

Bodoland University
Curriculum Structure for UG syllabus for Computer Science (Honours),

No. of papers=14+12=26, Total Credits= 140

Total Marks = 2400

SEM-I						
Paper Code	Course	L+T+P	Credit	End Sem	Int	Total
CS-101H	C-1	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20 20	100
CS-102H	C-2	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20 20	100
MATH-GE-103H	GE-1	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20 20	100
COMM-104HR	AECC-1:English/Hindi/MIL(Communication)	2	2	50(L)		50
Total-			20	290	60	350

SEM-II						
Paper Code	Course	L+T+P	Credit	End Sem	Int	Total
CS -201H	C-3	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
CS-202H	C-4	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
MATH-GE-203H	GE-2	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
ENV-204HR	AECC-2:Environmental Science	2	2	50(L)		50
Total-			20	290	60	350

SEM-III						
Paper Code	Course	L+T+P	Credit	End Sem	Int	Total
CS-301H	C-5	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
CS-302H	C-6	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
CS-303H	C-7	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
CS-SEC1-304HR	SEC-1	2	2	50(L)		50
PHY-GE-305H	GE-3	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
Total-			26	370	80	450

SEM-IV						
Paper Code	Course	L+T+P	Credit	End Sem	Int	Total
CS-401H	C-8	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
CS-402H	C-9	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
CS-403H	C-10	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
CS-SEC2-404HR	SEC-2	2	2	50(L)		50
PHY-GE-405H	GE-4	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
Total-			26	370	80	450

SEM-V						
Paper Code	Course	L+T+P	Credit	End Sem	Int	Total
CS -501H	C-11	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
CS-502H	C-12	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
CS–DSE1-503H	DSE-1	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
CS–DSE2-504H	DSE-2	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
Total-			24	320	80	400

SEM-VI						
Paper Code	Course	L+T+P	Credit	End Sem	Int	Total
CS-601H	C-13	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
CS-602H	C-14	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
CS–DSE3-603H	DSE-3	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
CS–DSE4-604H	DSE-4 (Project/Dissertation)	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
Total-			24	320	80	400

1. Where there is a practical there will be no tutorial or vice-versa.
2. Institute should evolve a system/policy about ECA/ General Interest/Hobby/Sports/NCC/NSS/related courses on its own.
3. **Skill Enhancement Courses (SEC):** These courses are to be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge and should contain both theory and lab/hands-on/training/field work. The main purpose of these courses is to provide students life-skills in hands-on mode so as to increase their employability. The list provided under this category are suggestive in nature and each Institution/College has complete freedom to suggest their own papers under this category based on their expertise, specialization, requirements, scope and need. However, in this case approval of Academic section of the University is mandatory.

1ST SEMESTER

C-I: Programming Fundamentals using C/C++

Theory: 60 Lectures

1. Introduction to C and C++ (3 Lectures)

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

2. Data Types, Variables, Constants, Operators and Basic I/O (5 Lectures)

Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Basic Header Files (stdio.h, iostream.h, conio.hetc).

3. Expressions, Conditional Statements and Iterative Statements (5 Lectures)

Simple Expressions in C++, Understanding Operators Precedence in Expressions, Conditional Statements, Understanding syntax and utility of Iterative Statements, Use of break and continue in Loops, Using Nested Statements

4. Functions and Arrays (10 Lectures)

Utility of functions, Functions returning value, Void functions, Inline Functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Command Line Arguments/Parameters in Functions

Creating and Using One Dimensional Arrays, Use various types of arrays

5. Derived Data Types (Structures and Unions) (3 Lectures)

Declaring, initializing and using simple structures and unions, Manipulating individual members of structures and unions, Array of Structures, Individual data members as structures, Passing and returning structures from functions

6. Pointers and References in C++ (7 Lectures)

Understanding a Pointer Variable, Pointers to Pointers, Pointers to structures, Passing pointers as function arguments, Returning a pointer from a function, using arrays as pointers, Passing arrays to functions. Pointers vs. References

7. Memory Allocation in C++ (3 Lectures)

Differentiating between static and dynamic memory allocation, use of malloc, calloc and free functions, use of new and delete operators

8. File I/O, Pre-processor Directives (4 Lectures)

Opening and closing a file, Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files, Understanding the Pre-processor Directives, Macros

9. Using Classes in C++ (7 Lectures)

Defining & Using Classes, Class Constructors, Constructor Overloading, Function overloading in classes, Class Variables & Functions, Objects as parameters, Overview of Template classes

10. Overview of Function Overloading and Operator Overloading (5 Lectures)

Overloading functions by number and type of arguments, Looking at an operator as a function call, Overloading Operators

11. Inheritance, Polymorphism and Exception Handling (8 Lectures)

Introduction to Inheritance, Polymorphism, Basics Exceptional Handling

Reference Books

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

COMPUTER SCIENCE LAB (C-I): Programming Fundamentals using C/C++ Lab Practical: 60 Lectures

1. WAP to print the sum and product of digits of an integer.
2. WAP to reverse a number.
3. WAP to compute the sum of the first n terms of the following series $S = 1 + 1/2 + 1/3 + 1/4 + \dots$
4. WAP to compute the sum of the first n terms of the following series $S = 1 - 2 + 3 - 4 + 5 - \dots$
5. Write a function that checks whether a given string is Palindrome or not. Use this function to find whether the string entered by user is Palindrome or not.
6. Write a function to find whether a given no. is prime or not. Use the same to generate the prime numbers less than 100.
7. WAP to compute the factors of a given number.
8. Write a macro that swaps two numbers. WAP to use it.
9. WAP to print a triangle of stars as follows (take number of lines from user):

```

*
***
*****
*****
*****

```

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

The program should present a menu to the user and ask for one of the options. The menu should also include options to re-enter array and to quit the program.
11. WAP that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.
12. Write a program that swaps two numbers using pointers.
13. Write a program in which a function is passed address of two variables and then alter its contents.
14. Write a program which takes the radius of a circle as input from the user, passes it to another function that computes the area and the circumference of the circle and displays the value of area and circumference from the main() function.
15. Write a program to find sum of n elements entered by the user. To write this program, allocate memory dynamically using malloc() / calloc() functions or new operator.
16. Write a menu driven program to perform following operations on strings:

- a) Show address of each character in string
 - b) Concatenate two strings without using strcat function.
 - c) Concatenate two strings using strcat function.
 - d) Compare two strings
 - e) Calculate length of the string (use pointers)
 - f) Convert all lowercase characters to uppercase
 - g) Convert all uppercase characters to lowercase
 - h) Calculate number of vowels
 - i) Reverse the string
17. Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered array.
 18. WAP to display Fibonacci series (i)using recursion, (ii) using iteration
 19. WAP to calculate Factorial of a number (i)using recursion, (ii) using iteration
 20. WAP to calculate GCD of two numbers (i) with recursion (ii) without recursion.
 21. Create Matrix class using templates. Write a menu-driven program to perform following Matrix operations (2-D array implementation):
 - a) Sum b) Difference c) Product d) Transpose
 22. Create the Person class. Create some objects of this class (by taking information from the user). Inherit the class Person to create two classes Teacher and Student class. Maintain the respective information in the classes and create, display and delete objects of these two classes (Use Runtime Polymorphism).
 23. Create a class Triangle. Include overloaded functions for calculating area. Overload assignment operator and equality operator.
 24. Create a class Box containing length, breath and height. Include following methods in it:
 - a) Calculate surface Area
 - b) Calculate Volume
 - c) Increment, Overload ++ operator (both prefix & postfix)
 - d) Decrement, Overload -- operator (both prefix & postfix)
 - e) Overload operator == (to check equality of two boxes), as a friend function
 - f) Overload Assignment operator
 - g) Check if it is a Cube or cuboid

Write a program which takes input from the user for length, breath and height to test the above class.
 25. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
 26. Write a program to retrieve the student information from file created in previous question and print it in following format: Roll No. Name Marks
 27. Copy the contents of one text file to another file, after removing all whitespaces.
 28. Write a function that reverses the elements of an array in place. The function must accept only one pointer value and return void.
 29. Write a program that will read 10 integers from user and store them in an array. Implement array using pointers. The program will print the array elements in ascending and descending order.

C-2: Computer System Architecture

Theory: 60 Lectures

1. Introduction

(8 lectures)

Logic gates, Boolean Algebra, combinational circuits, and sequential circuits, memory units.

2. Data Representation and Basic Computer Arithmetic

(10 lectures)

Number systems, fixed and floating point representation, character representation, addition, subtraction

3. Basic Computer Organization and Design

(13 lectures)

Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference, input -output and interrupt, Interconnection Structures

4. Central Processing Unit

(15 lectures)

Register organization, arithmetic and logical micro-operations, stack organization, micro programmed control. Instruction formats, addressing modes, instruction codes, input output programming, RISC, CISC architectures, pipelining and parallel architecture.

5. Memory Organization

(6 lectures)

Cache memory, mapping.

6. Input-Output Organization

(8 lectures)

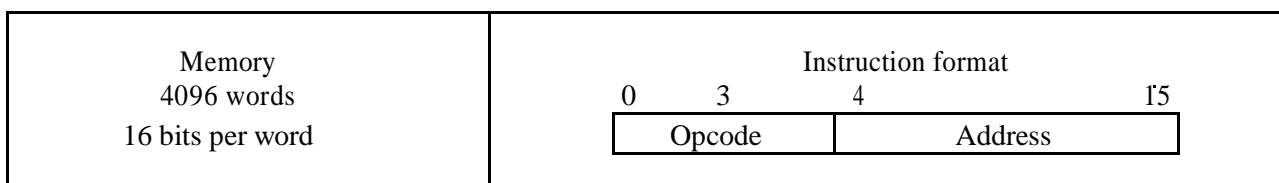
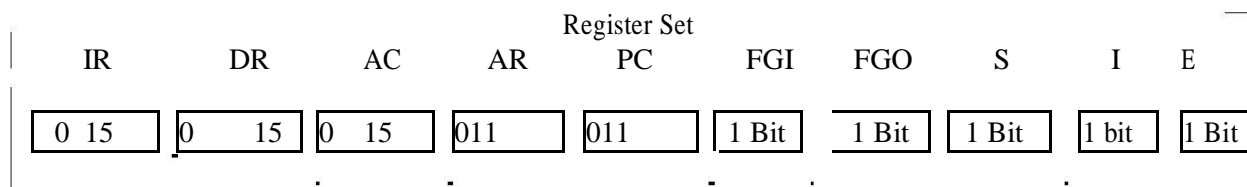
I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels.

Recommended Books:

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

COMPUTER SCIENCE LAB (C-2): Computer System Architecture
Lab Practical: 60 Lectures

I. Create a machine based on the following architecture:



Basic Computer Instructions

Memory Reference		Register Reference		Input-Output		
Symbol	Hex	Symbol	Hex	Symbol	Hex	
AND	0xxx	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		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					

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

0	2	3	4	15
Opcode	I	Address		

- 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.

GE-1:Computer Fundamentals**Theory: 60 lectures**

- | | |
|---|------------|
| 1. Introduction: Introduction to computer system | 6L |
| 2. Data Representation: Number systems and character representation | 12L |
| 3. Human Computer Interface: Types of software, Operating system as user interface, | 6L |
| | 10L |
| 4. Devices: Input and output devices (with connections and practical demo) | 6L |
| 5. Memory: Primary, secondary, auxiliary memory | 12L |
| 6. Computer Organisation and Architecture: C.P.U., registers, system bus, main memory unit, cache memory, Motherboard, processors. | 8L |
| 7. Overview of Emerging Technologies: Cloud computing, big data, mobile computing and embedded systems. | |

Reference Books:

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

Computer Fundamentals Lab**Practical: 60 lectures**

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

MS Word

1. Prepare a **grocery list** having four columns (Serial number, The name of the product, quantity and price) for the month of April, 06.
 - Font specifications for Title (Grocery List): 14-point Arial font in bold and italics.
 - The headings of the columns should be in 12-point and bold.
 - The rest of the document should be in 10-point Times New Roman.
 - Leave a gap of 12-points after the title.
2. Create a **telephone directory**.
 - The heading should be 16-point Arial Font in bold
 - The rest of the document should use 10-point font size
 - Other headings should use 10-point Courier New Font.
 - The footer should show the page number as well as the date last updated.
3. Design a **time-table form** for your college.
 - The first line should mention the name of the college in 16-point Arial Font and should be bold.
 - The second line should give the course name/teacher's name and the department in 14-point Arial.
 - Leave a gap of 12-points.

- The rest of the document should use 10-point Times New Roman font.
 - The footer should contain your specifications as the designer and date of creation.
4. BPB Publications plans to release a new book designed as per your syllabus. Design the **first page of the book** as per the given specifications.
- The title of the book should appear in bold using 20-point Arial font.
 - The name of the author and his qualifications should be in the center of the page in 16-point Arial font.
 - At the bottom of the document should be the name of the publisher and address in 16-point Times New Roman.
 - The details of the offices of the publisher (only location) should appear in the footer.
5. Create the following one page documents.
- a. Compose a note inviting friends to a get-together at your house, Including a list of things to bring with them.
 - b. Design a certificate in landscape orientation with a border around the document.
 - c. Design a Garage Sale sign.
 - d. Make a sign outlining your rules for your bedroom at home, using a numbered list.
6. Create the following documents:
- (a) A newsletter with a headline and 2 columns in portrait orientation, including at least one image surrounded by text.
 - (b) Use a newsletter format to promote upcoming projects or events in your classroom or college.
7. Convert following text to a table, using comma as delimiter
Type the following as shown (do not bold).
- Color, Style, Item**
Blue, A980, Van
Red, X023, Car
Green, YL724, Truck
Name, Age, Sex
Bob, 23, M
Linda, 46, F
Tom, 29, M
9. Enter the following data into a table given on the next page.

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

Banks, Jennifer	1201	2528	1203
Atwater, Kelly	4098	3079	2067

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

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

10. Wrapping of text around the image.

11. Following features of menu option must be covered

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

MS Excel

1. Enter the Following data in Excel Sheet

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

**TOTAL
AVERAGE**

(a) Apply Formatting as follow: I.Title in

TIMES NEW ROMAN

- ii. Font Size - 14
- iii. Remaining text - ARIAL, Font Size -10
- iv. State names and Qtr. Heading Bold, Italic with Gray Fill Color.
- v. Numbers in two decimal places.
- vi. Qtr. Heading in center Alignment.
- vii. Apply Border to whole data.

(b) Calculate State and Qtr. Total

(c) Calculate Average for each quarter

(d) Calculate Amount = Rate * Total.

2. Given the following worksheet

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

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

If Marks	Then Grade
≥ 80	A+
$\geq 60 < 80$	A
$\geq 50 < 60$	B
< 50	F

3. Given the following worksheet

	A	B	C	D	E	F	G
1	Salesman		Sales in (Rs.)				
2	No.	Qtr1	Qtr2	Qtr3	Qtr4	Total	Commission
3	S001	5000	8500	12000	9000		
4	S002	7000	4000	7500	11000		
5	S003	4000	9000	6500	8200		
6	S004	5500	6900	4500	10500		
7	S005	7400	8500	9200	8300		
8	S006	5300	7600	9800	6100		

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

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

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

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

Allowances

- HRA Dependent on Basic

30% of Basic if Basic ≤ 1000

25% of Basic if Basic > 1000 & Basic ≤ 3000

20% of Basic if Basic >3000

- DA Fixed for all employees, 30% of Basic
- Conveyance Allowance Rs. 50/- if Basic is ≤ 1000 Rs.
75/- if Basic >1000 & Basic ≤ 2000
Rs. 100 if Basic >2000
- Entertainment Allowance NIL if Basic
is ≤ 1000 Rs. 100/- if Basic > 1000

Deductions

- Provident Fund 6% of Basic
- Group Insurance Premium Rs. 40/- if Basic is ≤ 1500
Rs. 60/- if Basic > 1500 & Basic ≤ 3000
Rs. 80/- if Basic >3000

Calculate the following:

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

Total deduction = Provident Fund + Group Insurance Premium

Net Salary = Gross Salary – Total Deduction

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

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

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

Rate of Interest	8%
Time	5 Years
Principal	Simple Interest
1000	?
18000	?
5200	?

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

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

- (a) Calculate total sale year wise.
- (b) Calculate the net sale made by each salesman
- (c) Calculate the maximum sale made by the salesman

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

8. Enter the following data in Excel Sheet

PERSONAL BUDGET FOR FIRST QUARTER

Monthly Income (Net): 1,475

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

Monthly Total

Calculate Quarter total and Quarter average.

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

9. Enter the following data in Excel Sheet

TOTAL REVENUE EARNED FOR SAM'S BOOKSTALL

Publisher name	1997	1998	1999	2000	total
A	Rs. 1,000.00	Rs. 1100.00	Rs. 1,300.00	Rs. 800.00	
B	Rs. 1,500.00	Rs. 700.00	Rs. 1,000.00	Rs. 2,000.00	
C	Rs. 700.00	Rs. 900.00	Rs. 1,500.00	Rs. 600.00	
D	Rs. 1,200.00	Rs. 500.00	Rs. 200.00	Rs. 1,100.00	
E	Rs. 800.00	Rs. 1,000.00	Rs. 3,000.00	Rs. 560.00	

- (a) Compute the total revenue earned.
 (b) Plot the line chart to compare the revenue of all publishers for 4 years.
 (b) Chart Title should be Total Revenue of sam's Bookstall (1997-2000)
 (c) Give appropriate categories and value axis title.

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

3RD SEMESTER

C-5: Data Structures

Theory: 60 Lectures

- | | |
|---|----------------------|
| 1.Arrays
Single and Multi-dimensional Arrays | (5 Lectures) |
| 2.Stacks
Implementing single / multiple stack/s in an Array; Prefix, Infix and Postfix expressions,
Applications of stack | (5 Lectures) |
| 3.Linked Lists
Singly, Doubly and Circular Lists; Normal and Circular representation of Stack in Lists | (10 Lectures) |
| 4.Queues
Array and Linked representation of Queue | (5 Lectures) |
| 5.Recursion
Developing Recursive Definition of Simple Problems and their implementation | (5 lectures) |
| 6.Trees
Introduction to Tree as a data structure; Binary Trees , Binary Search Trees, Threaded Binary Tree,
AVL Trees | (20 Lectures) |
| 7.Searching and Sorting
Linear Search, Binary Search, Bubble Sort, Selection Sort, Insertion Sort,
Shell Sort | (5 Lectures) |
| 8.Hashing
Introduction to Hashing, Efficiency of Rehash Methods, Hash
Table Reordering, Resolving collusion by Open Addressing, Separate
Chaining, Dynamic and Extendible Hashing | (5 Lectures) |

Reference Books:

1. Adam Drozdek, "Data Structures and algorithm in C++", Third Edition, Cengage Learning, 2012.
2. SartajSahni, Data Structures, "Algorithms and applications in C++", Second Edition, Universities Press, 2011.
3. Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using C and C++", Second edition, PHI, 2009.
4. Robert L. Kruse, "Data Structures and Program Design in C++", Pearson,1999.
5. D.S Malik, Data Structure using C++,Second edition, Cengage Learning, 2010.
6. Mark Allen Weiss, "Data Structures and Algorithms Analysis in Java", Pearson Education, 3rd

edition, 2011

7. Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using Java, 2003.
 8. Robert Lafore, "Data Structures and Algorithms in Java, 2/E", Pearson/ Macmillan Computer Pub,2003
 9. John Hubbard, "Data Structures with JAVA", McGraw Hill Education (India) Private Limited; 2 edition, 2009
 10. Goodrich, M. and Tamassia, R. "Data Structures and Algorithms Analysis in Java", 4th Edition, Wiley,2013
-

COMPUTER SCIENCE LAB (C-5): Data Structures Lab

Practical: 60 Lectures

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

22. WAP to create a Threaded Binary Tree as per inorder traversal, and implement operations like finding the successor / predecessor of an element, insert an element, inorder traversal.
23. WAP to implement various operations on AVL Tree.

C-6: Operating Systems**Theory: 60 Lectures****1. Introduction**

(10 Lectures)

Basic OS functions, types of operating systems—multiprogramming systems, batch systems , time sharing systems; process control & real time systems.

2. Operating System Organization

(6 Lectures)

Processor and user modes, kernels, system calls and system programs.

3. Process Management

(20 Lectures)

System view of the process and resources, process abstraction, process hierarchy, threads; Process Scheduling, concurrent and processes, critical section, semaphores, methods for inter-process communication; deadlocks.

4. Memory Management

(10 Lectures)

paging, segmentation, virtual memory

5. File and I/O Management

(10 Lectures)

Directory structure, file operations, device management.

6. Protection and Security

(4 Lectures)

Policy mechanism, Authentication

Recommended Books:

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

COMPUTER SCIENCE LAB (C-6): Operating Systems Lab**Practical: 60 Lectures****C/ C++ programs**

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 implement non-preemptive priority based scheduling algorithm.
 10. Write program to implement preemptive priority based scheduling algorithm.
 11. Write program to implement SRJF scheduling algorithm.
 12. Write program to calculate sum of n numbers using *thread* library.
 13. Write a program to implement first-fit, best-fit and worst-fit allocation strategies.
-

COMPUTER SCIENCE (C-7): Computer Networks**Theory: 60 Lectures****1. Introduction to Computer Networks** (8 Lectures)

Network topologies; network classifications; network protocol; overview of OSI reference model; overview of TCP/IP protocol suite.

2. Data Communication Fundamentals and Techniques (10 Lectures)

Analog and digital signal; digital to digital line encoding schemes; parallel and serial transmission; digital to analog modulation-; multiplexing techniques- FDM, TDM; transmission media.

3. Networks Switching Techniques and Access mechanisms (10 Lectures)

Circuit switching; packet switching, dial-up modems; digital subscriber line; cable TV for data transfer.

4. Data Link Layer Functions and Protocol (10 Lectures)

Error detection and error correction techniques; data-link control- framing and flow control; error recovery protocols- stop and wait ARQ, go-back-n ARQ

5. Multiple Access Protocol and Networks (5 Lectures)

CSMA/CD protocols; Ethernet LANS; repeaters, hubs, switches, bridges, router and gateways

6. Networks Layer Functions and Protocols (6 Lectures)

Routing; routing algorithms; IP protocol

7. Transport Layer Functions and Protocols (6 Lectures)

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

8. Overview of Application layer protocol (5 Lectures)

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

Reference Books

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

COMPUTER SCIENCE LAB (C-7): Computer Networks Lab**Practical: 60 Lectures**

1. Simulate Cyclic Redundancy Check (CRC) error detection algorithm for noisy channel.
2. Simulate and implement stop and wait protocol for noisy channel.
3. Simulate and implement go back n sliding window protocol.
4. Simulate and implement selective repeat sliding window protocol.
5. Simulate and implement distance vector routing algorithm
6. Simulate and implement Dijkstra algorithm for shortest path routing.

SEC 1: Oracle (SQL/PL-SQL)**(1+2 Lab)****Theory: 15 Lectures****1. Introduction to Oracle as RDBMS****SQL Vs. SQL * Plus:**

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

2. Managing Tables and Data:

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

3. Other Database Objects

- View
- Synonyms, Index (2L)

4. Transaction Control Statements

- Commit, Rollback, Save point (2L)

5. Introduction to PL/SQL

- SQL v/s PL/SQL
- PL/SQL Block Structure
- Language construct of PL/SQL (Variables, Basic and Composite Data type, Conditions looping etc.)
- (5L)

Books Recommended:

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

Software Lab Based on SQL/PL-SQL:**Practical: 30 Lectures****[SQL COMMANDS]**

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

[SQL FUNCTION]

- 6) To use oracle function viz aggregate, numeric, conversion, string function.
- 7) To understand use and working with joins.

- 8) To make use of transaction control statement viz rollback, commit and save point.
- 9) To make views of a table.
- 10) To make indexes of a table. **[PL/SQL]**
- 11) To understand working with PL/SQL
- 12) To implement Cursor on a table.
- 13) To implement trigger on a table

GE-3:Computer Networks and Internet Technologies**Theory: 60 lectures**

- 1.Computer Networks:** Introduction to computer network, data communication, components of data communication, LAN, MAN, WAN, wireless LAN, internet, intranet, extranet. **6L**
- 2.Network Models:** Client/ server network and Peer-to-peer network, OSI, TCP/IP **8L**
- 3.Transmission Media:** Introduction, Guided Media, Unguided media **4L**
- 4.LAN Topologies:** Ring, bus, star, mesh and tree topologies. **2L**
- 5.Network Devices:** NIC, repeaters, hub, bridge, switch, gateway and router. **2L**
- 6.Internet Terms:** Web page, Home page, website, internet browsers, URL, Hypertext, ISP, Web server, download and upload, online and offline. **2L**
- 7.Internet Applications:** www, telnet, ftp, e-mail, social networks, search engines, Video Conferencing, e-Commerce, blogs. **6L**
- 8.Introduction to Web Design:** Introduction to hypertext markup language (html), creating web pages, hosting options and domain name registration. Customized **16L**
- 9.JavaScript Fundamentals:** Data types and variables, functions, methods and events, controlling program flow, JavaScript object model. **14L**

Reference Books:

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

Computer Networks and Internet Technologies Lab**Practical: 60 lectures**

Practical exercises based on concepts listed in theory using HTML.

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

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

About	This frame would show the contents according to the link clicked by the user on the left Frame.
Department 1	
Department 2	
Department 3	

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

Department Names (could be along with Logos)
Contents according to the Link clicked

8. Create a website of 6 – 7 pages with different effects as mentioned in above problems.
9. Create a form using HTML which has the following types of controls:
 - V. Text Box
 - VI. Option/radio buttons
 - VII. Check boxes
 - VIII. Reset and Submit buttons

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List of Practical using Javascript :

Create event driven program for following:

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

5TH SEMESTER**C-11: Internet Technologies****Theory: 60 Lectures**

- 1. Java** **(5 lectures)**
Use of Objects, Array and Array List, class
- 2. JavaScript** **(15 lectures)**
Data types, operators, functions, control structures, events and event handling.
- 3. JDBC** **(10 lectures)**
JDBC Fundamentals, Establishing Connectivity and working with connection interface, working with statements, Creating and Executing SQL Statements, Working with Result Set Objects.
- 4. JSP** **(20 lectures)**
Introduction to Java Server Pages, HTTP and Servlet Basics, The Anatomy of a JSP Page, JSP Application Design with MVC, Setting Up the JSP Environment, Implicit JSP Objects, Database Access.
- 5. Java Beans** **(10 lectures)**
Java Beans Fundamentals, JAR files, Introspection, Developing a simple Bean, Connecting to DB

Recommended Books:

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

COMPUTER SCIENCE LAB (C-11): Internet Technologies Lab**Practical: 60 Lectures**

Create event driven program for following:

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

C-12: Theory of Computation

Theory: 60 Lectures

1. Languages (8 Lectures)

Alphabets, string, language, Basic Operations on language

2. Finite Automata and Regular Languages (20 Lectures)

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

3. Context free languages (17 Lectures)

Context free grammars, parse trees, ambiguities in grammars and languages, Pushdown automata.

4. Turing Macines and Models of Computations (15 Lectures)

Turing Machine as a model of computation, Universal Turing Machine, Language acceptability, decidability, halting problem

Recommended Books:

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

COMPUTER SCIENCE LAB/Tutorial (C-12): Theory of Computation
Tutorial: 15 Lectures

DSE-1: Digital Image Processing

Theory: 60 Lectures

1. Introduction (6 Lectures)

Pixels, Imaging Geometry, Spatial Domain Filtering, sampling and quantization.

2. Spatial Domain Filtering (7 Lectures)

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

3. Filtering in the Frequency domain (8 Lectures)

Fourier Transforms and properties, FFT, Discrete Cosine Transform, Frequency domain filtering.

4. Image Restoration (8 Lectures)

Basic Framework, Interactive Restoration, Image deformation and geometric transformations, image morphing, Restoration techniques, Noise characterization, Noise restoration filters

5. Image Compression (10 Lectures)

Encoder-Decoder model, Types of redundancies, Lossy and Lossless compression, Entropy of an information source, Transform Coding, Sub-image size selection, blocking artifacts, DCT implementation using FFT, Run length coding, Threshold Coding, JPEG, Lossless predictive coding, Lossy predictive coding, Motion Compensation

6. Wavelet based Image Compression (5 Lectures)

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

7. Morphological Image Processing (7 Lectures)

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

8. Image Segmentation (9 Lectures)

Boundary detection based techniques, Point, line detection, Edge detection, Edge linking, local processing, regional processing, Hough transform, Thresholding, Iterative thresholding, Region-based segmentation, Watershed algorithm

Reference Books

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

Digital Image Processing Lab

Practical: 60 Lectures

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

9. Write and execute programs for image frequency domain filtering
 - a. Apply FFT on given image
 - b. Perform low pass and high pass filtering in frequency domain
 - c. Apply IFFT to reconstruct image
10. Write a program in C and MATLAB/SCILAB for edge detection using different edge detection mask
11. Write and execute program for image morphological operations erosion and dilation.
12. To write and execute program for wavelet transform on given image and perform inverse wavelet transform to reconstruct image.

DSE-2: Numerical Methods

Theory: 60 Lectures

1. Floating point representation and computer arithmetic, Significant digits, Errors:
2. Bisection method, Secant method, Regula–Falsi method, Newton–Raphson method, Newton’s method for solving nonlinear systems, Gauss elimination method (with row pivoting) and Gauss–Jordan method
3. Iterative methods: Jacobi and Gauss-Seidel iterative methods, Interpolation: Lagrange’s form and Newton’s form
4. Finite difference operators, Gregory Newton forward and backward differences, Interpolation, Linear interpolation, Numerical differentiation: First derivatives and second order derivatives
5. Numerical integration: Trapezoid rule, Simpson’s rule (only method)
6. Extrapolation methods: Romberg integration, Gaussian quadrature, Ordinary differential equation: Euler’s method, Modified Euler’s methods: Heun method and Mid-point method, Runge-Kutta second methods

REFERENCE BOOKS:

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

Numerical Methods Lab

Practical: 60 lectures

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