1. R.S. Pressman, Software Engineering: A Practitioner's Approach, McGraw-Hill, Ed 7, 2010.
2. P. Jalote, An Integrated Approach to Software Engineering, Narosa Publishing House, Edition 3, 2011.

Reference Books:

3. R. Mall, Fundamentals of Software Engineering, Prentice-Hall of India, 3rd Edition, 2009.
4. I. Sommerville, Software Engineering (9th edition), Addison Wesley, 2010

LIST OF PRACTICALS OF CSDC1-603: SOFTWARE ENGINEERING

S. No.	Practical Title
1.	<ul style="list-style-type: none">• Problem Statement,• Process Model

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2.	Requirement Analysis: <ul style="list-style-type: none">• 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

CSDC1-701: Systems Programming and Compiler Design

Assemblers & Loaders, Linkers:	10L
One pass and two pass assembler, design of an assembler, Absolute loader, relocation and linking concepts, relocating loader and Dynamic Linking.	
[1]: chap. 3 [p36-62] Chap. 4 [p63-83]	
Introduction:	2L
Overview of compilation, Phases of a compiler	
[2] §1.1-§1.2 [p1-12]	
Lexical Analysis:	6L
Role of a Lexical analyzer, Specification and recognition of tokens, Symbol table, lex,	
2 [§3.5, p140-144],	
Parsing:	10L
Bottom up parsing- LR parser, yacc.	
[2] [§4.6-§4.9 p241-297]	
Intermediate representations	10L
Three address code generation, syntax directed translation, translation of types, control statements	
[2] [§5.1-§5.2.4, p303-314] [§ 6.2-§ 6.9, p363-425]	
Storage organization:	5L
Activation records, stack allocation	
[2][§7.1-§7.2, p427-441]	
Code Generation:	5L
Object code generation	

[2] [§p505-522]

Recommended Reading Material

Text 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.

Reference Books

3. D. M. Dhamdhere, *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

LIST OF PRACTICALS OF CSDC1-701: SYSTEMS PROGRAMMING AND COMPILER DESIGN

1. To implement an assembler for a hypothetical language.
2. To get familiar with lex: write a program to recognize numbers, identifiers.
3. To get familiar with yacc: write a desk calculator.

.CSDC1-702: Network Programming

Introduction: 4 L

Day Time Client/Server, Concurrent Client/Server, Error Handling, Protocol Independence, Port Numbers.

[1], Chapter1-sections 1.1 - 1.5, Chapter2-sections 2.1 - 2.11]

Sockets: 9 L

Address structures, value – result arguments, Byte ordering and manipulation function and related functions, Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers, Close and related function.

[1], Chapter3-sections 3.1 - 3.7, Chapter4-sections 4.1 - 4.10]

TCP Client Server 8 L

Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host.

[1],Chapter5-sections 5.1 – 5.18]

I/O Multiplexing and socket options: 8 L

I/O Models, Select function, Batch input, shutdown function, Poll function, TCP Echo server, getsockopt and setsockopt functions. Socket states, Generic socket option, IPV6 socket option, ICMPV6 socket option, IPV6 socket option and TCP socket options.

[1], Chapter6-sections 6.1 - 6.8, Chapter7]

Elementary UDP sockets: 4 L

Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP.

[1], Chapter 8,-sections 8.1 – 8.9, 8.11]

Elementary name and Address conversions: 4 L

Domain Name System, gethostbyname function, RES_USE_INET6 Resolver option, gethostbyname2 function and IPv6 support, gethostbyaddr function, uname function, gethostname function, getservbyname and getservbyport functions.

[1], Chapter11-sections 11.2 – 11.5]

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IPv4 and IPv6 interoperability: 4 L

IPv4 client, IPv6 server, IPv6 client, IPv4 server .

[1], Chapter 13-sections 13.1-13.3]

Network Management and Debugging: 7 L

Troubleshooting a Network, ping, traceroute, netstat, Packet Sniffers, Network Management Protocols, SNMP.

[2] Chapter 21]

Recommended Reading Material

Text Books

1. R. W. Stevens, B. Fenner, A. M. Rudoff, *Unix Network Programming: The Sockets Networking API*, 3rd edition, vol.1, PHI, 2010.
2. E. Nemeth, G. Snyder, T. R. Hein, B. Whaley, *UNIX and Linux System Administration Handbook 4th Edition*, Pearson Education 2011.

Reference Books

3. A.S. Tanenbaum; *Computer Networks*, 5th edition, Pearson, 2012.
4. B.A. Forouzan, *Data Communications and Networking*, 4th edition, Tata McGraw Hill, 2006.

LIST OF PRACTICALS CSDC1-702: NETWORK PROGRAMMING

1. Implement TCP Echo client and TCP Echo server (Iterative).
2. Implement TCP Echo client and TCP Echo server (Concurrent).

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3. Implement TCP daytime client and TCP daytime server (Iterative).
4. Implement TCP daytime client and TCP daytime server (concurrent).
5. Implement UDP Echo Client and UDP Echo Server.
6. Implement UDP daytime Client and UDP daytime server.
7. Implement TCP client and server (concurrent) where client gets input from the user and sends it to server. Server displays it on the screen. Server then gets another input from the user and sends it to client. Client displays it on the screen. The process continues till server or client sends “bye” to the other party.
8. Implement TCP client and server (concurrent) where client requests server to transfer a file. Assume file is smaller than 1K size. If the file is present on the server, it is sent to the client otherwise an error message is sent to client. Client copies the file on the hard disk and disconnects.
9. Implement UDP client and UDP server where server displays the IP address and port number of the client sending the datagram. Client sends a datagram (size 64 bytes) three times to the same server. Server sends the message back to client. Client reports the time elapsed in sending and receiving of the message. Use connected UDP sockets.
10. Write to program to
 - i. display name of the host
 - ii. all IP addresses of the host.
 - iii. Check whether FTP and HTTP services are running on the system.
 - iv. Display the name of the service running on port number specified by user.

CSDC1-703: Research Methodology and Project Work

Understanding Research Problem: 4 L

Meaning of Research, Objectives of Research, Motivations in Research, Types of Research, Research Approaches, Significance of Research, Research Methods v/s Methodology, Research and Scientific Methods, Research Process, use of alerts, Criteria of Good Research, Impact factor, SJR, SNIP, H index, G index, i-10 index, identifying the research problem.

[1]: [Chap 1 (Page 1-31)]

[5]: [Page 1- 18]

Data Collection, Processing and Analysis: 8 L

Criteria for selecting a sample, Characteristics of Good sampling procedure, Types of Sample Design, Selecting Random Samples, Collection of Primary Data, Observation Method, Interview method, Collection of Data through questionnaire, Schedules and web logs, generating data using programs, Collection of Secondary Data, Selection of appropriate method for data collection, Case Study Method, Guidelines for developing questionnaire, successful interviewing. Survey v/s experiment, Measures of Central Tendency, Dispersion, Correlation and Regression, Analysis of Variance and Co-variance.

[1]: [Chap 4 (up to page 61), Chap 6, Chap 7 (page 130-136, page 142-143)]

[2]: [Chap 4 (4.2), Chap 11 (11.1, 11.2, 11.8, 11.12)]

Testing of Hypothesis: 8 L

Meaning, Basic concepts Hypothesis Testing: Null and Alternate Hypothesis, Two types of errors, Level of significance, critical region, one and two tailed test, P-Value for decision making, single sample and two sample test (Z-test, t-test, F-test), goodness of fit(chi square test).

[1]: [Chap 9 (page 184-197), Chap 10 (page 233-236)]

[2]: [Chap 10 (10.1-10.5, 10.10, 10.11)]

Report Writing

4 L

Significance and Different Steps of Report Writing, Layout of Research Report, Types of Reports.

[1]: [Chap 14 (page 346-358)]

Recommended Reading Material

Text Books

1. Kothari, C.R., *Research Methodology (Methods and Techniques)*, New Age Publisher, 2004.
2. Ronald E. Walpole , Raymond H.Myers, Sharon L.Myers & Keying Ye, *Probability and Statistics for Engineers & Scientists*, 8th edition, Pearson Education, 2009.
3. S.M.Ross: *Introduction to Probability Models*, 10th edition, Academic Press, 2012.

Reference Books

4. K. S. Trivedi, *Probability and Statistics with Reliability, Queuing, and Computer, Science Applications*, PHI Learning Pvt. Ltd, .2013

Online Reading/Supporting Material

5. <http://www.library.auckland.ac.nz/subject-guides/med/pdfs/H-index%20and%20impact%20factors.pdf>
6. www.openintro.org/stat/down/OpenIntroStatFirst.pdf

Minor Project for Paper CSDC1-703: Research Methodology and Project Work

Students will carry out a Minor Project based on the subjects which they have studied before this paper or any relevant topic of Computer Science.

CSDC1-801: Artificial Intelligence

Introduction: 6 L

Introduction to Artificial Intelligence, Background and Applications, Turing Test and Rational Agent Approaches, Introduction to intelligent agents, their structure, behavior and environment.

[1]: [1.1, 1.2, 2.1 to 2.4]

Problem Solving and Searching Techniques: 15 L

Problem Characteristics, Production Systems, Control Strategies, Breadth First Search, Depth First Search, Local Search, Heuristics Search Techniques , Best First Search, A* Algorithm, Constraint Satisfaction Problem, Means-End Analysis, Introduction to Game Playing, Min Max and Alpha Beta Pruning.

[2]: [2.1 to 2.5, 3.1 to 3.3, 3.5, 12.1 to 12.3]

Knowledge Representation: 9 L

Introduction to First Order Predicate Logic, Resolution Principle, Unification, Semantic Nets, Frames, Production Rules, Conceptual Graph, Conceptual Dependencies.

[3]: [4.1 to 4.9, 7.1 to 7.4]

[2]: [10.1]

Programming in Logic: 9 L

PROLOG Programming.

[4]: [1.1 to 1.8, 2.1 to 2.6 , 3.1 to 3.8 , 4.1 to 4.4]

Planning: 5 L

The Planning Problem, Planning with State Space Search, Partial Order Planning.

[1]: [10.1, 10.2, 10.4.4]

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Understanding Natural Language:

4 L

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

[3]: [12.1 to 12.5]

Recommended Reading Material

Text Books

1. Russell and Norvig, *Artificial Intelligence- A Modern Approach*, 3rd edition, Pearson Prentice Hall, 2010.
2. Elaine Rich, Kevin Knight, Shivashankar B. Nair, *Artificial Intelligence*, 3rd edition, Tata McGraw Hill, 2009.
3. D W Patterson, *Artificial Intelligence and Expert Systems*, Prentice Hall of India, 2002.
4. William F. Clocksin, Christopher S. Mellish, *Programming in Prolog*, 5th Edition Springer-Verlag, 2003.

Reference Books

5. Saroj Kaushik, *Artificial Intelligence*, 1st Edition, Cengage Learning, 2011.
6. Ivan Bratko, *Prolog Programming for Artificial Intelligence*, 4th Edition, Pearson Education, 2011.

LIST OF PRACTICALS CSDC1-801: ARTIFICIAL INTELLIGENCE

S. No	Practical Title
1.	<ul style="list-style-type: none">• Write a prolog program to calculate the sum of two numbers.• Write a prolog program to find the maximum of two numbers.• Write a prolog program to calculate the factorial of a given number.• Write a prolog program to calculate the nth Fibonacci number.
2.	<ul style="list-style-type: none">• Write a prolog program, insert_nth(item, n, into_list, result) that asserts that

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	<p>result is the list into_list with item inserted as the n'th element into every list at all levels.</p> <ul style="list-style-type: none"> • Write a Prolog program to remove the Nth item from a list. • Write a Prolog program, remove-nth(Before, After) that asserts the After list is the Before list with the removal of every n'th item from every list at all levels. • Write a Prolog program to implement append for two lists.
3.	<ul style="list-style-type: none"> • Write a Prolog program to implement palindrome(List). • Write a Prolog program to implement max(X,Y,Max) so that Max is the greater of two numbers X and Y. • Write a Prolog program to implement maxlist(List,Max) so that Max is the greatest number in the list of numbers List. • Write a Prolog program to implement sumlist(List,Sum) so that Sum is the sum of a given list of numbers List.
4.	<ul style="list-style-type: none"> • Write a Prolog program to implement two predicates evenlength(List) and oddlength(List) so that they are true if their argument is a list of even or odd length respectively. • Write a Prolog program to implement reverse(List,ReversedList) that reverses lists. • Write a Prolog program to implement maxlist(List,Max) so that Max is the greatest number in the list of numbers List using cut predicate. • Write a Prolog program to implement GCD of two numbers.
5.	<ul style="list-style-type: none"> • Write a prolog program that implements Semantic Networks/Frame Structures.

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6.	<ul style="list-style-type: none">• Write a program in Jade to implement Breadth First Search algorithm• Write a program in Jade to search “COOKIES” folder in the system and delete its content.• Write a program in Jade to check the URL entered by the user.• Write a program to check the strength of the password entered by user.
7.	<ul style="list-style-type: none">• Create an agent in Jade that responds with the statistics of number of active agents in a system and the related information about those agents.• Write a program in Jade to exchange arguments between two agents.• Create four agents in Jade where each agent requests information from the remaining agents on a given topic.• Create an agent in Jade that reports about any communication going around other agents.

CSDC1-802: Information Security

Introduction:

History ,Critical Characteristics, Components , Approaches of Implementation, Security Systems Development Life Cycle, Security Professionals. 10L

[1] Pages 1 - 30

Security Issues :

Need for Security, threat, risk, attack, legal and ethical issues. 8 L

[1] Pages 37-68

Error Detection / Correction:

Block Codes, Generator Matrix, Parity Check Matrix, Minimum distance of a Code, Error detection and correction, Standard Array and syndrome decoding. Hamming Codes. 8 L

[3] Pages 51-80

Cryptography:

Modular Arithmetic, Congruence.[2] Pages16-37 4L

Plain text, Cipher Text, Key, Encryption, Decryption, Kerckhoff's Principle. Substitution Ciphers, Transposition Ciphers, Types of Attacks on Ciphers. Cryptanalysis of Substitution Ciphers, Transposition Ciphers. Block Cipher, Stream Cipher, Data Encryption Standard,

[2] Pages 46 – 76. Pages 106 – 128 Pages 144-157

Diffie- Hellma key exchange algorithm, Rabin Cipher. 10L

[2]. Pages 283, Pages 410-411

Public Key Infrastructure. 4L

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[2] Pages 415-422

Digital Signature

[2] Pages 358-362

E-mail Security .

[2] Pages 415-422.

Security tools :

4 L

Intrusion detection systems, Honey pots, Honey nets and padded cell systems, scanning and analysis tools

[1]. Pages 284- 317

Recommended Reading Material

Text Books

1. Michael E. Whitman , H J Mattord , 2nd edition *Principals of Information Security*, Thompson course technology, 2007.
2. Behrouz A Forouzan, Debdeep Mukhopadhyay, *Cryptography and Network Security*, 2nd edition, Tata McGraw Hill Education Private Limited , New Delhi, 2012.
3. Shu Lin , D.J. Costello,Jr *Error Control Coding: Fundamentals and applications*, Printice –Hall, New Jersey, 2003.

References Books:

4. Kaufman, Perlman , Speciner ‘Network Security’ PHI ,India, 2nd Ed. 2010

Online References :

5. <http://www.cryptogram.org>
6. <http://www.math.niu.edu>

PRACTICAL LIST BASED CSDC1-802: INFORMATION SECURITY

Write Programs for the following

1. Additive Cipher

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2. Multiplicative Cipher
3. Affine Cipher
4. Monoalphabetic substitution Cipher
5. Playcipher
6. Vigenere cipher
7. Hill cipher
8. One time pad cipher
9. Roter cipher
10. Enigma Machine
11. Transposition cipher
12. Double Transposition cipher
13. Stream cipher based on XOR operation
14. Data Encryption Algorithm
15. Rabin Cipher
16. For a given parity check matrix write a program to find
 - a. the code words and minimum weight of the code
 - b. Standard array of the code
 - c. error patterns and syndromes

CSDC1-803: Research

Major Project for Paper CSDC1-803: Research

Students will carry out a Major Project based on the subjects which they have studied before this paper or any relevant topic of Computer Science. This project may also be the continuation of Minor Project for Paper CSDC1-703: Research Methodology and Project Work.

Discipline Course –II (DC-II)

CSDC2-301: Fundamentals of Computer Systems

Introduction:

Generation of Computer, Functional components of Computer 2L

[2]: (pg. 1-12, pg. 250-255)

Number Systems:

Number systems , fixed and floating point representation, addition, subtraction, multiplication and division of fixed point numbers.

[2]: (pg.14-25,pg.95-107) 10L

Software:

System Software, Application Software. 3 L

[2]: (pg. 169-178)

Human Computer Interface:

Operating System as User Interface, System Tools, Control Panel settings and Utility Programs

[2]: (pg.196-213) 4L

Computer Architecture:

Logic Gates, Boolean algebra,

[1]: (pg. 5-12) 5L

Circuits, Decoders, Multiplexers, Registers, Bus System,

[1]: (pg. 43-52), (pg.97-102) 5L

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Instruction cycle, Instruction Format, Addressing Modes.

[1]:Section (5.1,5.5,8.5),(pg.125-129,pg.141-146,pg.262-268) 7L

Devices:

Input and Output Devices.

[2] : (pg.29-42) 4L

Memory:

Primary Memory, Secondary Memory and Cache Memory.

[2] : (pg.45-73) 3L

Office Tools:

Introduction to Word Processor, Electronic Spreadsheet, and Presentation tool

5L

Recommended Reading Material

Text Books

1. M. M. Mano, Computer System Architecture, 3rd Edition, Prentice Hall of India,2008.
2. V Rajaraman, Fundamentals of Computers, Fifth Edition, PHI, 2010.

Reference Books

3. W. Stallings, Computer Organization and Architecture-Designing for Performance, 8th Edition, Pearson Education/PHI, Inc., 2010.
4. J. P. Hayes, Computer Architecture and Organization, 3rd Edition, Tata McGraw-Hill, 2012.
5. P.K. Sinha, Priti Sihna , Computers Fundamental, 6th Edition BPB Publication,2011.

Online references:

6.http://books.google.co.in/books/about/Computer_Fundamentals_Architecture_and_O.html?id=PVz_IvZr5lcC&redir_esc=y

7.http://books.google.co.in/books?id=PVz_IvZr5lcC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

8.http://books.google.co.in/books?id=xfYMoFsX3vsC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

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9.http://books.google.co.in/books?id=2Rqj5WrI89AC&printsec=frontcover&source=gb_s_gg_summary_r&cad=0#v=onepage&q&f=false

PRACTICALS LIST OF CSDC2-301: FUNDAMENTALS OF COMPUTER SYSTEMS

I Document Preparation

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

2. The time-table form for your college.
 - The first line should mention the name of the college in 16-point Arial Font and should be bold.
 - The second line should give the course name/teacher's name and the department in 14-point Arial.
 - Leave a gap of 12-points.
 - The rest of the document should use 10-point Times New Roman font.
 - The footer should contain your specifications as the designer and date of creation.

3. Create the following one page document.
 - (a) Compose a note inviting friends to a get-together at your house, including a list of things to bring for get together.
 - (b) Design a certificate in landscape orientation with a border around the document.

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4. Create the following document:

(a) A newsletter with a headline and 2 columns in portrait orientation, including at least one image surrounded by text.

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

Type the following as shown (do not bold).

Color, Style, Item

Blue, A980, Van

Red, X023, Car

Green, YL724, Truck

Name, Age, Sex

Bob, 23, M

Linda, 46, F

Tom, 29, M

6. Use mail merge to create labels for invitations to all your clients in the Pacific Northwest to attend a seminar that you're offering in Portland and Oregon. To demonstrate the process, set up a sample filter that selects all records with a ZIP code greater than 95000.

7. 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.

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

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

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- 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.

9. Create the following one page documents.

(a) Design a Garage Sale sign.

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

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

Salesperson	Dolls	Trucks	Puzzles
Amit	1327	1423	1193
Shivi	1421	3863	2934
Om	5214	3247	5467
Ananya	2190	1278	1928
Anupama	1201	2528	1203
Maharshi	4098	3079	2067

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

II Electronic Spreadsheet

1. Create a student worksheet containing roll numbers, names and total marks. Open a document in Word and insert the excel worksheet using :-
 - i) Copy/Paste
 - ii) Embedding
 - iii) Linking

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2. The term wise marks for APS class of 20 students are stored in 3 separate sheets named term1, term2 and term3. Create 4th worksheet that contains student names and their total and average marks for the entire year. Give proper headings using headers. Make the column headings bold and italic. The 4th worksheet should contain college name as the first line. Make it bold, italic and center it.

3. Tabulate and graph the function $y = \sin(2x) - 4\cos(x)$ between -5 and +5.

X -5 -4 -3 -2 -1 0 1 2 3 4 5

4. Using a simple pendulum, plot 1-T and 1-T² graph.

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

5. Consider the following employee worksheet:-

Full Name (First Last)	Grade 1/2/3	Basic Salary	HRA	PF	Gross	Net	(VA) Vehicle Allowance

HRA is calculated as follows:

Grade HRA %(of Basic)

1 40%

2 35%

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3 30%

Gross = Basic + HRA + VA

Net = Gross –PF

PF is 8% for all Grades

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

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

7. Consider the following nonlinear equation:

$$f(x)=5x^3-50x^2+200x+18000=0$$

Find the value of x that make $f(x) = 0$ using Goal Seek.

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

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

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

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10. Plot the Bar Chart for OHM's Law. Analyze the chart by changing it to line graph.
11. Plot the pie-chart for composition of air.
12. Plot the chart for marks obtained by the students (out of 5) vs. frequency (total number of students in class is 50).
13. Create the following worksheet(s) containing an year wise sale figure of five salesmen in Rs.

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

Apply the following Mathematical & Statistical functions:

- i) Calculate the commission for each salesman under the condition :-
 - a) If total sales is greater than Rs. 3,00,000/-, then commission is 10% of total sale made by the salesman.
 - b) Otherwise, 4% of total sale.
- ii) Calculate the maximum sale made by each salesman.
- iii) Calculate the maximum sale made in each year.
- iv) Calculate the minimum sale made by each salesman.
- v) Calculate the minimum sale made in each year.
- vi) Calculate the average sales made by each salesman.
- vii) Calculate the total sale made by each salesman.
- viii) Count the no. of sales persons.
- ix) Calculate the cube of sales made by Mohan in the year 2002.
- x) Find the difference in sales by salesman Mitra between the year 2002 and 2003.
Find the absolute value of difference.

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- x) Also calculate the Mode, Stddev, Variance, Median for the sale made by each salesman.
- xi) Calculate the year wise Correlation coefficient between the sales man Mohan and Mitra year wise.

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

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

- xii) Calculate total sale year wise.
- xiii) Calculate the net sales made by each salesman
- xiv) Calculate the commission for each salesman under the condition :-
 - c) If total sales is greater than Rs. 4,00,000/-, then commission is 5% of total sale made by the salesman.
 - d) Otherwise, 2% of total sale.
- xv) Calculate the maximum sale made by each salesman.
- xvi) Calculate the maximum sale made in each year.
- xvii) Draw a bar graph representing the sale made by each salesman.
- xviii) Draw a pie graph representing the sale made by salesmen in year 2001.

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

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

Grade is calculated as follows:-

If % ≥ 90 Grade A

If % ≥ 80 & < 90 Grade B

If % ≥ 70 & < 80 Grade C

If % ≥ 60 & < 70 Grade D

Otherwise students will be declared fail.

- i) Calculate Grade using if function
- ii) Sort the data according to total marks
- iii) Apply filter to display the marks of the students having more than 65% marks.
- iv) Draw a pie chart showing % marks scored in each subject by the topper of the class.
- v) Draw the doughnut chart of the data as in (iv)
- vi) Enter the S.No. of a student and find out the Grade of the student using VLOOKUP.
- vii) Extract all records where name
 - a) Begins with "A"
 - b) Contains "A"
 - c) Ends with "A"

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16. Enter the data as given below using spread sheet:

	A	B	C	D	E
1	Subjects	Marks			
2	Physics	76			
3	Maths	94			
4	Biology	88			
5	Chemistry	91			
6	English	----			
7					
8	Percentage	=	80%		
9					

Use Goal Seek to find out the marks in English subject to get total percentage of marks which is set to 80%.

III Practical List for Presentation tool

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

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- 4 Create five Power Point slides, one having table, one having clip-art and others giving in brief the details of the two above slides. Create a self-running demo of the slides.

- 5 Create a Power Point presentation to teach that area of a square is a^2 where a is the size of side of the square. Explain this feature with suitable diagram. Also explain that when a given square is divided into two equal parts, how do you calculate its area(area of part), with a suitable example.

- 6 Create a Power Point presentation to explain the key feature of BSc program with proper coloring and formatting of the slides(at least 8 slides). Your slides should contain figures, graphs. During slide show, slides should run automatically after specified time (a suitable time).

CSDC2-401: Computer Networks and Internet Technology

Introduction: 3 L

Use of Computer Networks, Point to Point, Broad cast Network, LAN, MAN, WAN, Bluetooth and WLAN network.

[1] chap.1 [1.1, 1.2 (up to 1.2.4)]

Network Reference Models: 5 L

ISO-OSI Reference model, ISO-OSI layers and functions, TCP/IP Reference models, TCP/IP layers and functions, Comparisons of OSI & TCP/IP reference models.

[1] Chap. 1 [1.4 (up to 1.4.3)]

Transmission Media: 3 L

Unshielded Twisted Pair (UTP), Coaxial Cable, Shielded Twisted Pair(STP), Optical Fibre, Radio and Satellite links.

[2] Chap. 4 [4.1 to 4.10]

Error Detection and Error Recovery Protocols: 4 L

Definition of packets and frames, transmission errors, Parity checking, Detecting error with checksums, Detecting error with cycling redundancy checks, Error recovery protocols.

[2] Chap. 7 [7.4 to 7.10]

LAN and Ethernet: 6 L

CSMA/CA, Twisted pair Ethernet, 10 Base-T, 100 Base-T Ethernet, Repeaters, Bridges and Switches, WAN and packet switches.

[2] Chap. 8 [8.7, 8.8], chap.10 [10.8] , Chap. 11[11.4, 11.5, 11.13, 11.14], Chap. 13[13.1 to 13.5]

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TCP/IP: 7 L

Address resolution techniques and protocol, Virtual packets, IP datagram, Routing table entries, Services of TCP, End to end service and datagrams, Packet loss and Retransmission, Three-Way Handshake.

[2] Chap. 18 [18.3 to 18.7], chap.19 [19.8], Chap.20 [20.4 to 20.6] Chap.25 [25.3 to 25.7, 25.11]

Domain Name System: 3 L

Name space, Domain name, DNS in internet, Name-address resolution, Registrars.

[3] Chap. 25 [25.1 to 25.8].

Telnet & E-mail: 4 L

Remote logging, Telnet, Email Architecture, User Agent, SMTP, POP and IAMP, FTP.

[3] Chap. 26 [26.1, 26.2].

WWW and HTTP: 3 L

WWW Architecture, URL, Cookies, Web Documents: Static & Dynamic, HTTP transaction.

[3] Chap 27 [27.1 to 27.3].

Multimedia: 5 L

Multimedia concepts and Authoring tools, creating animation.

[4] Chap 7 [Page 170 -186]

Website development: 5 L

Content Managements System (CMS), Web Hosting, Web site development .

[5] Pages 1-25..

Recommended Reading Material

Text Books

1. A.S. Tanenbaum, *Computer Networks*, 4th edition, Pearson,2003
2. E,Douglas E. Comer, M. S.Narayanan *Computer Networks and Internets with Internet Applications*, 4th edition, Pearson, 2008.

FOUR YEAR UNDERGRADUATE PROGRAMME IN COMPUTER SCIENCE

3. B.A. Forouzan: Data Communication and Networking, 4th edition, Tata McGraw Hill, 2007.
4. Tay Vaughan, *Multimedia making it work*, 7th edition, McGraw Hill 2008
5. Dr. Andy Williams, *Wordpress for Beginners - A Visual Step-by-Step Guide to Creating your Own Wordpress Site in Record Time, Starting from Zero!* (Webmaster Series), [Kindle Edition] ,2013.

Reference Books

6. James F. Kurose, K W. Ross, *Computer Networking*, 5th edition, Pearson.

Online Reading/Supporting Material

7. <http://nptel.iitm.ac.in/video.php?subjectId=106105084>
8. <http://codex.woprdpress.org>

PRACTICAL LIST OF CSDC2-401: Computer Networks and Internet Technology

List of Programs in Word Press

1. Install the word press and provide all the supporting files.
2. Create a web page using different headers and text styles.
3. Create a web page using table on that..
4. Create a web page using hyper link and moving text .
5. Create a web page using a form which have textbox ,option buttons check box and command buttons.
6. Create a web page using ordered list and unordered list.
7. Create a web page using menus in page.
8. Create a web page using different columns in a single page and create hyperlinks with in the frames.

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9. Create a web page that will display text CRICKET TEAMS spreads over two rows with the names of the teams on the right.
10. Develop a webpage having two frames that divide the webpage into two equal rows and then divide the row into equal columns fill each frame with a different background color.
11. Create a web page for the registration form like you see while creating an account in Gmail.
12. Create a web page using frame. Divide the page into two parts with Navigation links on left hand side of page (width=20%) and content page on right hand side of page (width = 80%). On clicking the navigation Links corresponding content must be shown on the right hand side.
13. Create a form to stores the information of students and a submit button that will store it in the database.

List of Programs in Flash

1. Design a flash movie using Motion and shape Tween.
2. Design a flash movie using Motion guide layer.
3. Design a flash movie using multiple layers.
4. Design a flash movie using filters.
5. Design a flash movie using action buttons.
6. Design a flash movie using break apart.
7. Design a flash movie using bitmaps.
8. Design a flash movie and embed it with the web page of the web site.

CSDC2-501: Database Systems and Applications

Introduction:

Introduction to Database Management Systems, Characteristics of database approach,

[1] Pages 3-27, 6L

Introduction to data models, DBMS architecture, data independence Pages

[1] 29-38 6L

E-R model: Entity Relationship and ER Modeling, Entity types, entity set, attribute and key, relationships, relation types,

[1] Pages 199-218 6L

ER diagrams, database design using ER diagrams, ER to relational mapping.

[1] Pages 285-291 8L

Relational data model: Basic concepts, relational constraints, primary and foreign key,.

[1] Pages 59-80, 2L

Functional dependencies, And Normal form up to third normal form

[1] Pages 501-528 8L

Structured Query Language:

SQL queries: DDL, DML, Aggregate functions,

[1] Page 87-110 4L

Nested queries.

[1] Pages 115-130 8L

Recommended Reading Material

Text book:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems (6th Ed.), Pearson Education, 2010.

References:

2. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts (6th Ed.), McGraw Hill, 2010.
3. R. Ramakrishanan, J. Gehrke, Database Management Systems (3rd Ed.), McGraw-Hill, 2002.

On-line references

4. http://nptel.iitm.ac.in/courses/IIT-MADRAS/Intro_to_Database_Systems_Design/index.php

PRACTICAL LIST OF CSDC2-501: DATABASE SYSTEMS AND APPLICATIONS

For the software used, the following concepts must be introduced to the students:

DDL Commands

Create table, alter table, drop table

DML Commands

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

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

LibraryBooks (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 “Navathe”.
- 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 two 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)

Academic and Attendance in the college (College roll number, Paper 1, Attendance in paper 1, Marks in home examination in paper 1, Paper 2, Attendance in paper 2, Marks in home examination in paper 2, Paper 3, Attendance in paper 3, Marks in home examination in paper 3)

- 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 “Delhi” 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.

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3. Create the following tables, enter at least 10 records in each table 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)

- Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.
- List all the customers who have the bicycles manufactured by manufacturer "Honda".
- List the bicycles purchased by the customers who have been referred by customer "C1".
- List the manufacturer of red colored bicycles.
- 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)

- Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.
- Alter table employee, add a column "email" of type varchar(20).
- Find the name of all managers who work for both Samba Bank and NCB Bank.
- Find the names, street address, cities of residence and salary of all employees who work for "Samba Bank" and earn more than \$10,000.
- Find the names of all employees who live in the same city as the company for which they work.
- Find the highest salary, lowest salary and average salary paid by each company.
- Find the sum of salary and number of employees in each company.
- 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.

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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. Create the tables and insert at least 5 records in each table.
- b) Get supplier nos 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).

CSDC2-601: Operating System and Open Source Software

Introduction:

Operating System objectives and operations, Operating System architecture, Operating System structure, Evolution of operating systems, Operating System services, User Operating System interface, System Boot, Batch Processing, Multiprogramming, Multitasking, Multiuser, Parallel, Distributed & Real-Time O.S. 8L

[1] Pages 1 – 20, 24 – 31, 35 – 43, 55 – 62, 74 – 75, 78 – 81, 92 – 93.

Process Management and Coordination:

Process concept, Process states, process scheduling, Multithreaded, Process Synchronization, CPU Scheduling and Deadlocks. 8L

[1] Pages 105 – 117, 120 – 121, 163 – 166, 203 – 209, 261 – 277, 315 – 322.

Memory Management:

Physical and Logical Address Space, Address Binding, Write a Program using Contiguous Memory Allocation, Paging, Segmentation and Virtual Memory. 8L

[1] Pages 351 - 372, 397 – 400.

Introduction Open Source Software:

The philosophy of Open Source Software(OSS), Definition of Open Source Software, Proprietary/Close Source Software vs OSS, Free vs OSS, Notion of Open source community, benefits of community based software development, different categories of stake holders in OSS development, technical infrastructure required, licensing models. 6L

[2] (Pages 36-51, 56-71)

[3] (Pages 9-29, 36-62, 79-80, 153-160)

Open Source Software development:

Developing blogs, group, forum, and social network for social purposes, OSS development process and basic principles, Quality Control Process, releases early and releases often, many-

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eyeball effect, Bug reporting and tracking system, Bug tracking Tools and Concurrent Versioning System, Refactoring. 10L

[2] Pages 282-294.

[3] Pages 46-59,111-129, 135-136.

OSS Usage:

Adoption of OSS; OSS and Government, OSS and education, OSS and Industry, trends and potential—global and Indian 4L

(Course material will be provided from freeopensourcesoftware.org)

Popular FOSS examples and their installation and functioning, 4L

(Course material will be provided from freeopensourcesoftware.org)

Recommended Reading Material

Text Books

1. A Silberschatz, Peter B Galvin and Greg Gagne, Operating System Concepts *Ninth Edition* John Wiley & John Wiley & Sons, 2012
2. Joseph Feller, Brian Fitzgerald, Scott A. Hissam and Karim R. Lakhani Perspectives On Free And Open Source Software ISBN: 9780262562270 | 570 pp. MIT Press January, 2007
3. Karl Fogel, Producing Open Source Software <http://producingoss.com>, 2010,

References Books

4. Stalling William, "Operating Systems 6th Edition, Pearson Education
5. J. Feller and B. Fitzgerald, *Understanding Open Source Software Development*, Addison-Wesley, 2002.
6. Karl Fogel and Moshe Bar, Open Source Development with CVS, Third Edition, URL: <http://cvsbook.red-bean.com/>
7. Sumitabha Das, Your UNIX: the ultimate guide, McGraw-Hill Publishing Co. March 1, 2001
8. Unix Shell Programming BY Yashavant P. Kanetkar BPB Publications ,2003
9. Sobell Mark, G. A Practical Guide To Linux Commands, Editors, And Shell Programming 2nd edition, PRENTICE HALL, 2010

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Online Reading/Supporting Material

10. <http://williamstallings.com/OS/OS6e.html>
11. [www. Sourceforge.Net](http://www.Sourceforge.Net)
12. <http://www.igi-global.com/journal/international-journal-open-source-software/1123>
13. http://home.dei.polimi.it/bellasi/lib/exe/fetch.php?media=docs:lf_os_dev_model.pdf
14. freeopensourcesoftware.org/

LIST OF PRACTICAL BASED OF CSDC2-601: OPERATING SYSTEM AND OPEN SOURCE SOFTWARE

I. Operating System:

1. Installation of GNU/Linux distribution,
2. Basic shell commands - logging in, listing files, editing files, copying/moving files, viewing, file contents, changing file modes and permissions, VI editor commands
3. Write a simple shell script that takes any number of arguments on the command line, and prints the arguments with “Hello” in front.
4. Write a simple shell script that takes two numbers as parameters and uses a while loop to print all the numbers from the first to the second inclusive, each number separated only by a space from the previous number.
5. Write a script which displays “Good morning”, “Good afternoon” or “Good evening”, on the monitor, depending on the time of running the script.
6. Write a script which reads a number in units of seconds and converts it to the unit’s hours: minutes: seconds and prints the result to standard output. Your script must prompt for re-input if a negative value is input
7. Write a script calculate, which accepts 4 arguments a, b, c, d and prints the value of $a \times 20 - b \times 2 + c \div d$ to standard output.

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II Open source software:

1. Practical understanding of bug reporting
2. Practical understanding bug tracking, fixing and request for feature addition in open source software.
3. Understanding LaTeX for document preparation

CSDC2-701: Programming Fundamentals and Data Structures

Introduction to Python: 6 L

Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators.

[1], Chapter 1,
[2], Chapter 3

Creating Python Programs: 20 L

Input and Output Statements, Control statements, Defining Functions, default arguments, Errors and Exceptions.

[1], Chapter 3, 6(Introduction only),
[2], Chapter 4 (Upto 4.6), 8 (Upto 8.3),

Object Oriented Programming: 8 L

Introduction to Classes, Objects and Methods, Standard Libraries.

[1], Chapter 7,
[2], Chapter 9 (Upto 9.6), 10(Introduction only)

Data Structures: 6 L

Arrays, list, sets, hashing and dictionaries; stacks and queues.

[1], Chapter 4, 5,
[2], Chapter 5,
[3], Basic Data Structures, Stacks and Queues

Searching and Sorting: 8 L

Linear and Binary Search, Bubble, Selection and Insertion sort.

[3], Sorting and Searching

Recommended Reading Material

Text Books

1. T. Budd, *Exploring Python*, Tata McGraw Hill, 1st Edition, 2011.

Online Reading/Supporting Material

2. <http://docs.python.org/3/tutorial/index.html>
3. <http://interactivepython.org/courselib/static/pythonds/>

LIST OF PRACTICALS CSDC2-701: PROGRAMMING FUNDAMENTALS AND DATA STRUCTURES

1. Using for loop, print a table of Celsius/Fahrenheit equivalences. Let c be the Celsius temperatures ranging from 0 to 100, for each value of c , print the corresponding Fahrenheit temperature.
2. Using while loop, produce a table of sines, cosines and tangents. Make a variable x in range from 0 to 10 in steps of 0.2. For each value of x , print the value of $\sin(x)$, $\cos(x)$ and $\tan(x)$.
3. Write a program that reads an integer value and prints “leap year” or “not a leap year”.
4. Write a program that takes a positive integer n and then produces n lines of output shown as follows.

Enter a size: 5

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

5. Write a function that takes an integer ‘ n ’ as input and calculates the value of $1 + 1/1! + 1/2! + 1/3! + \dots + 1/n!$

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6. Write a function that takes an integer input and calculates the factorial of that number.
7. Write a function that takes a string input and checks if it's a palindrome or not.
8. Write a list function to convert a string into a list, as in `list('abc')` gives `[a, b, c]`.
9. Write a method to combine two dictionaries.
10. Write a method that takes a list and removes all duplicates from the list.
11. Write a method that takes a filename from the user and displays the content of that file on the terminal.
12. Write a method to calculate GCD of two numbers.
13. Write a program to create a class `ComplexNumbers`. Write methods to add, subtract and multiply two complex numbers.
14. Write a program to create a class `Fraction`. Write methods to add, subtract and multiply two complex numbers. Also write a method to compare two fractions and a method to check if it's a valid fraction or not. (denominator should not be 0)
15. Write a program to demonstrate multiple inheritance.
16. Write a program to create `Stack Class` and implement all its methods.
17. Write a program to create `Queue Class` and implement all its methods.
18. Write a program to create `PriorityQueue Class` and implement all its methods.
19. Write a program to implement linear and binary search on lists.
20. Write a program to implement linear and binary search on lists.
21. Write a program to sort a list using insertion sort, bubble sort, selection sort.

CSDC2- 801: Information Security & E-Governance

INFORMATION SECURITY:

Introduction

5 L

Definition, Security as a concept, function and subject area. Security domains, Problems associated with computer system security – A Scenario. Reasons and Targets for attack. Forms of attack and remedies.

[1] Pages 2-23

Security Concepts

5 L

Security concepts, goals, and services. Role of Cryptography In Information Security. Cryptanalysis.

[1] Pages 60-97

Authentication Systems

8L

Key management. Cryptographic Authentication. Authentication Systems :Kerberos, Public Key Infrastructure. Remote Authentication dial in user services,

[1] Pages 98-111,119-150

Human Authentication, Proxies of humans

2L

Security Process Management and Standards

4L

ISO 27001,27002.

[1] Pages 168-183

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E-GOVERNANCE

Basics of E-Governance; 6L

why E-Governance; Issues in E-Governance Applications and Digital Divide. Evolution of E-Governance and its scope and content. Present Global trends of growth in E-Governance.

[2] Pages 1-9

E-Governance Models 6L

Models of Digital Governance:

- Broadcasting Model
- Critical Flow Model
- Comparative Analysis Model
- Interactive Service Model
- E-Governance maturity model
- Mobilisation and Lobbying model

Towards good governance through E-governance

[2] Pages 10-25

E-Governance Infrastructure, Stages in Evaluation and Strategies for Success 6L

E-Readiness

Data System Infrastructural preparedness

Legal Infrastructural preparedness

Human Infrastructural preparedness

Institutional Infrastructural preparedness

Technological Infrastructural preparedness

Leadership and Strategic Planning

[2] Pages 26-37

Case Studies 6L

Challenges In E-Governance Comparative Study of India & any other developing country in terms of implementation of E-Governance; National E-Governance Plan Of Indian Government; Various Agencies Involved and websites In Indian EGovernance; E-

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Governance Products and Services in India; Case Study-Indian passport portal/ Indian Railways/ Online filing of Income Tax.

[2] Pages 38-100

Recommended Reading Material

Text Books:

1. Stuart Jacobs 'Engineering Information Security' IEEE Press Series on Information and Communication Network Security, IEEE Press,2011.
2. C.S.R. Prabhu ,E-Governance: Concepts And Case Studies, PHI ,2011.

Online References:

- 3.http://books.google.co.in/books?id=dfxoPL11PwYC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
- 4.<http://india.gov.in/e-governance/national-e-governance-plan>

PRACTICAL LIST OF CSDC2 – 801: INFORMATION SECURITY AND E-GOVERNANCE

1: Download cryptographic tools for the following :

- a. Block cipher
- b. Stream Cipher
- c. Asymmetric Cipher
- d. Digital Signature
- e. Digital Certificate

Submit the study of these tools as laboratory work.

2: Describe your College as an enterprise and list the following with reference to information flow in the college:

- a. IT Infrastructure
- b. Network Diagram
- c. Business Operations
- d. Identification of threats
- e. Evaluate existing security policy
- f. Develop security procedure

Submit the study as laboratory work

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3: Study the security implemented in your

- a. Computer Science Laboratory
 - b. On your system
- Submit the study as laboratory work

4: Study any Government/Non-Profit Web Site Development and Analysis e-governance in India and submit the study as laboratory work.

5: Develop a design specification for an e-government or e-governance application. Listing the use of information and communication technology in the public governance of safety and security; list input interfaces and output design and stakeholders

APPLIED COURSES (AC)

CSAC 301: Geo-informatics

Introduction: 2L

Understanding the concept and mathematical characteristics of location and administrative boundaries.

[1] (sec 1.2, 1.3, 2.1.1,6.1 ,6.2)

Overview of Geo-referencing and analysis tools: 7L

Mapping the earth, Referencing location on earth's surface, Google earth vs google maps and Introduction to positioning technologies like GPS

[1] (sec 2.4, 2.5, 6.1- 6.4)

[3] : pages 1 to33 .

Annotation (Google Earth and Google maps) 10 L

Adding placemarkers, paths polygons, embedding images and videos in google earth. Embedding google earth in website.Creating custom maps for google maps. Adding placemarkers, lines and shapes ,Sharing and collaborating your map.

[6],[7],[10] : pages 1 to 60

Geospatial Visualization and data analysis 5L

Data collection, mapping GPS data in Google earth.

[4],[5],[8],[9]: pages1 to 25

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Recommended reading material

Text Books

- 1) Kang Tsung Shang, *Introduction to Geographic Information System* , Mcgraw Hill, Fifth edition.
- 2) Michael Miller, *Using Google Maps and Google Earth* , Pearson education,2011.
Online references

Online reading /supporting material

- 3) http://en.wikipedia.org/wiki/Global_Positioning_System
- 4) <http://en.wikipedia.org/wiki/Geovisualization>
http://www.deloitte.com/view/en_US/us/Services/consulting/technology-consulting/37ad18fab4335310VgnVCM2000001b56f00aRCRD.htm#read
- 5) <http://www.google.co.in/earth/outreach/tutorials/annotate.html>
- 6) <http://www.google.co.in/earth/outreach/tutorials/earthoverlays.html#prereq>
- 7) <http://www.google.co.in/earth/outreach/tutorials/kmlembed.html#prereq>
- 8) <http://www.google.co.in/earth/outreach/tutorials/importgps.html>
- 9) <http://www.google.co.in/earth/outreach/tutorials/custommaps.html#prereq>

LIST OF PRACTICALS OF CSAC 301: GEO-INFORMATICS

S. No.	Practical Title
1.	Annotating Google earth
2.	Embedding earth in your website
3.	Annotating Google maps.
4.	Collecting and importing GPS data into google earth
5.	Sharing and collaborating maps

CSAC 401: Mobile Application on Android Platform

Introduction: 2 L

History of Android, Introduction to Android Operating Systems, Android Development Tools, Android Architecture.

[2],[3] : pages 1 to 10

Overview of object oriented programming using Java: 6 L

OOPs Concepts: Inheritance, Polymorphism, Interfaces, Abstract class, Threads, Overloading and Overriding, Java Virtual Machine.

[5] : pages 1 to 50

Development Tools: 5 L

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.

[1]: Chap 1, Chap 2, Cha[3 (page 55-59)],[4]: pages 1 to 20.

User Interface Architecture: 3 L

Application context, intents, Activity life cycle, multiple screen sizes

[6]: pages 1 to 11,[7]: pages 1 to 8, [8]: page 1to 6.

User Interface Design: 6 L

Form widgets, Text Fields, Layouts, Button control, toggle buttons, Spinners(Combo boxes),Images, Menu, Dialog.

[1]: chap 4 (page 65-89), chap 7(page 163-167), chap 8(179-189): [10]: 16 pages, [11]: 9 pages

Database: 2 L

Understanding of SQLite database, Connecting with the database.

[1]: chap 9 (page 197-207), [12]: 1 to 6 pages

Recommended Reading Material

Text Books

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

Online Reading / Supporting Material

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

LIST OF PRACTICAL CSAC 401: MOBILE APPLICATION on Android Platform

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.

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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.

CSAC-501: Web Technology

Introduction: 8 L

Basics of World Wide Web (WWW), Web Browser and its architecture, Hyper Text Markup Language (HTML), Common Gateway Interface (CGI), Content Management System (CMS), Remote Login (TELNET).

[1]: [chap. 6 Complete].

JavaScript: 7 L

Basic concepts, structure, variables, operators, functions, control structures, standard objects, event handling, Introduction to AJAX.

[1]: [chap. 7 Complete]

Java Server Pages: 9 L

Introduction to Java Server Pages (JSP), elements of a JSP (directives, comments, scripting), developing a simple JavaBean, Java Database Connectivity (JDBC).

[1]: [9.1.5 – 9.1.8, 9.1.11, 9.1.12]

Recommended Reading Material

Text Books

3. A. S. Godbole and A. Kahate, Web Technologies: TCP/IP, Architecture and Java Programming, McGraw-Hill, 2nd Edition, 2012.

Reference Books

4. H.M. Deitel, P.J. Deitel and A.B. Goldberg, Internet and World Wide Web: How to Programe, 4th Edition, Pearson Prentice Hall, 2008
5. N. P. Gopalan and J. Akilandeswari, Web Technology: A Developer’s Perspective, PHI, 2013.
6. J. C. Jackson, Web Technologies: A Computer Science Perspective, PHI, 2009.

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Online Reading / Supporting Material

1. <http://www.w3schools.com/>
2. <http://netbeans.org/>

LIST OF PRACTICALS CSAC-501: WEB TECHNOLOGY

S. No.	Practical Title
1.	Create an admission form of your college which includes: <ul style="list-style-type: none">• College name and its website address that links to the website• numbered list of various fields• Check boxes• image for photograph• combo box and• submit button
2.	Design a set of web pages to organize the content on the topic 'Web Technology' or any other topic of your choice using frames.
3.	Design a web page using CSS to demonstrate a web portal of tutorials.
4.	Put validation checks on all possible fields on admission form (Pract. 1) using JavaScript.
5.	Create an interactive multiple-choice quiz using JavaScript and AJAX.
6.	Create an Ajax-enabled HTML page for accepting a user ID and password from the user, and check if the user ID and password are correct.
7	Create a JDBC connection to the admission form (Pract 1) for generating a database of students. Send an appropriate acknowledgement to the student after accepting the form. (Make use of JSP, JDBC and MySql)

CSAC-601: Embedded Systems

Introduction

6 L

Definition of Embedded systems, Embedded Processing and its evolution, Issues and challenges, Embedded system design and process, Embedded systems and its applications, Embedded Operating System, Memory and I/O/ devices, Real-time Operating Systems Familiarity with microcontrollers like 8051 and related microprocessors for desktop and mobile apps like ARM processors.

[1] (chapter: 1: 1.1-1.5, 1.8), chapter 2: section 2.1(page 62-63), 2.4(96-103), page 350-350
2] pages 17-34

Programming Tools and environments

12 L

Programming embedded systems, Assembly vs High level programming, C program elements, Macros and functions, use of pointers, use of function calls, embedded software development tools–Emulators and debuggers, Testing of Embedded Systems. Learning programming environment for microcontrollers and testing programs.

[1] section 5.1-5.4, chapter 14 (pages 649-660)
[2] Chapter 3

Design and Implementation issues

6 L

Embedded system design issues and techniques, case studies/Project development. implementation case studies in mobile chair, mobile robotics, mobile speakers, hardware platforms from INDRION, sensor suites and outdoor testing for calibration, communication, computation and scalability, Real life implementation and transition path to the market Commercializing and developing a full-fledged product to help humanity.

[1] Chapter 12(pages 567-617)
[2] Chapter 10(pages 1 to 24)

Recommended Reading Material

Text Books

1. Raj Kamal “Embedded Systems Tata McGraw-Hill Education, 2008
2. Michael J. Pont, “Embedded C”, Pearson Education, 2007.

Reference Books

3. Steve Heath, *Embedded System Design*, Elsevier, 2005.
4. Wayne Wolf, “Computers as Components: Principles of Embedded Computer System Design”, Elsevier, 2006.

Online Reading / Supporting Material

5. <http://nptel.iitm.ac.in/>

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LIST OF PRACTICAL CSAC-601: EMBEDDED SYSTEMS

1. Program for running LED on one of the port.
2. Program to implement Boolean expression.
3. Program to measure pulse width.
4. Program to generate delay using timer.
5. C program for on chip ADC.
6. C program of serial communication on UART.
7. Study experiment on ARM core.
8. ARM Processors & Interfaces
9. LEDs and Keyboard Interface
10. Counting external events with on chip counter
11. Relay and Buzzer Control for alarm events

Embedded Systems Projects

Students are supposed to do the following projects:

1. Message Display System for Colleges
2. Information System Using GPS
3. Security System Using GSM
4. Finger Print Based Attendance System
5. RFID Based Door Security System
6. Electronic Voting Machine
7. SMS Based Home Appliance Control
8. RFID Based Automatic Toll Gate System
9. Carbon Monoxide Monitoring System
10. GSM Based Home Security Control