NEP

Syllabus for

B.Sc. Computer Application

Major,
Minor
and
Interdisciplinary

SEM	level		Major	Lab	Minor	Lab	Multidisciplinary	Lab
I	100	1	**CMADSC101T** Computer Fundamentals	Y	**CMAMIN101T** Computer Fundamentals	Y	**CMACOR101T** Computer Fundamentals	Y
			CMADSC101P Computer Fundamentals		**CMAMIN101P** Computer Fundamentals		**CMACOR101P** Computer Fundamentals	
II		2	**CMADSC202T** **Programming wi**th C	Y	**CMAMIN202T** Programming with C	Y	**CMACOR202T** Programming with C	Y
			CMADSC202P **Programming with C**		**CMAMIN202P** Programming with C		**CMACOR202P** Programming with C	
III	200	3	**CMADSC303T** Data Structure	Y	**CMAMIN303T** Data Structures	Y	**CMACOR303T** Data Structures	Y
			CMADSC303P Data Structure		**CMAMIN303P** Data Structures		**CMACOR303P** Data Structures	
IV		4	**CMADSC404T** Object Oriented Programing	Y			**CMACOR404T** Operating System **CMACOR404P** Operating System	Y
			CMADSC404P Object Oriented Programing					
		5	**CMADSC405T** Operating Systems	Y				
			CMADSC405P Operating Systems					
		6	**CMADSC406T** Computational Mathematics	N				
		7	**CMADSC407T**	N				

			Computer System Architecture			Y		
V	300	8	**CMADSC508T** Analysis of Algorithms / **CMADSC508P** Analysis of Algorithms	Y			**CMACOR505T** Database Management System / **CMACOR505P** Database Management System	Y
		9	**CMADSC509T** Database Management System / **CMADSC509P** Database Management System	Y				
		10	**CMADSC510T** Software Engineering / **CMADSC510P** Software Engineering	Y				
		11	**CMADSC511T** Networking	N				
VI		12	**CMADSC612T** Graphics and Multimedia / **CMADSC612P** Graphics and Multimedia	Y			**CMACOR606T** Software Engineering	N
		13	**CMADSC613T** Artificial Intelligence / **CMADSC613P** Artificial Intelligence	Y				
		14	**CMADSC614T** Internet of Things	N				
		15	**CMADSC615T** Theory of Computation	N				
VII	400	16	**CMADSC716T** Image Processing	Y	**CMASMC701T** Operating Systems	Y		

			CMADSC716P Image Processing		**CMASMC701P** Operating System			
		17	**CMADSC717T** Data Science	Y				
			CMADSC717P Data Science					
VIII		18	**CMADSC818T** Big Data	N				
		19	**CMADSC819T** Cyber Security and Cyber Laws	N				
		20	**CMADSC820T** Mobile Computing	N				
		21	**CMADSC821P** Application Design & Development	L A B				
VIII		20	**CMADSC818T** Big Data	N	Honours with Research			
		21	**CMARES801P** Major Project	L A B				

	MDC	Lab		SEC	Lab
CMAHMD101T / CMAGMD101T	Computer Fundamentals	N	CMAHSE101T / CMAGSE101T	R Programming	Y
CMAHMD201T / CMAGMD201T	Computer Fundamentals	N	CMAHSE202T / CMAGSE202T	Python Programming	Y
CMAHMD301T / CMAGMD301T	Computer Fundamentals	N			

CORE COURSES (MAJOR / HONOURS IN COMPUTER APPLICATION)

CMADSC101T: Computer Fundamentals :   **Theory: 45 Lectures**

1. Introduction: **(3 Lectures)**
Functional units of a Computer Systems, Different Types of computers, Software and Hardware, Types of software:System s/w and Application s/w, Operating System as user interfaces

2.Data Representation   **(8 Lectures)**
Base or radix, Number systems(Decimal,Binary,Octal and Hexadecimal) ,Conversion from one number system to another, binary arithmetic(addition and subtraction),Integer representation(Signed magnitude,1's complement,2's complement), Character representation and Floating Point representation.

3.Boolean Algebra and Digital Logic   **(10 Lectures)**
Logic Gates: AND,OR & NOT(basic logic gates),NAND & NOR(universal logic gates),XOR,XNOR(graphical symbol,truth table and Boolean expression of all logic gates),Basic laws of Boolean Algebra, De Morgan's theorems, Cannonical expressions, MIN terms and MAX terms, SOP and POS expressions and their conversion, Simplifications of expressions by both boolean algebra and K-MAP method(upto 4 variables),Don't-care conditions, Representation of simplified boolean expressions by NAND/NOR gates

4.Combinational and Sequential Logic: **(12 Lectures)**
Sequential logic circuits: Adder (half adder and full adder), Subtractor (half subtractor and full subtractor), Encoder, Decoder, Multiplexer & Demultiplexer Combinational logic circuits: Flip-flops: latch, clocked, Types of flip-flops(RS,JK,D,T):characteristic tables, Excitation table and logic diagram, Registers, shift registers, registers with parallel loads, Counters, Types of counters: synchronous and asynchronous(diagram and explanation of how it counts)

5.Devices: **(4 Lectures)**
Input and output devices (with connections and practical demo), keyboard, mouse, joystick, scanner, OCR, OMR, barcode reader, web camera,monitor, printer, plotter

6.Memory: **(4 Lectures)**
Primary, secondary, auxiliary memory, RAM, ROM, cache memory, hard disks, optical disks

7.Computer Organisation and Architecture   **(4 Lectures)**
 C.P.U., registers, system bus, Inside a computer, SMPS, Motherboard, Ports and Interfaces, expansion cards, ribbon cables, memory chips.

Text Books
1. Mano, M. Morris. Computer system architecture. Prentice-Hall, Inc., 1993.
2. A. Goel, Computer Fundamentals, Pearson Education, 2010.

Reference Books
1. P. Aksoy, L. DeNardis, Introduction to Information Technology, Cengage Learning,

2006
2. P. K.Sinha, P. Sinha, Fundamentals of Computers, BPB Publishers, 2007

CMADSC101P: Computer Fundamentals Practical   **Practical:45 Lectures**

MS-DOS

1. Explain and execute the following DOS Commands

   DIR, MD ,CD, RD ,COPY, MOV ,DEL, COPYCON ,PATH, DATE ,TYPE, REN, TREE, LABEL ,VOL

Exercise 1

1. Create two new subdirectories labeled: PUBLIC and PRIVATE in the C:\Work directory. Create two subdirectories labeled PROGRAMS and DATAS in the PUBLIC directory . Create a subdirectory labeled DOCUMENT in the PRIVATE directory.
2. In the DOCUMENT directory create a text file named mylive.txt, and write your firstname, lastname, birth date in this file.
3. Copy the file mylive.txt to the DATA directory.
4. Rename the file from mylive.txt to your lastname, for example: kowalski.txt.

Exercise 2

1. From the level of the C:\Work directory create a directory labeled LAB, and then create two subdirectories labeled: LAB2A and LAB3A in the LAB directory.
2. In the LAB3A directory create a subdirectory labeled LAB4.
3. In the LAB2A directory create files: file1.txt and write your firstname and lastname in this file, file2.txt and write the number of your index in it.
4. Place a data from the files: file1.txt and file2.txt into mydata.txt file.
5. Display the contents of the file mydata.txt.
6. Copy the file mydata.txt to the LAB3 directory renaming it to filescal.txt.
7. Rename the file from mydata.txt to mydata.lst.
8. Create a directory: C:\WORK\LABOR.
9. Remove the structure from the LAB directory to the LABOR directory.
10. Place the information about the structure of the C:\WORK directory in the file inflab.txt, and the information about the attributs of this structure in the file infolab2.txt.
11. Delete the tree of the C:\WORK\LAB directory.

Exercise 3

1. Copy FILE1.TXT and make a file2.txt, file3.dat, file4.xyz, file5.txt. Pay attention to the names and extensions of the files.
2. List out the directory and see ALL the newly created files.
3. Now you just want to see a list of the files that have TXT as their extension.

4. Make a copy of file4.xyz and call it first.dat
5. Create a subdirectory under the directory you're currently in. Call this new directory TESTDIR
6. Copy all the files with an extension of DAT to the new subdirectory.
7. Change directories to the newly created directory and list all the files in there.
8. Delete file3.dat.
9. Go back up to the parent directory of the current directory you are in.
10. List all the file with an extension of DAT in the current directory and the one you just created. Use only one command to do so.
11. Change the name of file1.txt to file6.txt.
12. Delete the directory you created (TESTDIR). Are you able to do this ? Why or Why not ?
13. Change directories to the TESTDIR directory. Delete the remaining file.   Change directories up to the parent directory (up one level) and now delete the directory.
14. List all the files that start with FI and have an extension of TXT.
15. List all the files that start with the word FILE, then a single digit an extension of TXT.

Text Editor (In Open source software like open office)

1.   Prepare **a material list** having four columns (Serial number, The name of the   product, quantity and price) for the month of JUNE, 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 school.
- 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.   Pearson 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 birthday party 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

8. 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

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.

9.   Wrapping of text around the image.

10.   Create your CV by incorporating most of the options learned till now.

11.   Following features of menu option must be covered

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

Spreadsheet

Exercise 1
Objectives:

- Introduction to MS Excel files, Workbooks, Worksheets, Columns and Rows.
- Formatting Worksheets.
- AutoFill, Numeric formats, previewing worksheets.

	A	B	C	D	E	F	G
1	Payroll						
2	Date:	1/1/2011					
3	EMPL Number	EMPL Name	Hourly Rate	Hours Worked	Gross Pay	S.S Tax	Net Pay
4	E00001	Ford	7.5	35	?	?	?
5	E00002	Mino	8	30	?	?	?
6	?	Bell	6.5	25	?	?	?
7	?	Davis	9	40	?	?	?
8	?	Turro	10	39	?	?	?

- Open a new workbook and save the file with the name "Payroll".
- Enter the labels and values in the exact cells locations as desired.
- Use AutoFill to put the Employee Numbers into cells A6:A8.
- Set the columns width and rows height appropriately.
- Set labels alignment appropriately.
- Use warp text and merge cells as desired.
- Apply borders, gridlines and shading to the table as desired.
- Format cell B2 to Short Date format.
- Format cells E4:G8 to include dollar sign with two decimal places.
- Calculate the Gross Pay for employee; enter a formula in cell E4 to multiply Hourly Rate by

Hours Worked.

- ○ Calculate the Social Security Tax (S.S Tax), which is 6% of the Gross Pay; enter a formula in cell F4 to multiply Gross Pay by 6%.
- ○ Calculate the Net Pay; enter a formula in cell G4 to subtract Social Security Tax from Gross Pay.
- ○ Set the worksheet vertically and horizontally on the page.
- ○ Save your work.

Exercise 2

Objectives:
- Using Formulas.
- Header and Footers.

	A	B	C	D	E
1			London Team Call Statistics		
2					
3	Name	No. calls	Hours worked	Calls per Hour	Bonus
4	Adam	42	5	?	?
5	Jhon	6	4		
6	Jamse	39	6		
7	Alex	15	6		
8	Emma	2	7		
9					
10	TOTAL	?	?	?	?
11					
12	Bonus Rate	25%			

1. Open a new workbook and save the file with the name "Call Statistics".
2. Delete Sheet 2 & 3, and rename Sheet 1 to (Call Statistics).
3. Enter the labels and values in the exact cells locations as desired.
4. Set the row height of rows 1 & 3 to size 30; and rows 4 until 10 to size 20.
5. Set labels alignment appropriately.
6. Use Warp Text, Orientation and merge cells as desired.
7. Apply border, gridlines and shading to the table as desired.
8. Format column E to include euro (€) sign with two decimal places.
9. Format cell B12 to include % sign with 0 Decimal places.
10. Calculate the Calls per Hour, enter a formula in cell D4 to divide numbers of calls by Hours worked. Using AutoFill, copy the formula to the remaining cells.
11. Calculate the Bonus. Enter a formula in cell E4 to multiply 'Calls per Hours' by the fixed Bonus Rate in cell B12. Using AutoFill, copy the formula to the remaining cells.
12. Calculate the 'TOTAL'.
13. Set the worksheet vertically and horizontally on the page.
14. Create a header that includes your name in the left section, and your ID number in the right section. Create a footer that includes the current Date in the center.

Exercise 3

Objectives:

- Number, Commas and Decimal numeric formats.
- Working with Formulas (Maximum, Minimum, Average, Count and Sum).
- Percentage Numeric Formats.

	A	B	C	D	E	F
1			Panda EST			
2			Monthly Sales Report - July			
3						
4	Emp. No.	Name	Salary	Sales Amount	Comission	Total Salary
5	S101	Ahmed	1600	2500	?	?
6	S105	Hassan	1800	3000		
7	S112	Ali	1500	2200		
8	S107	Waleed	2000	4500		
9	S110	Mohammed	1700	3500		
10	S103	Samir	1600	2500		
11						
12		Totals	?	?	?	?
13		Average	?	?	?	?
14		Highest	?	?	?	?
15		Lowest	?	?	?	?
16		Count	?			

1. Create the worksheet shown above.
2. Set the **column widths** as follows: Column A: 8, Column B: 14, Columns C & D: 15, Columns E & F: 14.
3. Enter the formula to find COMMISSION for the first employee. The commission rate is 2% of sales, **COMMISSION = SALES * 2%** Copy the formula to the remaining employees.
4. Enter the formula to find TOTAL SALARY for the first employee where:
   TOTAL SALARY = SALARY + COMMISSION
   Copy the formula to the remaining employees.
5. Enter formula to find **TOTALS**, **AVERAGE**, **HIGHEST**, **LOWEST**, and **COUNT** values. Copy the formula to each column.
6. Format numeric data to include **commas** and **two decimal places**.
7. Align all column title labels horizontally and vertically **at the center**.
8. Create a **Header** that includes your name in the left section, page number in the center section, and your ID number in the right section.
9. Create **footer** with DATE in the left section and TIME in the right section.
10. Save the file with name Exercise 3.

Exercise 4

Objectives:

Working with the IF Statement.

ITEM NO.	NO. OF ITEMS	ITEM PRICE	TAX	TOTAL PRICE BEFORE TAX	TOTAL PRICE AFTER TAX	RATE
100	115	30				
101	256	12				
	49	56				
	23	150				
	840	5				
	200	56				
	294	300				
	4	90				
Count of items	?					
Average of tax	?					
Min ITEM PRICE	?					
Max ITEM PRICE	?					

For the above table find the following:

1. TAX (If ITEM PRICE is less than 100, TAX is 50, otherwise it should be 100).

2. TOTAL PRICE BEFORE TAX =NO. OF ITEMS * ITEM PRICE.

3. TOTAL PRICE AFTER TAX = TOTAL PRICE BEFORE TAX + TAX.

4. RATE (If TOTAL PRICE AFTER TAX > 3500 then the rate is "HIGH", otherwise it is REASONABLE.

5. Find Count of Items, Average of Taxes, Min Item PRICE and Max Item PRICE.

6. Save file as Exercise 4.

Objectives:

- Working with SumIF and CountIF statements.
- Inserting Charts.

	A	B	C	D	E	F	G
1		Sales and Profit Report - First Quarter 2012					
2	No	City	Jan	Feb	Mar	Average	Maximum
3	C001	New York	$22,000.00	$29,000.00	$19,000.00	?	?
4	C002	Los Angeles	$42,000.00	$39,000.00	$43,000.00	?	?
5	?	London	$18,000.00	$20,000.00	$22,000.00	?	?
6	?	Paris	$35,000.00	$26,000.00	$31,000.00	?	?
7	?	Munich	$12,000.00	$15,000.00	$13,000.00	?	?
8		Total Sales	?	?	?		
9		Cost	$83,000.00	$84,000.00	$43,000.00		
10		Profit	?	?	?		
11		10% Bonus	?	?	?		
12							
13		Total Sales greater than 30,000	?	?	?		
14		No Sales greater than 30,000	?	?	?		

1. Create the worksheet shown above.
2. Set the Text alignment, Columns width and high appropriately.
3. Use AutoFill to put the Series Numbers into cells A5:A7.
4. Format cells C3:G7, C8:E11, C13:E13 to include dollar sign with two decimal places.
5. Find the Average Sales and Maximum Sales for each City.
6. Find the Total Sales for each Month.
7. Calculate the Profit for each month , where profit = Total Sales – Cost
8. Calculate the 10% Bonus, which is 10% of the Profit.
9. Find the Total Sales for each Month; only for sales greater than 30,000.
10. Find the No of Sales for each Month; only for sales greater than 30,000.
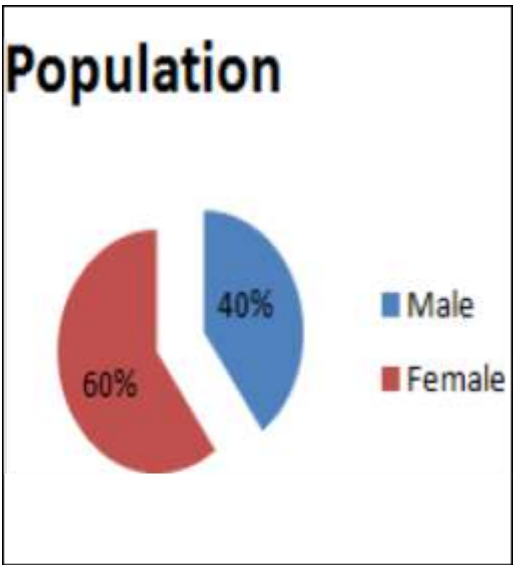11. Create the following Charts:
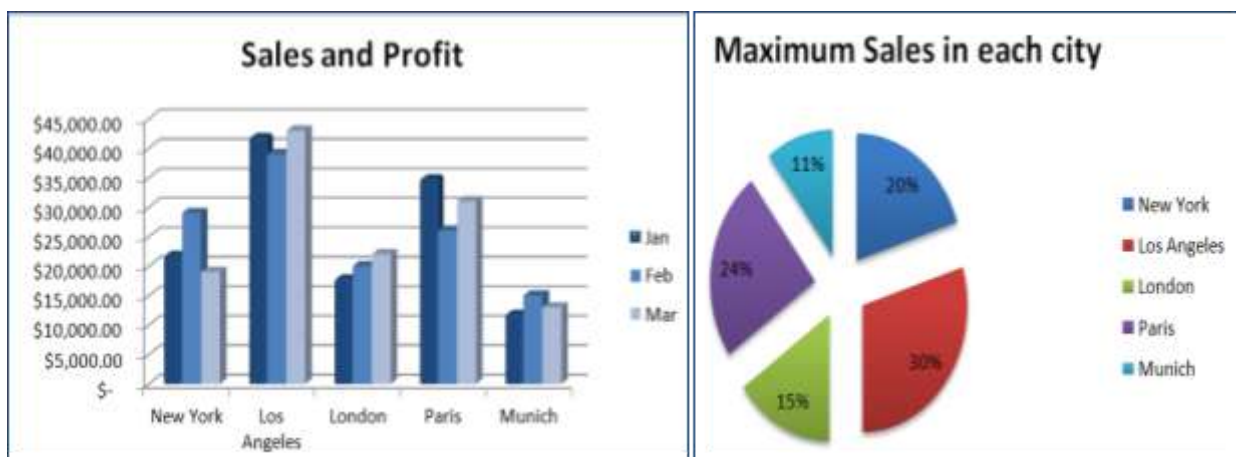
Exercise 6

Objectives:

- Working with Sum IF and Count IF statements.
- Inserting Charts.

	A	B	C	D	E	F
1			USA Annual Purchases Report 2011			
2	Customer ID	Gender	City	Education	Annual Purchases	Annual Salary
3	C11	M	New York	University	$6,233	$7,500
4	C12	M	New York	High School	$4,233	$4,999
5		F	Seattle	University	$6,560	$6,750
6		M	Chicago	University	$5,001	$12,000
7		F	New York	University	$7,034	$17,500
8		F	Chicago	University	$5,345	$13,150
9		F	Seattle	High School	$790	$3,799
10		F	Seattle	None	$240	$2,150
11		M	Seattle	University	$4,300	$22,450
12		f	New York	None	$232	$2,500
13						
14						
15	City	Total Annual Purchases		Annual Salary	Gender	
16	New York	?		City	Male	Female
17	Chicago	?		New York	?	?
18	Seattle	?		Chicago	?	?
19				Seattle	?	?
20	Education	Average Annual Purchases				
21	University	?				
22	High School	?				
23	None	?				
24						
25	Gender	Population				
26	Male	?				
27	Female	?				

1. Open a new workbook and create the above worksheet.
2. Make sure that your worksheet looks like the picture (Alignment, Shedding, Borders, Wrap text, Orientation …).
3. Find the entire customer IDs.
4. Format Column E & D to Currency with dollar sign and two decimal places.
5. Find the Total Annual Purchases for each City
6. Find the Average Annual Purchases for each Education.
7. Find the total number of customers from each gender.
8. Find the total annual salary for each gender in each city.

9. Create the following Chart:

Annual Phurchases

	New York	Chicago	Seattle
Male	$5,155.67	$5,001.00	$4,300.00
Female	$7,034.00	$5,345.00	$2,530.00

Population

- Male 40%
- Female 60%

Total Annual Purchases

- Seattle $11,890.00
- Chicago $10,346.00
- New York $17,732.00

Anual Purchases Vs. Annual Salary

Annual Purchases   Annual Salary

C11 C12 C13 C14 C15 C16 C17 C18 C19 C20

Exercise 7

The following worksheet contains Roll.Nos. & Marks in 5 subject of a student. Calculate his grades as per the following :

Marks	Grades
0-40	4
40-50	3
50-60	2
60 & above	1

	A	B	C	D	E	F
1	Roll No.	ENG	HINDI	SCIENCE	MATHS	SO. SCI
2	110	45	56	67	**78**	**60**
3	GRADE					
4						
5						
6						
7						
8						
9						
10						
11						

Exercise 8

The following worksheet contains Names & Sale for 10 salesmen. Calculate their bonus as per the following :

Sale	Bonus
0-30000	0
30000-40000	3000
40000-50000	4000
50000-60000	5000
60000-70000	6000
70000-80000	7000
80000 & above	8000

	A	B	C
1	NAME	SALE	BONUS
2	Deep	30000	
3	Jayesh	40000	
4	Yash	45000	
5	Sara	48000	
6	Gita	55000	
7	Jinal	32000	
8	Kavita	66000	
9	Minal	23000	
10	Naresh	43000	
11	Rima	37000	

Exercise 9

The following worksheet contains Customer No. , Number of units consumed for 10 customers.

Calculate their bill amount as per the following :

Number of units	Rate
< 200	Rs. 3
>=200, < 500	Rs. 6
>= 500	Rs. 10

	A	B	C	D
1	Cust. No.	No. of Units	Rate	Bill Amount
2	1101	340		
3	1102	180		
4	1103	400		
5	1104	600		
6	1105	350		
7	1106	470		
8	1107	890		
9	1108	200		
10	1109	500		
11	1110	360		

Exercise 10

A worksheet contains Roll Number , Marks in 2 subjects for 50 students in a class.
Calculate Result and Grade using the following:

A student is declared as PASS if he gets 40 or more in both the subjects , Otherwise FAIL.
All FAILED students will be given Grade IV

For PASSED students Grade will be obtained as follows :

AVERAGE	GRADE
>=60	I
<60 but >=50	II

<50 but >=40   III

	A	B	C	D	E	F
1	ROLL	SUB1	SUB2	AVERAGE	RESULT	GRADE
:						

Exercise 11

The following worksheet contains Name & Sales of 10 salesmen .Calculate commission as per the following:

Sales	Commission
First 30,000	5%
Next 40,000	10%
Excess	15%

	A	B	C
1	NAME	SALE	COMMISSION
2			
:			
:			
11			

Exercise 12

The following worksheet contains Name & Taxable Income for 50 employees .Calculate Income Tax Surcharge and Total Tax for the following worksheet

	A	B	C	D	E
1	NAME	TAXABLE INCOME	INCOME TAX	SURCHARGE	TOTAL TAX
2					
:					
:					
50					

Income Tax is calculated as follows :

Taxable Income
Income tax First

1,50,000	Nil
Next 1,00,000	10%
Next 75,000	20%
Excess	30%

Surcharge is 3% on Income Tax if Taxable income is above 5,00,000

Exercise 13

A worksheet contains following data :

	A	B	C	D	E
	A	**B**	**C**	**D**	**E**
1	NAME	GENDER	CLASS	CATEGORY	FEES
2	Deep	M	FY	Open	**3000**
3	Jayesh	M	SY	Reserved	**1000**
4	Yash	M	TY	Reserved	**1000**
5	Sara	F	FY	Reserved	**500**
6	Gita	F	FY	Open	**3000**
7	Jinal	F	TY	Open	**5000**

8	Kavita	F	SY	Open	4000
9	Minal	F	SY	Reserved	1000
10	Karan	M	TY	Reserved	1000
11	Abhay	M	TY	Open	5000
12	Bina	F	FY	Open	3000
13	Seema	F	FY	Reserved	500
14	Naresh	M	FY	Reserved	500
15	Rima	F	TY	Open	5000
16	Gajendra	M	SY	Open	4000

Filter the worksheet to show

a) Female students from Reserved category
b) Male students from TY
c) Open category students paying fees > 3000

Exercise 14

A worksheet contains name and marks in 3 subjects . Calculate Total Marks

	A	B	C	D	E
1	NAME	SUB 1	SUB 2	SUB 3	TOTAL MARKS
2	Deep	30	34	44	
3	Jayesh	40	35	45	
4	Yash	45	36	47	
5	Sara	48	32	50	
6	Gita	35	32	43	
7	Jinal	32	31	37	
8	Kavita	36	28	38	
9	Minal	23	25	40	

| 10 | Naresh | 43 | 27 | 50 | |
| 11 | Rima | 37 | 44 | 46 | |

d) Construct 3D Pie Chart for Total marks
e) Construct 2D Line Chart for Subject 1 and Subject 3
f) Construct 2D Column Chart for Sub1,Sub2,Sub3
g) Construct Stacked Column Chart for Sub1,Sub2,Sub3

CMADSC202T: Programming with C   **Theory: 45 Lectures**

1.Overview of Programming elements   **(6 Lectures)**
History, Basic Structure, Algorithms, Structured programming and Object Oriented Programming Concept, Character sets, C Token, Keywords, Constants, Variables, Data Types, Declaration of storage classes.

2.Operators, expressions and Preprocessor   **(8 Lectures)**
Arithmetic, Relational, Logical and Assignment; Increment and Decrement and Conditional, Bitwise, Special operator, Operator Precedence and Associativity; Arithmetic Expressions,Evaluation of expression, type casting. Comments, Input and output operations. Understanding the Preprocessor Directives (#include, #define, #error, #if, #else, #elif, #endif, #ifdef, #ifndef and #undef), Macros

3.Decision & Loop Control Structure   **(8 Lectures)**
If-else statements, Nested if-else, switch, Conditional operator. While, do-While, for loop, break statements, continue statements, goto statements.

4.Functions and Arrays   **(8 Lectures)**
Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Command Line Arguments/Parameters in Functions, Functions with variable number of Arguments. Creating and Using One Dimensional Arrays (Declaring and Defining an Array, Initializing an Array, Accessing individual elements in an Array, Manipulating array elements using loops), Use Various types of arrays (integer, float and character arrays / Strings) Two-dimensional Arrays (Declaring, Defining and Initializing Two Dimensional Array, Working with Rows and Columns), Introduction to Multi-dimensional arrays

5.User defined data types and memory Allocation   **(7 Lectures)**
Enumerated data types, Structures. Structure arrays, Pointers to Functions and Structures, Unions. Differentiating between static and dynamic memory allocation, use of malloc, calloc and free functions, use of new and delete operators, storage of variables in static and dynamic memory allocation.

6.Pointers and File Access   **(8 Lectures)**
Definition and initialization, Pointer arithmetic, Pointers and arrays, String functions and manipulation, Dynamic storage allocation,Opening and closing a file, Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files.

Text Books

1. Let Us C, Kanetkar, BPB Publication.
2. Programming in ANSI C, Balaguruswamy, McGraw Hill.
3. The C Programming Language, Kernighan and Dennis Ritchie, PHI.

Reference Books

1. Programming with C, Byron S. Gottfried, McGraw Hill.
2. The Complete reference C, Herbert Schildt, McGraw Hill.
3. Programming Languages, Allen B. Tucker, Tata McGraw Hill.

CMADSC202P: Programming Fundamentals using C   **Practical : 60 Lectures**

1. WAP to print the sum and product of digits of an integer.
2. WAP to reverse a number.WAP to compute the sum of the first n terms of the following series S = 1+1/2+1/3+1/4+……
3. WAP to compute the sum of the first n terms of the following series S =1-2+3-4+5…………….
4. 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.
5. Write a function to find whether a given no. is prime or not. Use the same to generate the prime numbers less than 100.
6. WAP to compute the factors of a given number.
7. WAP to print a triangle of stars as follows (take number of lines from user):

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

8. Print the even-valued elements of an array
9. Print the odd-valued elements of an array
10. Calculate and print the sum and average of the elements of array
11. Print the maximum and minimum element of array
12. Remove the duplicates from the array
13. Print the array in reverse order
14. 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.
15. WAP that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.
16. Write a program that swaps two numbers using pointers.
17. Write a program in which a function is passed address of two variables and then alter its contents.
18. 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.
19. Write a menu driven program to perform following operations on strings:
20. Show address of each character in string
21. Concatenate two strings without using strcat function.
22. Concatenate two strings using strcat function.
23. Compare two strings
24. Calculate length of the string (use pointers)

25. Convert all lowercase characters to uppercase
26. Convert all uppercase characters to lowercase
27. Calculate number of vowels
28. Reverse the string
29. Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered array.
30. WAP to display Fibonacci series (i)using recursion, (ii) using iteration
31. WAP to calculate Factorial of a number (i)using recursion, (ii) using iteration
32. WAP to calculate GCD of two numbers (i) with recursion (ii) without recursion.
33. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
34. Write a program to retrieve the student information from file created in previous question and print it in following format:
    Roll No. Name   Marks
35. Copy the contents of one text file to another file, after removing all white spaces.
36. 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.

CMADSC303T: Data Structures using C++   Theory:45 Lectures

1. Introduction   (5 Lectures)
Data Object, Abstract Data Type, Data Structures and Data Types. Types of Data Structures – Linear and non-linear Data Structures. Single and Multi-dimensional Arrays, Address Calculations, Sparse Matrices (Array Representation).

2. Linked Lists   (7 Lectures)
Singly, Doubly and Circular Lists (Array and Linked representation); Operations on Lists. Sparse Matrices (Linked Representation).

3. Stacks and Queues   (9 Lectures)
Implementing single / multiple stack/s in an Array; Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another; Applications of stack; Limitations of Array representation of stack. Array and Linked representation of Queue, De-queue, Priority Queues

4. Recursion   (5 lectures)
Developing Recursive Definition of Simple Problems and their implementation; Advantages and Limitations of Recursion; Understanding what goes behind Recursion (Internal Stack Implementation)

5. Binary Trees   (10 Lectures)
Introduction; Properties, Binary Trees Traversals (Recursive and Non-Recursive), Binary Search Trees (Insertion, Deletion), Recursive and Iterative Traversals in Binary Search Trees; Threaded Binary Trees (Concept only); Height-Balanced Trees (Concept only).

6. Searching, Sorting and Hashing   (9 Lectures)
Linear Search, Binary Search, Comparison of Linear and Binary Search, Selection Sort, Insertion Sort, Bubble Sort, Comparison of Sorting Techniques. Introduction to Hashing, Resolving collusion by Open Addressing, Coalesced Hashing, Separate Chaining and simple examples.

Text 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. Robert Lafore, "Data Structures and Algorithms in Java, 2/E", Pearson/ Macmillan Computer

Pub,2003

4.Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using C and C:, Second edition, PHI, 2009.

Reference Books:

1. Robert L. Kruse, "Data Structures and Program Design in C", Pearson,1999.
2. D.S Malik, Data Structure using C,Second edition, Cengage Learning, 2010.
3. Mark Allen Weiss, "Data Structures and Algorithms Analysis in Java", Pearson Education, 3rd edition, 2011
4. Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using Java, 2003.

CMADSC303P: Data Structures using C++   **Practical: 60 Lectures**

1. Write a program to search an element from a list. Give user the option to perform Linear or Binary search.
2. WAP 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 for insertion, deletion and search of a number, reverse the list
4. and concatenate two linked lists (include a function and also overload operator +).
5. Implement Doubly Linked List for insertion, deletion and search of a number, reverse the list.
6. Implement Circular Linked List for insertion, deletion and search of a number, reverse the list.
7. Perform Stack operations using Linked List.
8. Perform Stack operations using Array.
9. Perform Queues operations using Circular Array.
10. Create and perform different operations on Double-ended Queues.
11. WAP to calculate factorial and to compute the factors of a given no. (i)using recursion,
12. (ii) using iteration
13. (ii) WAP to display Fibonacci series (i)using recursion, (ii) using iteration
14. WAP to calculate GCD of 2 number (i) with recursion (ii) without recursion
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.

CMADSC404T: Object Oriented Programing using Java   **Theory: 45 Lectures**

1.Introduction to Java   **(5 Lectures)**
Java Architecture and Features, Understanding the semantic and syntax differences between C and Java, Compiling and Executing a Java Program, Variables, Constants, Keywords Data Types, Operators (Arithmetic, Logical and Bitwise) and Expressions, Comments, Doing Basic Program Output, Decision Making Constructs (conditional statements and loops) and Nesting, Java Methods (Defining, Scope, Passing and Returning Arguments, Type Conversion and Type and Checking, Built-in Java Class Methods),

2. Arrays, Strings and I/O   **(8 Lectures)**
Creating & Using Arrays (One Dimension and Multi-dimensional), Referencing Arrays Dynamically, Java Strings: The Java String class, Creating & Using String Objects,
Manipulating Strings, String Immutability & Equality, Passing Strings To & From Methods, String Buffer Classes. Simple I/O using System.out and the Scanner class, Byte and Character streams,

Reading/Writing from console and files.

3. Object-Oriented Programming Overview (4 Lectures)

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

4.Inheritance, Interfaces, Packages, Enumerations, Autoboxing and Metadata (16 lectures)

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

5.Exception Handling, Threading, (12 Lectures)

Exception types, uncaught exceptions, throw, built-in exceptions, Creating your own exceptions; Multi-threading: Thread class and Runnable interface, creating single and multiple threads, Thread prioritization, synchronization and communication, suspending/resuming threads.

Text Books:

1. Herbert Schildt, "Java The Complete Reference"
2. E. Balaguruswamy, "Programming with Java", 4th Edition, McGraw Hill.2009.
3. Ken Arnold, James Gosling, David Homes, "The Java Programming Language", 4th Edition, 2005.
4. James Gosling, Bill Joy, Guy L Steele Jr, GiladBracha, Alex Buckley"The Java Language Specification,
5. Java SE 8 Edition (Java Series)", Published by Addison Wesley, 2014.

Reference Book

1. Joshua Bloch, "Effective Java" 2nd Edition,Publisher: Addison-Wesley, 2008.
2. Cay S. Horstmann, GaryCornell, "Core Java 2 Volume 1 ,9th Edition,Printice Hall.2012
3. "Head First Java", Orielly Media Inc. 2nd Edition, 2005.
4. David J. Eck, "Introduction to Programming Using Java", Published by CreateSpace Independent Publishing Platform, 2009.
5. John R. Hubbard, "Programming with JAVA", Schaum's Series, 2nd Edition, 2004.

CMADSC404P:Object Oriented Programing using Java Practical: 60 Lectures

1. To find the sum of any number of integers entered as command line arguments
2. To find the factorial of a given number
3. To learn use of single dimensional array by defining the array dynamically.
4. To learn use of .lenth in case of a two dimensional array
5. To convert a decimal to binary number
6. To check if a number is prime or not, by taking the number as input from the keyboard
7. To find the sum of any number of integers interactively, i.e., entering every number from the keyboard, whereas the total number of integers is given as a command line argument
8. Write a program that show working of different functions of String and StringBufferclasss like setCharAt(, setLength(), append(), insert(), concat()and equals().
9. Write a program to create a ―distance class with methods where distance is computed in terms of feet and inches, how to create objects of a class and to see the use of this pointer
10. Modify the ―distance class by creating constructor for assigning values (feet and inches) to the distance object. Create another object and assign second object as reference variable to another

object. Further create a third object which is a clone of the first object.
11. Write a program to show that during function overloading, if no matching argument is found, then java will apply automatic type conversions(from lower to higher data type)
12. Write a program to show the difference between public and private access specifiers. The program should also show that primitive data types are passed by value and objects are passed by reference and to learn use of final keyword
13. Write a program to show the use of static functions and to pass variable length arguments in a function.
14. Write a program to demonstrate the concept of boxing and unboxing.
15. Create a multi-file program where in one file a string message is taken as input from the user and the function to display the message on the screen is given in another file (make use of Scanner package in this program).
16. Write a program to create a multilevel package and also creates a reusable class to generate Fibonacci series, where the function to generate fibonacii series is given in a different file belonging to the same package.
17. Write a program that creates illustrates different levels of protection in classes/subclasses belonging to same package or different packages
18. Write a program ―DivideByZero□ that takes two numbers a and b as input, computes a/b, and invokes Arithmetic Exception to generate a message when the denominator is zero.
19. Write a program to show the use of nested try statements that emphasizes the sequence of checking for catch handler statements.
20. Write a program to create your own exception types to handle situation specific to your application (Hint: Define a subclass of Exception which itself is a subclass of Throwable).
21. Write a program to demonstrate priorities among multiple threads.
22. Write a program to demonstrate multi thread communication by implementing synchronization among threads (Hint: you can implement a simple producer and consumer problem).

CMADSC405T: Operating Systems   **Theory: 45 Lectures**

1. Introduction   **(4 Lectures)**
Basic OS functions, resource abstraction, types of operating systems–multiprogramming systems, batch systems , time sharing systems, 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, threading issues, thread libraries; Process Scheduling, non-pre-emptive and pre-emptive scheduling algorithms; concurrent processes, critical section, semaphores, methods for inter-process communication; deadlocks.

4. Memory Management   **(10Lectures)**
Physical and virtual address space; memory allocation strategies -fixedand variable partitions, paging, segmentation, virtual memory

5. File, I/O and Disk Management   **(5 Lectures)**
Introduction to Directory structure, file access and allocation methods, Device Management, Disk Scheduling algorithms.

Text Books:
1. . 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.

Reference Book:
1. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education 1997.
2. W. Stallings, Operating Systems, Internals & Design Principles, 5th Edition, Prentice Hall of India. 2008.
3. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.

CMADSC405P: Operating Systems Lab   **Practical: 60 Lectures**

C Programs (Use an open source C compiler.)

1. Write 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 program to report behavior of Linux kernel including kernel version, CPU type and model. (CPU information)
3. WRITE A PROGRAM to report behavior 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 programto 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.

CMADSC406T: Computational Mathematics   **Theory: 60 Lectures**

1. Introduction: (20 Lectures)
Sets - finite and Infinite sets, Operations of Matrices(Addition, Subtraction, Multiplication and transpose), functions, relations, Mapping, counting - Pigeonhole Principle, Permutation and Combination; Mathematical Induction, Principle of Inclusion and Exclusion.

2. Growth of Functions: (4 Lectures)
Asymptotic Notations

3. Recurrences: (10 Lectures)
Recurrence Relations, solution using and characteristics equation   .

4. Graph Theory   (16 Lectures)
Basic Terminology, Models and Types, multigraphs and weighted graphs, Graph Representation, Graph Isomorphism, Connectivity, Euler and Hamiltonian Paths and Circuits, Planar Graphs (concepts only), Trees, Basic Terminology and properties of Trees, Introduction to Spanning Trees.

5. Propositional Logic   (10 Lectures)
Logical Connectives, Well-formed Formulas, Tautologies, Equivalences, Inference Theory

Text Books:

1. C.L. Liu , D.P. Mahopatra, Elements of Discrete mathematics, 2nd Edition , Tata McGraw Hill, 1985,
2. Kenneth Rosen, Discrete Mathematics and Its Applications, Sixth Edition ,McGraw Hill 2006
3. T.H. Coremen, C.E. Leiserson, R. L. Rivest, Introduction to algorithms, 3rd edition Prentice Hall on India, 2009

Reference Book

1. M. O. Albertson and J. P. Hutchinson, Discrete Mathematics with Algorithms , John wiley Publication, 1988
2. J. L. Hein, Discrete Structures, Logic, and Computability, 3rd Edition, Jones and Bartlett Publishers, 2009
3. D.J. Hunter, Essentials of Discrete Mathematics, Jones and Bartlett Publishers, 2008
4. 7. Graph Theoryby N. Deo, PHI

CMADSC407T: Computer System Architecture   **Theory: 60 Lectures**

1. Introduction to basic computer organization and design.   **(12 Lectures)**
            Registers, bus system, instruction set, timing and control, instruction cycle, memory reference,   input -output and interrupt, Interconnection Structures, Bus Interconnection design of basic   computer.

2. Data Representation and Basic Computer Arithmetic   **(6 Lectures)**
        Magnitude comparison, multiplication and division algorithms for integers(Booth's Algorithm)

3. Central Processing Unit   **(20 Lectures)**
    Register organization, arithmetic and logical micro-operations, stack organization, micro programmed control. Instruction formats, addressing modes, instruction codes, machine language,   assembly language, input output programming, RISC, CISC architectures.

4. Memory Organization   **(12 Lectures)**
Main Memory, Auxiliary Memory, Associative memory, Cache memory mapping techniques.

5. Input-Output Organization   **(10 Lectures)**
Input / Output: External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels

Text Books:

1. M. Mano, Computer System Architecture, Pearson Education, 1992
2. A. J. Dos Reis, Assembly Language and Computer Architecture using C and JAVA, Course Technology, 2004

Reference Book:

1. W. Stallings, Computer Organization and Architecture Designing for Performance, 8 Edition, Prentice Hall of India, 2009
2. Carl Hamacher, Computer Organization, Fifth edition, McGrawHill, 2012.

CMADSC508T: Analysis of Algorithms   **Theory: 45 Lectures**

1. Introduction & Analysis Technique   (8 Lectures)

Definition, Characteristics, Correctness of Algorithm, Recursive and Non-recursive algorithms. Space and Time Complexity, Efficiency of an algorithm, Growth of Functions, Polynomial

and Exponential Complexity, Asymptotic Notations: Big O Notation, Big Ω Notations, Big Θ Notations, Properties: Best case/worst case/average case analysis of well-known algorithms.

3. Searching and Sorting Techniques   (5 Lectures)

Elementary Searching (Linear and Binary) and sorting techniques–Bubble Sort, Insertion Sort, Selection Sort, Advanced Sorting techniques - Merge Sort, Heap Sort, Quick Sort, Sorting in Linear Time - Bucket Sort; Complexity Analysis.

4. Algorithm Design Techniques   (12 Lectures)

Concepts and simple case studies of Greedy algorithms. Divide and conquer: Basic concepts, Case study of selected searching and sorting problems as divide and conquer techniques, Dynamic programming: General issues in Dynamic Programming, Case study of Binomial Coefficient computation. Backtracking Algorithms, Case study of N-Queen problem.

5. Graph Representation and Algorithm: (15 Lectures)
Graph traversal algorithms: Breadth First Search, Depth First Search and its Applications, Minimal spanning trees: Prim's Algorithm, Kruskal's Algorithm, Shortest path algorithms: Floyd's Algorithm, Floyd-Warshall Algorithm, Dijkstra's Algorithm, Bellman-Ford algorithm, Graph Coloring Algorithms. Application of Tree, Decision Trees, Red-Black Trees.

6. Classification of Problems: (5 Lectures)

P, NP, Satisfiability, Cook's Theorem (Statement Only)

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

Reference Books
1. Fundamentals of Computer Algorithms, E.Horowitz and Sahani, Galgoti
2. Algorithm Design, Jon Kleiberg and Eva Tardos, Pearson Education
3. Data Structures and Algorithms - K.Mehlhorn , EATCS, Vol. I & Vol. 2

CMADSC508P: Analysis of Algorithms   **Practical: 60 Lectures**

Instruction: Use a JAVA compiler.

1. Implement Linear Search .
2. Implement Binary Search.
3. Implement Insertion Sort
4. Implement Bubble Sort
5. Implement Selection Sort
6. Implement Merge Sort
7. Implement Heap Sort.
8. Implement Quick sort
9. Implement the Minimal Spanning Tree of the given Graph:-
   i. Using Prim's Algorithm
   ii. Using Kruskal's Algorithm
10. Implement Breadth-First Search in a graph
11. Implement Depth-First Search in a graph.

CMADSC509T:Database Management Systems   **Theory:45 Lectures**

1. Introduction   **(4 Lectures)**

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

2. Entity Relationship(ER) Modeling   **(5 Lectures)**

Entity types, relationships, constraints.

3. Relation data model   **(15 Lectures)**

Relational model concepts, relational constraints, relational algebra, SQL queries.

4. Database design   **(12 Lectures)**

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

5. Transaction Processing   **(3 Lectures)**

ACID properties, concurrency control.

6. File Structure and Indexing   **(6 Lectures)**

Operations on files, File of Unordered and ordered records, overview of File organizations,
Indexing structures for files(Primary index, secondary index, clustering index), Multilevel
indexing using B and B+ trees.

Text Books:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.
2. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.
3. MySQL High Availability: Tools for Building Robust Data Centers,Charles Bell, Mats Kindahl, Lars Thalmann, "O'Reilly Media, Inc.", 2010

Reference Books:

1. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002.

CMADSC509P: Database Management Systems (UsingMySql)

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

EMPLOYEE Schema

Create and use the following database schema to answer the given querie

EMPLOYEE Schema

Field	Type	NULL	KEY
Eno	Char(3)	NO	PI
Ename	Varchar(50)	NO	
Job_type	Varchar(50)	NO	
Manager	Char(3)	Yes	FI
Hire_date	Date	NO	
Dno	Integer	YES	FI
Commission	Decimal(10,2)	YES	
Salary	Decimal(7,2)	NO	

DEPARTMENT Schema

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

Query List

1. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee with the Employee Number appearing first.
2. Query to display unique Jobs from the Employee Table.
3. Query to display the Employee Name concatenated by a Job separated by a comma. Multimedia Systems and Internet Technologies
4. Query to display all the data from the Employee Table. Separate each Column by a comma and name the said column as THE_OUTPUT.
5. Query to display the Employee Name and Salary of all the employees earning more than $2850.
6. Query to display Employee Name and Department Number for the Employee No= 7900.
7. Query to display Employee Name and Salary for all employees whose salary is not in the range of $1500 and $2850.
8. Query to display Employee Name and Department No. of all the employees in Dept 10 and Dept 30 in the alphabetical order by name.
9. Query to display Name and Hire Date of every Employee who was hired in 1981.
10. Query to display Name and Job of all employees who don't have a current Manager.
11. Query to display the Name, Salary and Commission for all the employees who earn commission.
12. Sort the data in descending order of Salary and Commission.
13. Query to display Name of all the employees where the third letter of their name is _A'.
14. .Query to display Name of all employees either have two _R's or have two _A's in their name and are either in Dept No= 30 or their Manger's Employee No = 7788.
15. Query to display Name, Salary and Commission for all employees whose Commission Amount is 14 greater than their Salary increased by 5%.
16. Query to display the Current Date.
17. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after six months of employment.
18. Query to display Name and calculate the number of months between today and the date each employee was hired.
19. Query to display the following for each employee <E-Name> earns < Salary> monthly but wants < 3 * Current Salary >. Label the Column as Dream Salary.
20. Query to display Name with the 1st letter capitalized and all other letter lower case and length of their name of all the employees whose name starts with _J', 'A' and _M'.
21. Query to display Name, Hire Date and Day of the week on which the employee started.
22. Query to display Name, Department Name and Department No for all the employees.
23. Query to display Unique Listing of all Jobs that are in Department # 30.
24. Query to display Name, Dept Name of all employees who have an _A' in their name.
25. Query to display Name, Job, Department No. And Department Name for all the employees working at the Dallas location.
26. Query to display Name and Employee no. Along with their Manger's Name and the Manager's employee no; along with the Employees' Name who do not have a Manager.
27. 2 Query to display Name, Dept No. And Salary of any employee whose department No. and salary matches both the department no. And the salary of any employee who earns a commission.
28. Query to display Name and Salaries represented by asterisks, where each asterisk (*) signifies $100.
29. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees
30. Query to display the number of employees performing the same Job type functions.
31. Query to display the no. of managers without listing their names.
32. Query to display the Department Name, Location Name, No. of Employees and the average salary for all employees in that department.
33. Query to display Name and Hire Date for all employees in the same dept. as Blake.
34. Query to display the Employee No. And Name for all employees who earn more than the average salary.

35. Query to display Employee Number and Name for all employees who work in a department with any employee whose name contains a _T'.
36. Query to display the names and salaries of all employees who report to King.
37. Query to display the department no, name and job for all employees in the Sales department.
38. Basics of Pl/SQL and there use in query management.

CMAADSC510T: Software Engineering   **Theory : 45 Lectures**

1. **Introduction**   **(06 Lectures)**

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).

2. Requirement Analysis   **(08 Lectures)**

Software Requirement Analysis, Initiating Requirement Engineering Process, Requirement Analysis and Modeling Techniques, Flow Oriented Modeling, Need for SRS, Characteristics and Components of SRS.

3. Software Project & Risk Management   **(12 Lectures)**

Estimation in Project Planning Process, Project Scheduling Software Risks, Risk Identification, Risk Projection and Risk Refinement, RMMM Plan.

4. Quality Management: **(06 Lectures)**

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

5. Design Engineering: **(07 Lectures)**

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

6. Testing Strategies & Tactics   **(06 Lectures)**

Software Testing Fundamentals, Strategic Approach to Software Testing, Test Strategies for Conventional Software, Validation Testing, System testing, Black-Box Testing, White-Box Testing and their type, Basis Path Testing.

Text Books:
1. R.S. Pressman, Software Engineering: A Practitioner' s Approach (7th Edition), McGraw-Hill, 2009.
2. P. Jalote, An Integrated Approach to Software Engineering (2nd Edition), Narosa P. Jalote, And Integrated Approach to Software Engineering (2nd Edition), Narosa Publishing House, 2003.
3. K.K. Aggarwal and Y. Singh, Software Engineering (2nd Edition), New Age International Publishers, 2008.

Reference Books:
1. Sommerville, Software Engineering (8th edition), Addison Wesley, 2006.
2. D. Bell, Software Engineering for Students (4th Edition), Addison-Wesley, 2005.
3. R. Mall, Fundamentals of Software Engineering (2nd Edition), Prentice-Hall of India,2004

CMADSC510P: Software Engineering   **Practical: 60 Lectures**
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
Projects (Mini Projects) will be assigned to group of students (maximum 3) under a Faculty
member. Student will prepare presentation and present it in the practical examination.

CMADSC511T: Networking   **Theory: 60 Lectures**

1. Introduction to Computer Networks   **(8 Lectures)**
Network definition; network topologies; network classifications; network protocol; layered network
architecture; overview of OSI reference model; overview of TCP/IP protocol suite.
2. Data Communication Fundamentals and Techniques   **(10 Lectures)**
Analog and digital signal; data-rate limits; digital to digital line encoding schemes; pulse code
modulation; parallel and serial transmission; digital to analog modulation-; multiplexing techniques-
FDM, TDM; transmission media.
3. Networks Switching Techniques and Access mechanisms   **(10 Lectures)**
Circuit switching; packet switching- connectionless datagram switching, connection-oriented virtual
circuit switching; dial-up modems; digital subscriber line; cable TV for data transfer.
4. Data Link Layer Functions and Multiple Access 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; Point to Point Protocol on Internet.
CSMA/CD protocols; Ethernet LANS;
5. Networks Layer and Transport Layer Functions and Protocols   **(16 Lectures)**
connecting LAN and back-bone networks- repeaters, hubs,
switches, bridges, router and gateways;Routing; routing algorithms; network layer protocol of
Internet- IP protocol, Internet control protocols.Transport services- error and flow control,
Connection establishment and release- three way handshake.
6. Overview of Application layer protocol   **(6 Lectures)**
Overview of DNS protocol; overview of WWW &HTTP protocol.

Text Books

     1. B. A. Forouzan: Data Communications and Networking, Fourth edition, THM, 2007.
     2. A.S. Tanenbaum: Computer Networks, Fourth edition, PHI, 2002
Reference Books:
     1. Dr. Rakesh Kumar Mandal: Computer Networks for Students, First Edition, SPD, 2018
     2. W. Stallings, "Data and Computer Communication (5th Edition) – PHI/ Pearson Education

3. Black, "Data & Computer Communication", PHI.
4. Harvey M. Deitel & Paul J. Deitel, "Internet & World Wide Web: How to program:, 4/e.
5. Shishir Gundavaram, "CGI Programming on the world wide web", O'Relly and Associates', 1996.

CMADSC612T: Graphics and Multimedia   **Theory: 45 Lectures**

1. Introduction   **(4 Lectures)**
Basic elements of Computer graphics, Applications of Computer Graphics.
2. Graphics Hardware   **(4 Lectures)**
Architecture of Raster and Random scan display devices, input/output devices.
3. Fundamental Techniques in Graphics   **(8 Lectures)**
Raster scan line, Line Drawing Algorithm(DDA and Bresenham's), 2D Geometric Transformations.
4.Introduction to Multimedia and its components   **(15 Lectures)**
Concepts and uses of multimedia, hypertext and hypermedia. Image, video and audio standards, digital audio, MIDI, processing sound, sampling, compression, Digitization of sound, Various MPEG video compression standards (like MPEG,...), compression through spatial and temporal redundancy, inter-frame and intra-frame compression.
5.Animation   **(8 Lectures)**
Types, techniques, key frame animation, utility, morphing. Virtual Reality concepts.Morphing and tweening
6.Introduction to Web technology   **(6 Lectures)**

Concept of Client Server Architecture, 3-tier Web Architecture, Hyper Text Transfer Protocol (HTTP), File Transfer Protocol (FTP), Web Pages, Domain Names, URL, Internet Protocol Address, Website, Web browser, Web Servers, Web Hosting, Cookies.WWW- basic concepts, web-client & web-server.

Text Books:

1. J.D.Foley, A.Van Dan, Feiner, Hughes Computer Graphics Principles & Practice, 2nd edition Publication Addison Wesley 1990.
2. D.Hearn, Baker: Computer Graphics, Prentice Hall of India 2008.

Reference Books:
1. D.F.Rogers Procedural Elements for Computer Graphics, McGraw Hill 1997.
2. D.F.Rogers, Adams Mathematical Elements for Computer Graphics, McGraw Hill, 2nd edition 1989.

CMADSC612P:Graphics and Multimedia   **Practical :60 Lectures**

Graphics:-
Program1: Write a program using c to implement dda line drawing algorithm.
Program2: Write a program using c to implement bresenham's line drawing algorithm.

Multimedia:-
Program 1 : Procedure to create an animation to represent the growing moon.
Program 2 : Procedure to create an animation to indicate a ball bouncing on steps.

Program 3 : Procedure to simulate movement of a cloud.

Program 4 : Procedure to draw the fan blades and to give proper animation.

Program 5 : Procedure to display the background given (filename: tulip.jpg) through your name.

Program 6 : Procedure to create an animation with the following features. welcome
*Letters should appear one by one
*The fill colour of the text should change to a different colour after the display of the full word.

Program 7 : Procedure to simulate a ball hitting another ball.

Program 8 : Procedure to create an animated cursor using startdrag("ss", true); mouse.hide();

Program 9 : Procedure to design a visiting card containing atleast one graphic and text information.

Program 10 : Procedure to take a photographic image. give a title for the image. put the border. write your names. write the name of institution and place.

Program 11 : Procedure to prepare a cover page for the book in your subject area. plan your own design.

Program 12 :Procedure to extract the flower only from given photographic image and organize it on a background.

Program 13 : Procedure to adjust the brightness and contrast of the picture so that it gives an elegant look.

Program 14 : Procedure to position the picture preferably on a plain background of a color of your choice - positioning includes rotation and scaling.

Program 15 : Procedure to remove the arrows and text from the given photographic image

Program 16 : Procedure to type a word and apply the effects shadow emboss

Program 17 : Procedure to use appropriate tool(s) from the toolbox, cut the objects from 3 files
(f1.jpg, f2.jpg & f3.jpg); organize them in a single file and apply feather effects.

Program 18 : Procedure to display the background given (filename: garden.jpg) through your name using mask.

Program 19 : Procedure to make anyone of one of the parrots black & white in a given picture.

Program 20 : Procedure to change a circle into a square using flash.

CMADSC613T: Artificial Intelligence   Theory: 45 Lectures

1. **Introduction   (06 Lectures)**
   Introduction to artificial intelligence, background and applications, Turing test and rational agent approaches to AI, agents & environment, nature of environment, structure of agents, goal-based agents, intelligent agent, learning agents.

2. **Problem Solving by Searching   (08 Lectures)**
    Problems, Defining the problem as state space search, production system, problem characteristics, issues in the design of search programs, solving problems by searching, problem solving agents. searching for solutions; Uniform search strategies: Breadth first search, Depth first search, Depth limited search.

3. **Heuristic Search Strategies   (06 Lectures)**
   Greedy best first search, A* algorithm. Memory bounded heuristic search: local search algorithms & optimization problems: Hill climbing and its variations, constraint satisfaction problem, Means-End analysis.

4. **Adversarial Search: (05 Lectures)**
   Introduction to game playing, optimal decisions and strategies in games, Min-Max and Alpha-Beta pruning algorithms.

5. **Knowledge Representation   (20 Lectures)**
   Introduction to First Order predicate logic, resolution principle, unification, semantic nets, conceptual dependencies, frames, and scripts, production rules, conceptual graphs. Programming in Logic (PROLOG)

Text Books

1. DAN.W. Patterson, Introduction to A.I and Expert Systems – PHI, 2007.

2. Russell &Norvig, Artificial Intelligence-A Modern Approach, LPE, Pearson Prentice Hall, 2nd edition, 2005.

Recommended Books:

1. Rich & Knight, Artificial Intelligence – Tata McGraw Hill, 2nd   edition, 1991.
2. W.F. Clocksin and Mellish, Programming in PROLOG, Narosa Publishing House, 3rd edition, 2001.
3. Ivan Bratko, Prolog Programming for Artificial Intelligence, Addison-Wesley, Pearson Education, 3rd edition, 2000.

CMSDSC613P: Artificial Intelligence Lab: **60 Lectures**
Instruction: Use an open source Prolog compiler.

1. Write a prolog program to calculate the sum of two numbers.
2. Write a prolog program to find the maximum of two numbers.
3. Write a prolog program to calculate the factorial of a given number.
4. Write a prolog program to calculate the nth Fibonacci number.
5. Write a prolog program, insert_nth(item, n, into_list, result) that asserts that result is the list into_list with item inserted as the n'th element into every list at all levels.
6. Write a Prolog program to remove the Nth item from a list.
7. Write a Prolog program, remove-nth(Before, After) that asserts the After list is the Before list with the removal of every n'th item from every list at all levels.
8. Write a Prolog program to implement append for two lists.
9. Write a Prolog program to implement palindrome (List).
10. Write a Prolog program to implement max(X,Y,Max) so that Max is the greater of two numbers X and Y.
11. Write a Prolog program to implement maxlist(List,Max) so that Max is the greatest number in the list of numbers List.
12. Write a Prolog program to implement sumlist(List,Sum) so that Sum is the sum of a given list of numbers List.
13. Write a Prolog program to implement two predicates evenlength(List) and oddlength(List) so that they are true if their argument is a list of even or odd length respectively.
14. Write a Prolog program to implement reverse(List,ReversedList) that reverses lists.
15. Write a Prolog program to implement maxlist(List,Max) so that Max is the greatest number in the list of numbers List using cut predicate.
16. Write a Prolog program to implement GCD of two number

CMADSC614T : Internet of Things   **Theory: 60 Lectures**

1.Introduction to Internet of Things (IoT)   **(15 Lectures)**
Defining IoT, Characteristics of IoT, Physical design of IoT, Functional blocks of IoT, Communication models & APIs, Difference between IoT and M2M, Software defined Network, network function virtualization (NFV), difference between SDN and NFV.

2. Network & Communication aspects (10 Lectures)

Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Edge connectivity and protocols, Fog/Gateway Devices for Data aggregation and dissemination, Security challenges.

3. IoT Physical Servers and Cloud Offerings (10 Lectures)

Introduction to Cloud Storage models and communication APIs Web Server – Web Server for IoT, Cloud for IoT, Python web application framework.

4. Developing IoTs (10 Lectures)

Introduction to Python, Introduction to different IoT tools, Developing applications through IoT tools, Developing sensor based application through embedded system platform, Implementing IoT concepts with python.

5. IoT Physical Devices and Endpoints (8 Lectures)

Introduction to Raspberry PI-Interfaces (serial, SPI,I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets.

6. IoT Analytics and Domain specific applications of IoT (7 Lectures)

Signal processing, real-time and local analytics, Databases, cloud analytics and applications, Home automation, Industry applications, Surveillance applications.
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Text Books:

1. Internet Of Things by Bahga, Madishetty, Orient Blackswan pvt Ltd.
2. IOT fundamentals, David, Pearson Education. 8. Internet Of Things by Tripathy and Anuradha, CRC Press.

Reference Books:

1. Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015 3. Editors Ovidiu Vermesan
2. Peter Friess,'Internet of Things – From Research and Innovation to Market Deployment', River Publishers, 2014
3. N. Ida, Sensors, Actuators and Their Interfaces, SciTech Publishers, 2014.

CMAADSC615T: Theory of Computation   Theory:60 Lectures

1. Languages (8 Lectures)

Alphabets, string, language, Basic Operations on language, Concatenation, Kleene Star

2. Finite Automata and Regular Languages (20 Lectures)

Deterministic (DFA) and Non-deterministic finite automata (NDFA), NFA to DFA Conversion, Regular languages and their relationship with finite automata. Regular Expressions and their relationship with finite automata. closure properties of regular languages.equivalence form of FA,RE and RG

3. **Classification of Grammar** : Chomsky classification   **(2 Lectures)**

4. **Context free languages**   **(15 Lectures)**
   Context free grammars, parse trees, ambiguities in grammars and languages, Pushdown automata
   (Deterministic and Non-deterministic), Acceptance, Relationship of it with CFG and
   conversions. Properties of context free languages (concept only) and Normal forms.

5. **Turing Machines and Models of Computations**   **(15 Lectures)**
   Turing Machine as a model of computation, Universal Turing Machine, Language acceptability,

Text Books:
   1.Daniel I.A.Cohen, Introduction to computer theory, John Wiley,1996
   2.Theory of Computer Science,K.L.P. Mishra,N.Chandrasekaran,PHI,2016
   3.Hopcroft, Aho, Ullman, Introduction to Automata theory, Language & Computation –
   Third
   Edition, Pearson Education. 2006

Reference Books:
   1. A Textbook on Automata Theory, P.K.Srimani,Nasir S.F.B , Foundation Books,2008
   2. P. Linz, An Introduction to Formal Language and Automata fourth edition Publication
       Jones Bartlett, 2006
   3. Lewis & Papadimitriou, Elements of the theory of computation, PHI 1997.

CMADSC716T: Image Processing   **Theory:45 lectures**
   1.Introduction   (4 Lectures)
   Light, Brightness adaptation and discrimination, Pixels, Coordinate conventions, Imaging
Geometry, Perspective Projection, Spatial Domain Filtering, Sampling and quantization.

   2. Spatial Domain Filtering: **(10 Lectures)**
Intensity transformations, contrast stretching, histogram equalization, Correlation and convolution,
Smoothing filters, Sharpening filters, Gradient and Laplacian.

   3. Filtering in the Frequency domain: **(10 Lectures)**
Hotelling Transform, Fourier Transforms and properties, FFT (Decimation in Frequency and
Decimation in Time Techniques), Convolution, Correlation, 2-D sampling, Discrete Cosine
Transform, Frequency domain filtering.

   4. Image Restoration: **(10 Lectures)**
Basic Framework, Interactive Restoration, Image deformation and geometric transformations, image
morphing, Restoration techniques, Noise characterization, Noise restoration filters, Adaptive filters,
Linear, Position invariant degradations, Estimation of Degradation functions, Restoration from
projections.

   5. Image Compression: **(7 Lectures)**
Encoder-Decoder model, Types of redundancies, Lossy and Lossless compression, Entropy of an
information source, Shannon's 1st Theorem, Huffman Coding, Arithmetic Coding, Run length
coding

6. Image Segmentation: **(6 Lectures)**
Boundary detection based techniques, Point, line detection, Edge detection, Edge linking, Local processing, Regional processing, Hough transform, Thresholding, Iterative thresholding.

Text Books:

1. R C Gonzalez , R E Woods, Digital Image Processing, 4th Edition, Pearson Education.2018.
2. M A Joshi, Digital Image Processing: an algorithmic approach, 2nd Edition, PHI,
Reference Books:
1. K R Castleman, Digital Image Processing, Pearson Education.1996
2. Schalkoff, Digital Image Processing and Computer Vision, John Wiley and Sons. 1989.

CMADSC716P: Image Processing **Practical: 60 Lectures**

Instruction: Use an open source Python compiler and OpenCV.

1. Write program to read and display digital image.
 a. Become familiar with Basic commands
 b. Read and display image in
 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 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. Obtain B/W image by 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 function b. Program without using standard functions
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 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

CMADSC717T: Data Science **Theory 45 Lectures**

1.**Introduction**
Data Scientist's Tool Box (10 Lectures)
Turning data into actionable knowledge, introduction to the tools that will be used in building data

analysis software: version control, markdown, git, GitHub, R, and Rstudio.

2. Basics of R Programming in respect to Data Science (15 Lectures)

Overview of R, R data types and objects, reading and writing data, Control structures, functions, scoping rules, dates and times, Loop functions, debugging tools, Simulation, code profiling.

3. Getting and Cleaning Data (15 Lectures)

Obtaining data from the web, from APIs, from databases and from colleagues in various formats, basics of data cleaning and making data ─tidy.

4. Exploratory Data Analysis (5 Lectures)

Essential exploratory techniques for summarizing data.

Text Books:

1. D. Cielen, Arno D. B. Meysman, M. Ali, Introducing Data Science, Dreamtech Press
2. Rachel Schutt, Cathy O'Neil, "Doing Data Science: Straight Talk from the Frontiline" by Schroff/O'Reilly, 2013.
3. Foster Provost, Tom Fawcett, "Data Science for Business" What You Need to Know About Data Mining and Data-Analytic Thinking" by O'Reilly, 2013.

Reference Books:

1. John W. Foreman, "Data Smart: Using data Science to Transform Information into Insight" by John Wiley & Sons, 2013.
2. Ian Ayres, "Super Crunchers: Why Thinking-by-Numbers Is the New Way to Be Smart" Ist Edition by Bantam, 2007.
3. Eric Seigel, "Predictive Analytics: The Power to Predict who Will Click, Buy, Lie, or Die", 1st Edition, by Wiley, 2013.
4. Matthew A. Russel, "Mining the Social Web: Data mining Facebook, Twitter, Linkedln, Goole+, GitHub, and More", Second Edition, by O'Reilly Media, 2013.
8. Michael J. Crawley, The R Book, Wiley

CMADSC717P: Introduction to Data Science **Practical: 60 Lectures**

Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:
1. Write a program that prints „Hello World„ to the screen.
2. Write a program that asks the user for a number n and prints the sum of the numbers 1 to n
3. Write a program that prints a multiplication table for numbers up to 12.
4. Write a function that returns the largest element in a list.
5. Write a function that computes the running total of a list.
6. Write a function that tests whether a string is a palindrome.
   Implement matrices addition , subtraction and Multiplication
7. Fifteen students were enrolled in a course. There ages were:
20 20 20 20 20 21 21 21 22 22 22 22 23 23 23
a. Find the median age of all students under 22 years
b. Find the median age of all students
c. Find the mean age of all students
d. Find the modal age for all students
e. Two more students enter the class. The age of both students is 23. What is now mean, mode and median?
8. Following table gives a frequency distribution of systolic blood pressure. Compute all the measures of dispersion.

Midpoint	95.5	105.5	115.5	125.5	135.5	145.5	155.5	165.5	175.5
Number	5	8	22	27	17	9	5	5	2

10. Obtain probability distribution of, where X is number of spots showing when a six-sided symmetric die (i.e. all six faces of the die are equally likely) is rolled. Simulate random samples of sizes 40, 70 and 100 respectively and verify the frequency interpretation of probability.

CMADSC818T : Big Data   Theory: 60   lectures

1. Understanding Big Data   (10 lectures)
What is big data ,why big data ,Data!, Data Storage and Analysis, Comparison with Other Systems, Rational Database Management System , Grid Computing, Volunteer Computing, convergence of key trends , unstructured data ,industry examples of big data ,web analytics ,big data and marketing , fraud and big data risk and big data ,credit risk management ,big data and algorithmic trading ,big data and healthcare ,big data in medicine , advertising and big data ,big data technologies , introduction to Hadoop ,open source technologies ,cloud and big data ,mobile business intelligence , Crowd sourcing analytics ,inter and trans firewall analytics.

2. NOSQL Data Management   (20 lectures)
Introduction to NoSQL , aggregate data models ,aggregates ,key-value and document data models,relationships , graph databases , schema less databases , materialized views ,distribution models , shading ,version ,map reduce , partitioning and combining ,composing map-reduce calculations.

3. Basics Of Hadoop   (18 lectures)
 Data format , analyzing data with Hadoop , scaling out ,Hadoop streaming ,Hadoop pipes ,design of Hadoop distributed file system (HDFS) ,HDFS concepts ,Java interface ,data flow , Hadoop I/O ,data integrity, compression ,serialization , Avro ,file,based data structures.

4. Mapreduce Application   (15 lectures)
MapReduce workflows , unit tests with MRUnit ,test data and local tests , anatomy of MapReduce job run , classic Map-reduce , YARN ,failures in classic Map-reduce and YARN ,job scheduling ,shuffle and sort, task execution, MapReduce types ,input formats, output formats

5. Hadoop Related Tools   (12 lectures)
 Hbase, data model and implementations ,Hbase clients, Hbase examples –praxis. Cassandra Cassandra data model ,Cassandra examples, Cassandra clients,Hadoop integration. Pig ,Grunt ,pig data model, Pig Latin , developing and testing Pig Latin scripts. Hive ,data types and file formats , HiveQL data definition , HiveQL data manipulation , HiveQL queries.

Text Books:

1. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
2. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.

Reference Books:
1. Vignesh Prajapati, Big data analytics with R and Hadoop, SPD 2013.
2. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
3. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.
4. Alan Gates, "Programming Pig", O'Reilley, 2011 Minor / Multidisc

CMADSC819T : Cyber Security and Cyber Law   Theory: 60 Lectures

1. Introduction to Cyber Security   (8 Lectures)

Cyber Security definition and Concepts, OSI Security Architecture, Security Objectives and Challenges,

Security Attacks- active and Passive attack, Security Services, Security Mechanisms, Fundamental Security Design Principles, Cyber Security model.

2. Cryptography and Digital signature (12 Lectures)

Classical Encryption Techniques-Symmetric Cipher Model, Substitution Techniques, Transposition Techniques and Steganography. Public-Key Cryptography and RSA algorithm, Digital Signatures Requirements, properties and mechanism.

3. Malicious Software (10 Lectures)

Introduction to Malicious Software (Malware), Types of Malware- Viruses, Worms, Spam E-mail, Trojans, Keyloggers, Phishing and Spyware. Propagation of Viruses, Worms and Trojans. Countermeasures, Denial of Service Attacks (DOS).

4. Firewalls and Intrusion Detection System (10 Lectures)

Intruders, Intrusion Detection, Password Management. Need for Firewalls, Firewall Characteristics and Access Policy, Types of Firewalls, Firewall Basing, Firewall Location and Configurations.

5. Legal and Ethical Aspects (10 Lectures)

Cybercrime and Computer Crime, Intellectual Property, Privacy and Ethical Issues

6. Introduction to Cyber Law (10 Lectures)

Objective, Emerging Trends, Cyberspace, Cyber Security awareness and its policies

Text Books:

1. Cryptography and Network Security-Principles and Practice, William Stallings, Pearson/Prentice Hall

2. Cryptogramphy and Network Security,Atul Kahate,Tata-McGraw-Hill, 2nd Edition,2008

Reference Books:

1. Introduction to Cyber Security Guide to the World of Cyber Security, Anand Shinde, Notion Press.
2. Introduction to Cryptography and Network Security, Behrouz A. Forouzan, McGraw Hill.

CMADSC820T: Mobile Computing   **Theory:60 Lectures**

1. Introduction (15 Lectures)

Introduction to Mobile Computing ,Applications of Mobile Computing- Generations of Mobile Communication Technologies- Multiplexing , Spread spectrum -MAC Protocols, SDMA, TDMA, FDMA, CDMA

2. Mobile Telecommunication System (15 Lectures)

Introduction to Cellular Systems ,GSM ,Services & Architecture ,Protocols , Connection Establishment , Frequency Allocation ,Routing , Mobility Management ,Security , GPRS- UMTS ,

Architecture , Handover ,Security

3. Mobile Network Layer   (12 Lectures)

Mobile IP , DHCP , AdHoc,Proactive protocol-DSDV, Reactive Routing Protocols — DSR, AODV , Hybrid routing –ZRP, Multicast Routing- ODMRP, Vehicular Ad Hoc networks (VANET) –MANET Vs VANET , Security.

4. Mobile Transport and Application Layer   (8 Lectures)

Overview of : Mobile TCP– WAP , Architecture ,WDP ,WTLS , WTP ,WSP ,WAE ,WTA Architecture ,WML.

5. Mobile Platforms and Application   (10 Lectures)

Mobile Device Operating Systems ,Special Constraints & Requirements ,Commercial Mobile Operating Systems — Software Development Kit: iOS, Android, BlackBerry, Windows Phone , MCommerce ,Structure , Pros & Cons ,Mobile Payment System , Security Issues.

Text Books:

1. Jochen Schiller, ―Mobile Communications‖, PHI, Second Edition, 2003.

2. Prasant Kumar Pattnaik, Rajib Mall, ―Fundamentals of Mobile Computing‖, PHI

Learning Pvt.Ltd, New Delhi – 2012.

Reference Books:
1.Mobile Computing,Rishabh Anand, Khanna Publishing House,Khanna Publishing House
2.Mobile Computing, Raj Kamal,Oxford, 3rd edition

CMADSC821P

 Application Design & Development

CMARES801P: Major Project

CORE COURSES (MINOR IN COMPUTER APPLICATION)

CMAMIN101T: Computer Fundamentals :   **Theory : 45 Lectures**

1. Introduction: (3 Lectures)
Functional units of a Computer Systems, Different Types of computers, Software and Hardware, Types of software:System s/w and Application s/w, Operating System as user interfaces

2.Data Representation   (8 Lectures)
Base or radix, Number systems(Decimal,Binary,Octal and Hexadecimal) ,Conversion from one number system to another, binary   arithmetic(addition   and   subtraction),Integer representation(Signed magnitude,1's complement,2's complement), Character representation and Floating Point representation.

3.Boolean Algebra and Digital Logic   (10 Lectures)
Logic   Gates: AND,OR   &   NOT(basic   logic   gates),NAND   &   NOR(universal   logic gates),XOR,XNOR(graphical symbol,truth table and Boolean expression of all logic gates),Basic laws of Boolean Algebra, De Morgan's theorems, Cannonical expressions, min terms and max terms, SOP and POS expressions and their conversion, Simplifications of expressions by both boolean algebra and K-MAP method(upto 4 variables),Don't-care conditions, Representation of simplified boolean expressions by NAND/NOR gates

4.Combinational and Sequential Logic: (12 Lectures)
Sequential logic circuits: Adder (half adder and full adder), Subtractor (half subtractor and full subtractor), Encoder, Decoder, Multiplexer & Demultiplexer Combinational logic circuits: Flip-flops: latch, clocked, Types of flip-flops(RS,JK,D,T):characteristic tables, Excitation table and logic diagram, Registers, shift registers, registers with parallel loads, Counters, Types of counters: synchronous and asynchronous(diagram and explanation of how it counts)

5.Devices: (4 Lectures)
Input and output devices (with connections and practical demo), keyboard, mouse, joystick, scanner, OCR, OMR, bar code reader, web camera,monitor, printer, plotter

6.Memory: (4 Lectures)
Primary, secondary, auxiliary memory, RAM, ROM, cache memory, hard disks, optical disks

7.Computer Organisation and Architecture   (4 Lectures)
C.P.U., registers, system bus, Inside a computer, SMPS, Motherboard, Ports and Interfaces, expansion cards, ribbon cables, memory chips.

Text Books
1. Mano, M. Morris. Computer system architecture. Prentice-Hall, Inc., 1993.
2. A. Goel, Computer Fundamentals, Pearson Education, 2010.

Reference Books
1. P. Aksoy, L. DeNardis, Introduction to Information Technology, Cengage Learning, 2006

2. P. K.Sinha, P. Sinha, Fundamentals of Computers, BPB Publishers, 2007

CMAMIN101P : *same as paper paper code CMADSC101P: Computer Fundamentals*

CMAMIN202T: Programming with C   **Theory: 45 Lectures**

1.Overview of Programming elements   **(6 Lectures)**
History, Basic Structure, Algorithms, Structured programming and Object Oriented Programming Concept, Character sets, C Token, Keywords, Constants, Variables, Data Types, Declaration of storage classes.

2.Operators, expressions and Preprocessor   **(8 Lectures)**
Arithmetic, Relational, Logical and Assignment; Increment and Decrement and Conditional, Bitwise, Special operator, Operator Precedence and Associativity; Arithmetic Expressions,Evaluation of expression, type casting. Comments, Input and output operations. Understanding the Preprocessor Directives (#include, #define, #error, #if, #else, #elif, #endif, #ifdef, #ifndef and #undef), Macros

3.Decision & Loop Control Structure   **(8 Lectures)**
If-else statements, Nested if-else, switch, Conditional operator. While, do-While, for loop, break statements, continue statements, goto statements.

4.Functions and Arrays   **(8 Lectures)**
Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Command Line Arguments/Parameters in Functions, Functions with variable number of Arguments. Creating and Using One Dimensional Arrays (Declaring and Defining an Array, Initializing an Array, Accessing individual elements in an Array, Manipulating array elements using loops), Use Various types of arrays (integer, float and character arrays / Strings) Two-dimensional Arrays (Declaring, Defining and Initializing Two Dimensional Array, Working with Rows and Columns), Introduction to Multi-dimensional arrays

5.User defined data types and memory Allocation   **(7 Lectures)**
Enumerated data types, Structures. Structure arrays, Pointers to Functions and Structures, Unions. Differentiating between static and dynamic memory allocation, use of malloc, calloc and free functions, use of new and delete operators, storage of variables in static and dynamic memory allocation.

6.Pointers and File Access   **(8 Lectures)**
Definition and initialization, Pointer arithmetic, Pointers and arrays, String functions and manipulation, Dynamic storage allocation,Opening and closing a file, Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files.

Text Books
1. Programming in ANSI C, Balaguruswamy, McGraw Hill.
2. The C Programming Language, Kernighan and Dennis Ritchie, PHI.
Reference Books
1. Programming with C, Byron S. Gottfried, McGraw Hill.

2. The Complete reference C, Herbert Schildt, McGraw Hill.
3. Programming Languages, Allen B. Tucker, Tata McGraw Hill.
4. Let Us C, Kanetkar, BPB Publication.

CMAMIN202P: Programming Fundamentals using C   **Practical : 60 Lectures**

1. WAP to print the sum and product of digits of an integer.
2. WAP to reverse a number.WAP to compute the sum of the first n terms of the following series S = 1+1/2+1/3+1/4+……
3. WAP to compute the sum of the first n terms of the following series S =1-2+3-4+5…………….
4. 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.
5. Write a function to find whether a given no. is prime or not. Use the same to generate the prime numbers less than 100.
6. WAP to compute the factors of a given number.
7. WAP to print a triangle of stars as follows (take number of lines from user):

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

8. Print the even-valued elements of an array
9. Print the odd-valued elements of an array
10. Calculate and print the sum and average of the elements of array
11. Print the maximum and minimum element of array
12. Remove the duplicates from the array
13. Print the array in reverse order
14. 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.
15. WAP that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.
16. Write a program that swaps two numbers using pointers.
17. Write a program in which a function is passed address of two variables and then alter its contents.
18. 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.
19. Write a menu driven program to perform following operations on strings:
20. Show address of each character in string
21. Concatenate two strings without using strcat function.
22. Concatenate two strings using strcat function.
23. Compare two strings
24. Calculate length of the string (use pointers)
25. Convert all lowercase characters to uppercase
26. Convert all uppercase characters to lowercase
27. Calculate number of vowels
28. Reverse the string
29. Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered array.
30. WAP to display Fibonacci series (i)using recursion, (ii) using iteration
31. WAP to calculate Factorial of a number (i)using recursion, (ii) using iteration
32. WAP to calculate GCD of two numbers (i) with recursion (ii) without recursion.
33. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks.

Create 10 students and store them in a file.
34. Write a program to retrieve the student information from file created in previous question and print it in following format:
35. Roll No. Name   Marks
36. Copy the contents of one text file to another file, after removing all white spaces.
37. 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.

CMAMIN303T: Data Structures using C++   **Theory:45 Lectures**

1. Introduction   **(5 Lectures)**
Data Object, Abstract Data Type, Data Structures and Data Types. Types of Data Structures – Linear and non-linear Data Structures. Single and Multi-dimensional Arrays, Address Calculations, Sparse Matrices (Array Representation).

2. Linked Lists   **(7 Lectures)**
Singly, Doubly and Circular Lists (Array and Linked representation); Operations on Lists. Sparse Matrices (Linked Representation).

3. Stacks and Queues   **(9 Lectures)**
Implementing single / multiple stack/s in an Array; Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another; Applications of stack; Limitations of Array representation of stack. Array and Linked representation of Queue, De-queue, Priority Queues

4. Recursion   **(5 lectures)**
Developing Recursive Definition of Simple Problems and their implementation; Advantages and Limitations of Recursion; Understanding what goes behind Recursion (Internal Stack Implementation)

5. Binary Trees   **(10 Lectures)**
Introduction; Properties, Binary Trees Traversals (Recursive and Non-Recursive), Binary Search Trees (Insertion, Deletion), Recursive and Iterative Traversals in Binary Search Trees; Threaded Binary Trees (Concept only); Height-Balanced Trees (Concept only).

6. Searching, Sorting and Hashing   **(9 Lectures)**
Linear Search, Binary Search, Comparison of Linear and Binary Search, Selection Sort, Insertion Sort, Bubble Sort, Comparison of Sorting Techniques. Introduction to Hashing, Resolving collusion by Open Addressing, Coalesced Hashing, Separate Chaining and simple examples.

Text 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. Robert Lafore, "Data Structures and Algorithms in Java, 2/E", Pearson/ Macmillan Computer Pub,2003
4. Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using C and C:, Second edition, PHI, 2009.

Reference Books:
1. Robert L. Kruse, "Data Structures and Program Design in C", Pearson,1999.
2. D.S Malik, Data Structure using C,Second edition, Cengage Learning, 2010.
3. Mark Allen Weiss, "Data Structures and Algorithms Analysis in Java", Pearson

Education, 3rd edition, 2011
4. Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using Java, 2003.

CMAMIN303P: 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.
2. WAP 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 for insertion, deletion and search of a number, reverse the list
4. and concatenate two linked lists (include a function and also overload operator +).
5. Implement Doubly Linked List for insertion, deletion and search of a number, reverse the list.
6. Implement Circular Linked List for insertion, deletion and search of a number, reverse the list.
7. Perform Stack operations using Linked List.
8. Perform Stack operations using Array.
9. Perform Queues operations using Circular Array.
10. Create and perform different operations on Double-ended Queues.
11. WAP to calculate factorial and to compute the factors of a given no.
    (i)using recursion,
    (ii) using iteration
12. 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 convert the Sparse Matrix into non-zero form and vice-versa.
15. WAP to reverse the order of the elements in the stack using additional stack.
16. WAP to reverse the order of the elements in the stack using additional Queue.
17. WAP to implement Diagonal Matrix using one-dimensional array.
18. WAP to implement Lower Triangular Matrix using one-dimensional array.
19. WAP to implement Upper Triangular Matrix using one-dimensional array.
20. WAP to implement Symmetric Matrix using one-dimensional array.

CMASMC701T: Operating Systems   **Theory: 45 Lectures**

  1.Introduction   **(4 Lectures)**
Basic OS functions, resource abstraction, types of operating systems–multiprogramming systems, batch systems , time sharing systems, 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, threading issues, thread libraries; Process Scheduling, non-pre-emptive and pre-emptive scheduling algorithms; concurrent processes, critical section, semaphores, methods for inter-process communication; deadlocks.

  4.Memory Management   **(10Lectures)**
Physical and virtual address space; memory allocation strategies -fixedand
variable partitions, paging, segmentation, virtual memory

  5. File, I/O and Disk Management   **(5 Lectures)**
Introduction to Directory structure, file access and allocation methods, Device Management, Disk Scheduling algorithms.

Text Books:
1. Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition,
2. .A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.

Reference Book:
1. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education 1997.

2.W. Stallings, Operating Systems, Internals & Design Principles, 5th Edition, Prentice Hall of India. 2008.

3. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.

CMASMC701P: Operating Systems   **Practical: 60 Lectures**

C Programs (Use an open source C compiler.)

1. Write a program (using *fork()* and/or *exec()* commands) where parent and child execute:

 a. same program, same code.

 b. same program, different code.

 c. before terminating, the parent waits for the child to finish its task.

2. Write a program to report behavior of Linux kernel including kernel version, CPU type and model. (CPU information)
3. Write a program to report behavior 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 a program to implement FCFS scheduling algorithm.

7. Write a program to implement Round Robin scheduling algorithm.

8. Write a program to implement SJF scheduling algorithm.

9. Write a program to implement non-preemptive priority based scheduling algorithm.

10. Write a program to implement preemptive priority based scheduling algorithm.

CORE COURSES (Multidisciplinary In Computer Application)

CMACOR101T: Computer Fundamentals :   **Theory: 45 Lectures**

1. Introduction: (3 Lectures)

Functional units of a Computer Systems, Different Types of computers, Software and Hardware, Types of software:System s/w and Application s/w, Operating System as user interfaces

2.Data Representation   (8 Lectures)

Base or radix, Number systems(Decimal,Binary,Octal and Hexadecimal) ,Conversion from one number system to another, binary arithmetic(addition and subtraction),Integer representation(Signed magnitude,1's complement,2's complement), Character representation and Floating Point representation.

3.Boolean Algebra and Digital Logic   (10 Lectures)

Logic Gates: AND,OR & NOT(basic logic gates),NAND & NOR(universal logic gates),XOR,XNOR(graphical symbol,truth table and Boolean expression of all logic gates),Basic laws of Boolean Algebra, De Morgan's theorems, Cannonical expressions, min terms and max terms, SOP and POS expressions and their conversion, Simplifications of expressions by both boolean algebra and K-MAP method(upto 4 variables),Don't-care conditions, Representation of simplified boolean expressions by NAND/NOR gates

4.Combinational and Sequential Logic: (12 Lectures)

Sequential logic circuits: Adder (half adder and full adder), Subtractor (half subtractor and full subtractor), Encoder, Decoder, Multiplexer & Demultiplexer Combinational logic circuits: Flip-flops: latch, clocked, Types of flip-flops(RS,JK,D,T):characteristic tables, Excitation table and logic diagram, Registers, shift registers, registers with parallel loads, Counters, Types of counters: synchronous and asynchronous(diagram and explanation of how it counts)

5.Devices: (4 Lectures)

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

6.Memory: (4 Lectures)

Primary, secondary, auxiliary memory, RAM, ROM, cache memory, hard disks, optical disks

7.Computer Organisation and Architecture   (4 Lectures)

C.P.U., registers, system bus, Inside a computer, SMPS, Motherboard, Ports and Interfaces, expansion cards, ribbon cables, memory chips.

Text Books

1. Mano, M. Morris. Computer system architecture. Prentice-Hall, Inc., 1993.
2. A. Goel, Computer Fundamentals, Pearson Education, 2010.

Reference Books

1. P. Aksoy, L. DeNardis, Introduction to Information Technology, Cengage   Learning, 2006
2. P. K.Sinha, P. Sinha, Fundamentals of Computers, BPB Publishers, 2007

CMACOR101P: Computer fundamentals practical : *same as paper code CMADSC101P: Computer Fundamentals of Computer Application Major*

CMACOR202T: Programming with C   **Theory: 45 Lectures**

1.Overview of Programming elements   (6 Lectures)

History, Basic Structure, Algorithms, Structured programming and Object Oriented Programming Concept, Character sets, C Token, Keywords, Constants, Variables, Data Types, Declaration of storage classes.

2.Operators, expressions and Preprocessor   (8 Lectures)

Arithmetic, Relational, Logical and Assignment; Increment and Decrement and Conditional, Bitwise, Special operator, Operator Precedence and Associativity; Arithmetic Expressions,Evaluation of expression, type casting. Comments, Input and output operations. Understanding the Preprocessor Directives (#include, #define, #error, #if, #else, #elif, #endif, #ifdef, #ifndef and #undef), Macros

3.Decision & Loop Control Structure   (8 Lectures)

If-else statements, Nested if-else, switch, Conditional operator. While, do-While, for loop, break statements, continue statements, goto statements.

4.Functions and Arrays   (8 Lectures)

Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Command Line Arguments/Parameters in Functions, Functions with variable number of Arguments. Creating and Using One Dimensional Arrays (Declaring and Defining an Array, Initializing an Array, Accessing individual elements in an Array, Manipulating array elements using loops), Use Various types of arrays (integer, float and character arrays / Strings) Two-dimensional Arrays (Declaring, Defining and Initializing Two Dimensional Array, Working with Rows and Columns), Introduction to Multi-dimensional arrays

5.User defined data types and memory Allocation   (7 Lectures)

Enumerated data types, Structures. Structure arrays, Pointers to Functions and Structures, Unions. Differentiating between static and dynamic memory allocation, use of malloc, calloc and free

functions, use of new and delete operators, storage of variables in static and dynamic memory allocation.

6.Pointers and File Access (8 Lectures)

Definition and initialization, Pointer arithmetic, Pointers and arrays, String functions and manipulation, Dynamic storage allocation,Opening and closing a file, Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files.

Text Books
1. Programming in ANSI C, Balaguruswamy, McGraw Hill.
2. The C Programming Language, Kernighan and Dennis Ritchie, PHI.

Reference Books
1. Programming with C, Byron S. Gottfried, McGraw Hill.
2. The Complete reference C, Herbert Schildt, McGraw Hill.
3. Programming Languages, Allen B. Tucker, Tata McGraw Hill.
4. Let Us C, Kanetkar, BPB Publication.

CMACOR202P: Programming Fundamentals using C : **Practical:60 Lectures**

1. WAP to print the sum and product of digits of an integer.
2. WAP to reverse a number.WAP to compute the sum of the first n terms of the following series S = 1+1/2+1/3+1/4+……
3. WAP to compute the sum of the first n terms of the following series S =1-2+3-4+5…………….
4. 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.
5. Write a function to find whether a given no. is prime or not. Use the same to generate the prime numbers less than 100.
6. WAP to compute the factors of a given number.
7. WAP to print a triangle of stars as follows (take number of lines from user):
        *
       ***
      *****
     ****
    ****
8. Print the even-valued elements of an array
9. Print the odd-valued elements of an array
10. Calculate and print the sum and average of the elements of array
11. Print the maximum and minimum element of array
12. Remove the duplicates from the array
13. Print the array in reverse order
14. 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.
15. WAP that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.
16. Write a program that swaps two numbers using pointers.

17. Write a program in which a function is passed address of two variables and then alter its contents.
18. 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.
19. Write a menu driven program to perform following operations on strings:
20. Show address of each character in string
21. Concatenate two strings without using strcat function.
22. Concatenate two strings using strcat function.
23. Compare two strings
24. Calculate length of the string (use pointers)
25. Convert all lowercase characters to uppercase
26. Convert all uppercase characters to lowercase
27. Calculate number of vowels
28. Reverse the string
29. Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered array.
30. WAP to display Fibonacci series (i)using recursion, (ii) using iteration
31. WAP to calculate Factorial of a number (i)using recursion, (ii) using iteration
32. WAP to calculate GCD of two numbers (i) with recursion (ii) without recursion.
33. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
34. Write a program to retrieve the student information from file created in previous question and print it in following format:
    Roll No. Name   Marks
35. Copy the contents of one text file to another file, after removing all white spaces.
36. 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.

CMADSC303T: Data Structures using C++   **Theory:45 Lectures**

1. Introduction   **(5 Lectures)**
Data Object, Abstract Data Type, Data Structures and Data Types. Types of Data Structures – Linear and non-linear Data Structures. Single and Multi-dimensional Arrays, Address Calculations, Sparse Matrices (Array Representation).

2. Linked Lists   **(7 Lectures)**
Singly, Doubly and Circular Lists (Array and Linked representation); Operations on Lists. Sparse Matrices (Linked Representation).

3. Stacks and Queues   **(9 Lectures)**
Implementing single / multiple stack/s in an Array; Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another; Applications of stack; Limitations of Array representation of stack. Array and Linked representation of Queue, De-queue, Priority Queues

4. Recursion   **(5 lectures)**
Developing Recursive Definition of Simple Problems and their implementation; Advantages and Limitations of Recursion; Understanding what goes behind Recursion (Internal Stack Implementation)

5. Binary Trees   **(10 Lectures)**
Introduction; Properties, Binary Trees Traversals (Recursive and Non-Recursive), Binary Search Trees (Insertion, Deletion), Recursive and Iterative Traversals in Binary Search Trees; Threaded Binary Trees (Concept only); Height-Balanced Trees (Concept only).

6. Searching, Sorting and Hashing   (9 Lectures)

Linear Search, Binary Search, Comparison of Linear and Binary Search, Selection Sort, Insertion Sort, Bubble Sort, Comparison of Sorting Techniques. Introduction to Hashing, Resolving collusion by Open Addressing, Coalesced Hashing, Separate Chaining and simple examples.

Text 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. Robert Lafore, "Data Structures and Algorithms in Java, 2/E", Pearson/ Macmillan Computer Pub,2003
4. Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using C and C:, Second edition, PHI, 2009.

Reference Books:
1. Robert L. Kruse, "Data Structures and Program Design in C", Pearson,1999.
2. D.S Malik, Data Structure using C,Second edition, Cengage Learning, 2010.
3. Mark Allen Weiss, "Data Structures and Algorithms Analysis in Java", Pearson Education, 3rd edition, 2011
4. Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using Java, 2003.

CMACOR303P: 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.
2. WAP 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 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 for insertion, deletion and search of a number, reverse the list.
5. Implement Circular Linked List for insertion, deletion and search of a number, reverse the list.
6. Perform Stack operations using Linked List.
7. Perform Stack operations using Array.
8. Perform Queues operations using Circular Array.
9. Create and perform different operations on Double-ended Queues.
10. WAP to calculate factorial and to compute the factors of a given no.
    (i)using recursion,
    (ii) using iteration
11. WAP to display Fibonacci series (i)using recursion, (ii) using iteration
12. WAP to calculate GCD of 2 number (i) with recursion (ii) without recursion
13. WAP to convert the Sparse Matrix into non-zero form and vice-versa.
14. WAP to reverse the order of the elements in the stack using additional stack.
15. WAP to reverse the order of the elements in the stack using additional Queue.
16. WAP to implement Diagonal Matrix using one-dimensional array.
17. WAP to implement Lower Triangular Matrix using one-dimensional array.
18. WAP to implement Upper Triangular Matrix using one-dimensional array.
19. WAP to implement Symmetric Matrix using one-dimensional array.

CMACOR404T: Operating Systems   **Theory: 45 Lectures**

1.Introduction   (4 Lectures)

Basic OS functions, resource abstraction, types of operating systems–multiprogramming systems,
batch systems , time sharing systems, 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, threading
issues, thread libraries; Process Scheduling, non-pre-emptive and pre-emptive scheduling
algorithms; concurrent processes, critical section, semaphores, methods for inter-process
communication; deadlocks.

4.Memory Management   (10Lectures)

Physical and virtual address space; memory allocation strategies -fixedand variable partitions,
paging, segmentation, virtual memory

5. File, I/O and Disk Management   (5 Lectures)

Introduction to Directory structure, file access and allocation methods, Device Management,
Disk Scheduling algorithms.

Text Books:
1. 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.

Reference Book:
1. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education
   1997.
2. W. Stallings, Operating Systems, Internals & Design Principles, 5th Edition, Prentice
   Hall of India. 2008.
3. . M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.

CMACOR404P: Operating Systems   **Practical: 60 Lectures**

C Programs (Use an open source C compiler.)

1. WRITE A PROGRAM (using *fork()* and/or *exec()* commands) where parent and child
execute:

 a. same program, same code.

 b. same program, different code.

 c. before terminating, the parent waits for the child to finish its task.

2. WRITE A PROGRAM to report behavior of Linux kernel including kernel version,
CPU type and model. (CPU information)
3. WRITE A PROGRAM to report behavior 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.

CMACOR505T:Database Management Systems   **Theory:45 Lectures**

1. Introduction   **(4 Lectures)**
Characteristics of database approach, data models, database system **a**rchitecture and data independence

2. Entity Relationship(ER) Modeling   **(5 Lectures)**

Entity types, relationships, constraints.

3. Relation data model   **(15 Lectures)**

Relational model concepts, relational constraints, relational algebra, SQL queries.

4. Database design   **(12 Lectures)**

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

5. Transaction Processing   **(3 Lectures)**

ACID properties, concurrency control.

6. File Structure and Indexing   **(6 Lectures)**

Operations on files, File of Unordered and ordered records, overview of File organizations, Indexing structures for files(Primary index, secondary index, clustering index), Multilevel indexing using B and B+ trees.

Text Books:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.
2. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.
3. MySQL High Availability: Tools for Building Robust Data Centers,Charles Bell, Mats Kindahl,

Lars Thalmann, "O'Reilly Media, Inc.", 2010
Reference Books:
1. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002.

CMACOR505P: Database Management Systems

Practical :60 Lectures

(UsingMySql)

Create and use the following database schema to answer the given que

EMPLOYEE Schema

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

DEPARTMENT Schema

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

Query List

1. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee with the Employee Number appearing first.
2. Query to display unique Jobs from the Employee Table.
3. Query to display the Employee Name concatenated by a Job separated by a comma. Multimedia Systems and Internet Technologies
4. Query to display all the data from the Employee Table. Separate each Column by a comma and name the said column as THE_OUTPUT.

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

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

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

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

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

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

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

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

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

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

= 30 or their Manger's Employee No = 7788.

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

16. Query to display the Current Date.

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

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

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

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

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

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

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

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

25. Query to display Name, Job, Department No. And Department Name for all the employees working at the Dallas location.

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

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

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

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

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

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

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

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

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

35. Query to display Employee Number and Name for all employees who work in a department with any employee whose name contains a _T'.

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

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

38. Basics of Pl/SQL and there use in query management.

CMACOR606T: Software Engineering   **Theory: 60 Lectures**

1. Introduction   (06 Lectures)
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).

2. Requirement Analysis   (08 Lectures)
Software Requirement Analysis, Initiating Requirement Engineering Process, Requirement Analysis and Modeling Techniques, Flow Oriented Modeling, Need for SRS, Characteristics and Components of SRS.

3. Software Project & Risk Management   (12 Lectures)
Estimation in Project Planning Process, Project Scheduling Software Risks, Risk Identification, Risk Projection and Risk Refinement, RMMM Plan.

4. Quality Management: (06 Lectures)
Quality Concepts, Software Quality Assurance, Software Reviews, Metrics for Process and Projects.

5. Design Engineering: (07 Lectures)
Design Concepts, Architectural Design Elements, Software Architectural Level and Component Level, Mapping of Data Flow into Software Architecture, Modeling Component Level Design.

6. Testing Strategies & Tactics   (06 Lectures)
Software Testing Fundamentals, Strategic Approach to Software Testing, Test Strategies for Conventional Software, Validation Testing, System testing, Black-Box Testing, White-Box Testing and their type, Basis Path Testing.

Text Books:
1. R.S. Pressman, Software Engineering: A Practitioner' s Approach (7th Edition), McGraw-Hill,
2009.
2. P. Jalote, An Integrated Approach to Software Engineering (2nd Edition), Narosa P. Jalote, An

Integrated Approach to Software Engineering (2nd Edition), Narosa Publishing House, 2003.
3. K.K. Aggarwal and Y. Singh, Software Engineering (2nd Edition), New Age International
Publishers, 2008.

Reference Books:

1. . I. Sommerville, Software Engineering (8th edition), Addison Wesley, 2006.
   D. Bell, Software Engineering for Students (4th Edition), Addison-Wesley, 2005.
   R. Mall, Fundamentals of Software Engineering (2nd Edition), Prentice-Hall of India,2004

MDC IN COMPUTER APPLICATION

CMAHMD101T/CMAGMD101T (Credits:3) : Computer Fundamentals   **45 Classes**
Introduction to Computer:

11 classes

Computer Characteristics, Concept of Hardware (Functional Block Diagram of Computer. CPU, Input Device like Keyboard, Mouse, Scanner, MICR, OMR, Light Pen, Joysticks etc. Output Device: VDU, Printers – Dot Matrix, Daisy-wheel, Inkjet, Laser, Line Printers and Plotters. Computer Memory: Primary Memory, Secondary Memory, Cache Memory) Software (System and Application Software), Evolution of computer and Generations, Types of Computer – Analog and Digital computers, Hybrid Computers, General Purpose and Special Purpose Computer, Limitations of Computer Applications of Computer in Various Fields.

Operating System:

11 classes

Operating System, Evolution of Operating System. Functions of Operating System. Batch Processing, Time Sharing, Multi-programming, Multi-Processing. Types of Operating Systems. Detailed Study of Windows Operating System (Basic components of windows, icons, types of icons, taskbar, activating windows, using desktop, title bar, running applications, exploring computer, managing files and folders, copying and moving files and folders. Control panel—display properties, adding and removing software and hardware, setting date and time, screen saver and appearance. Using windows accessories.). Introduction and Features of LINUX OS.

Networking:

12 Classes

Concept, Basic Elements of a Communication System, Data Transmission Media, Data Transmission Modes(Simplex, Half-duplex, Full-duplex), Network Topologies, Network Types: LAN, MAN, WAN Intranet and Internet, Modem, Bridges, Routers, Concept of Channel, Bandwidth (Hz, KHz,

MHz) and Data Transfer rate (bps, Kbps, Mbps, Gbps, Tbps), Internet applications. World Wide Web, E-mail (E-mail Message Components, Advantages, Disadvantages), browsing and searching, search engines, Understanding URL, Client and Server Computers

Computer Security:

5 Classes

An Overview of Computer Security, Computer virus (Definition, Characteristics, types, Impact), Virus Preventive Measures: antivirus and Firewall .

Brief understanding of the following emerging trends: (Basic Concept)   6 Classes

Artificial Intelligence, Robotics, Internet of Things (IoT), Sensors, Smart cities, Cloud Computing and Cloud Services (SaaS, IaaS, PaaS); Blockchain technology.

Text Books:

1. Computer Fundamentals by Priti Sinha, Pradeep K., Sinha.

2. Fundamentals of Computers by Rajaraman V and Adabala N.

3. Fundamentals of Computers by Reema Thareja

CMAHMD201T/CMAGMD201T (Credits:3) :   Computer Fundamentals

Same as CMAHMD101T/CMAGMD101T

CMAHMD301T/CMAGMD301T (Credits:3) :   Computer Fundamentals

Same as CMAHMD101T/CMAGMD101T

SEC IN COMPUTER APPLICATION

CMAHSE101M(/CMAGSE101M (Credits:3): R Programming   45 Classes

1.Overview and History of R, Getting Help, Data Types, Subsetting, Vectorized Operations, Reading and Writing Data.   **(10 Lectures)**

2.Control Structures, Functions, lapply, tapply, split, mapply, apply, Coding Standards.
                                                                    (5 Lectures)

3.Scoping Rules, Debugging Tools, Simulation, R Profiler.
                                                                    (5 Lectures)

4. Simple Programs :

                                                                    (25 Lectures)

1. Write a program that prints ‗Hello World' to the screen.
2. Write a program that asks the user for a number n and prints the sum of the numbers 1 to n
3. Write a program that prints a multiplication table for numbers up to 12.
4. Write a function that returns the largest element in a list.
5. Write a function that computes the running total of a list.
6. Write a function that tests whether a string is a palindrome.

7. Implement the following sorting algorithms: Selection sort, Insertion sort, Bubble Sort
8. Implement linear search.
9. Implement binary search.
10. Implement matrices addition, subtraction and Multiplication

Text Books:
1. William N. Venables and David M. Smith, An Introduction to R. 2nd Edition. Network Theory
   Limited.2009
2. Norman Matloff, The Art of R Programming - A Tour of Statistical Software Design, No Starch
   Press.2011

Reference Books:
1**.**The Book of R,Tilman M. Davies,No Starch Press,1st edition
2.Discovering Statistics Using R,Andy Field,SAGE Publications Ltd,1st edition

CMAHSE202M/CMAGSE202M (Credits:3) : Python Programming   **45 Classes**

 1. Planning the Computer Program: **5 Classes**

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

 2. Techniques of Problem Solving   **5 Classes**

Flowcharting, decision table, algorithms, Structured programming concepts, Programming
methodologies viz. top-down and bottom-up programming.

 3. Overview of Programming   **6 Classes**

Structure of a Python Program, Elements of Python

4. **Introduction to Python**   **4 Classes**

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

5. **Creating Python Programs**   **10 Classes**
 Input and Output Statements, Control statements(Branching, Looping, Conditional Statement, Exit
 function, Difference between break, continue and pass.), Defining Functions, default arguments.

6**. Simple programs**   **15 Classes**

  1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and
vice versa depending upon users choice.

  2. WAP to calculate total marks, percentage and grade of a student. Marks obtained in each of the
 three subjects are to be input by the user. Assign grades according to the following criteria :

Grade A: Percentage
>=80
 Grade B:
Percentage>=70 and
<80
Grade C:
Percentage>=60 and
  <70
Grade D:
Percentage>=40 and
<60
Grade E:
Percentage<40
3. Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from the user.
   4. WAP to display the first n terms of Fibonacci series.

   5. WAP to find the factorial of the given number.

6. WAP to check whether a given number is prime or not.
7. WAP to check whether a given string is palindrome or not.
8. WAP to find the sum of the following series for n terms: 1 + 1/2 + 1/3 …

Text Books :
1.John V. Guttag, "Introduction to Computation and Programming Using Python", MIT Press
2. Allen Downey, "Think Python: How to Think Like a Computer Scientist", O'Reilly
3. Mark Lutz, "Learning Python, 5th Edition", O'Reilly

Reference Books:
1.. Python Programming for the Absolute Beginner, Michael Dawson, Cengage Learning.
2.. Learning to Program in Python 2017, P. M. Heathcote, PG Online Limited
3. Python Programming Fundamentals,: Lee and Kent D.