<table>
<thead>
<tr>
<th>S. NO.</th>
<th>SUBJECT/PAPER</th>
<th>#L</th>
<th>#T</th>
<th>#P</th>
<th>TOTAL CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>THEORY</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Basic Application of Computers</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Programming in C Language</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Digital Electronics</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Advanced Operating System</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Spiritual Studies</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>SSD-Functional English-I</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRACTICAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Basic Application of Computers LAB</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Programming in C Language LAB</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TOTAL CREDIT</td>
<td>18</td>
<td>6</td>
<td>4</td>
<td>28</td>
</tr>
</tbody>
</table>
MCA Semester: I
BASIC COMPUTER APPLICATION

**Objective:** This subject will give the student the basic knowledge of computer like its terminology, overview of the operating system.

**Unit I: Introduction to Computers**
Types of Programming Languages: Machine Languages, Assembly Languages, High Level Languages.
Memory: Types of Memory (Primary and Secondary): RAM, ROM, PROM, EPROM, EEPROM, Secondary S

**Unit II: Operating System and Services in O.S. 7**
DOS – Overview, Windows Operating Environment

**Unit III**
Computer Viruses, Types of Viruses, Ways to catch Computer Virus, virus detections and preventions, Worms. Security in IT- Attacks, hackers, crackers, cryptology, encryption and decryption, firewall etc.

**Unit IV**
Introduction to E-Supply Chain Management., E-Supply-Chain components, E-Supply-Chain architecture, Major Trends in E-SCM, Some examples of using ESCM.
E-Customer Relationship Management (E-CRM) Customer Relationship management concepts, How technology can help with this.E-CRM solutions, advantages, E-CRM capabilities, Data Mining & E-CRM, Some examples of using E-CRM.

**UNIT V**
MS Word 2007: – Word basics, formatting text and documents, working with headers, footers and footnotes, tabs, tables and sorting. Working with graphics, templates, wizards and sample documents, introduction to mail merge and macros.
MS Power Point 2007: - PowerPoint basics, creating presentation the easy way, working with graphics. Inserting various objects (Picture, Organizational Chart, Audio, Video etc.) in the slide .Adding Animation effects in the slide.
MS Excel 2007: - Excel basics, rearranging worksheets, excel formatting tips and techniques. Introduction to functions, Excel chart features, working with graphics.Using worksheet as a Database.

**Text Books**
1. Fundamental of Computers – By V. Rajaraman B.P.B. Publications

**Reference book**
1. Fundamental of Computers – By P. K. Sinha
Basic computer application Lab

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

**MS Word**

1. Prepare a **grocery list** having four columns (Serial number, The name of the product, quantity and price) for the month of April, 06.
   - Font specifications for Title (Grocery List): 14-point Arial font in bold and italics.
   - The headings of the columns should be in 12-point and bold.
   - The rest of the document should be in 10-point Times New Roman.
   - Leave a gap of 12-points after the title.

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

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

4. BPB Publications plans to release a new book designed as per your syllabus. Design the **firstpage of the book** as per the given specifications.
   - The title of the book should appear in bold using 20-point Arial font.
   - The name of the author and his qualifications should be in the center of the page in 16-point Arial font.
   - At the bottom of the document should be the name of the publisher and address in 16-point Times New Roman.
   - The details of the offices of the publisher (only location) should appear in the footer.

5. Create the following one page documents.
   a. Compose a note inviting friends to a get-together at your house, Including a list of things to bring with them.
   b. Design a certificate in landscape orientation with a border around the document.
   c. Design a Garage Sale sign.
   d. Make a sign outlining your rules for your bedroom at home, using a numbered list.
6. Create the following documents:
   (a) A newsletter with a headline and 2 columns in portrait orientation, including at least one image surrounded by text.
   (b) Use a newsletter format to promote upcoming projects or events in your classroom or college.
7. Convert following text to a table, using comma as delimiter
   Type the following as shown (do not bold).
<table>
<thead>
<tr>
<th>Color</th>
<th>Style</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>A980</td>
<td>Van</td>
</tr>
<tr>
<td>Red</td>
<td>X023</td>
<td>Car</td>
</tr>
<tr>
<td>Green</td>
<td>YL724</td>
<td>Truck</td>
</tr>
<tr>
<td>Name</td>
<td>Age</td>
<td>Sex</td>
</tr>
<tr>
<td>Bob</td>
<td>23</td>
<td>M</td>
</tr>
<tr>
<td>Linda</td>
<td>46</td>
<td>F</td>
</tr>
<tr>
<td>Tom</td>
<td>29</td>
<td>M</td>
</tr>
</tbody>
</table>
9. Enter the following data into a table given on the next page.

<table>
<thead>
<tr>
<th>Salesperson</th>
<th>Dolls</th>
<th>Trucks</th>
<th>Puzzles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kennedy, Sally</td>
<td>1327</td>
<td>1423</td>
<td>1193</td>
</tr>
<tr>
<td>White, Pete</td>
<td>1421</td>
<td>3863</td>
<td>2934</td>
</tr>
<tr>
<td>Pillar, James</td>
<td>5214</td>
<td>3247</td>
<td>5467</td>
</tr>
<tr>
<td>York, George</td>
<td>2190</td>
<td>1278</td>
<td>1928</td>
</tr>
<tr>
<td>Banks, Jennifer</td>
<td>1201</td>
<td>2528</td>
<td>1203</td>
</tr>
<tr>
<td>Atwater, Kelly</td>
<td>4098</td>
<td>3079</td>
<td>2067</td>
</tr>
</tbody>
</table>

Add a column Region (values: S, N, N,S,S,S) between the Salesperson and Dolls columns to the given table Sort your table data by Region and within Region by Salesperson in ascending order:
In this exercise, you will add a new row to your table, place the word "Total" at the bottom of the Salesperson column, and sum the Dolls, Trucks, and Puzzles columns.
10. Wrapping of text around the image.
11. Following features of menu option must be covered

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

**MS Excel**

1. Enter the Following data in Excel Sheet

<table>
<thead>
<tr>
<th>REGIONAL SALES PROJECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>State</strong></td>
</tr>
<tr>
<td>Delhi</td>
</tr>
<tr>
<td>Punjab</td>
</tr>
<tr>
<td>U.P.</td>
</tr>
<tr>
<td>Harayana</td>
</tr>
<tr>
<td>Rajasthan</td>
</tr>
</tbody>
</table>

**TOTAL**

**AVERAGE**

(a) Apply Formatting as follow:

1. Title in **TIMES NEW ROMAN**
2. Font Size - 14
3. Remaining text - **ARIAL**, Font Size -10
4. State names and Qtr. Heading **Bold**, **Italic** with **Gray Fill Color**.
5. Numbers in two decimal places.
6. Qtr. Heading in center **Alignment**.
7. Apply Border to whole data.

(b) Calculate State and Qtr. Total
(c) Calculate Average for each quarter
(d) Calculate Amount = Rate * Total.

2. Given the following worksheet

<table>
<thead>
<tr>
<th>Roll No.</th>
<th>Name</th>
<th>Marks</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1001</td>
<td>Sachin</td>
<td>99</td>
</tr>
<tr>
<td>2</td>
<td>1002</td>
<td>Sehwag</td>
<td>65</td>
</tr>
<tr>
<td>3</td>
<td>1003</td>
<td>Rahul</td>
<td>41</td>
</tr>
<tr>
<td>4</td>
<td>1004</td>
<td>Sourav</td>
<td>89</td>
</tr>
<tr>
<td>5</td>
<td>1005</td>
<td>HarBhajan</td>
<td>56</td>
</tr>
</tbody>
</table>
Calculate the grade of these students on the basis of following guidelines:

<table>
<thead>
<tr>
<th>If Marks</th>
<th>Then Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;= 80</td>
<td>A+</td>
</tr>
<tr>
<td>&gt;= 60 &lt; 80</td>
<td>A</td>
</tr>
<tr>
<td>&gt;= 50 &lt; 60</td>
<td>B</td>
</tr>
<tr>
<td>&lt; 50</td>
<td>F</td>
</tr>
</tbody>
</table>

3. Given the following worksheet

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Salesman</td>
<td>Qtr1</td>
<td>Qtr2</td>
<td>Qtr3</td>
<td>Qtr4</td>
<td>Total</td>
</tr>
<tr>
<td>2</td>
<td>No.</td>
<td>5000</td>
<td>8500</td>
<td>12000</td>
<td>9000</td>
<td>12000</td>
</tr>
<tr>
<td>3</td>
<td>S001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>S002</td>
<td>7000</td>
<td>4000</td>
<td>7500</td>
<td>11000</td>
<td>7500</td>
</tr>
<tr>
<td>5</td>
<td>S003</td>
<td>4000</td>
<td>9000</td>
<td>6500</td>
<td>8200</td>
<td>6500</td>
</tr>
<tr>
<td>6</td>
<td>S004</td>
<td>5500</td>
<td>6900</td>
<td>4500</td>
<td>10500</td>
<td>5500</td>
</tr>
<tr>
<td>7</td>
<td>S005</td>
<td>7400</td>
<td>8500</td>
<td>9200</td>
<td>8300</td>
<td>7400</td>
</tr>
<tr>
<td>8</td>
<td>S006</td>
<td>5300</td>
<td>7600</td>
<td>9800</td>
<td>6100</td>
<td>5300</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>If total Sales</th>
<th>Commission</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20000</td>
<td>0% of sales</td>
</tr>
<tr>
<td>&gt; 20000 and &lt; 25000</td>
<td>4% of sales</td>
</tr>
<tr>
<td>&gt; 25000 and &lt; 30000</td>
<td>5.5% of sales</td>
</tr>
<tr>
<td>&gt; 30000 and &lt; 35000</td>
<td>8% of sales</td>
</tr>
<tr>
<td>&gt;= 35000</td>
<td>11% of sales</td>
</tr>
</tbody>
</table>

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

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

**Allowances**

- **HRA** Dependent on Basic
  - 30% of Basic if Basic <=1000
  - 25% of Basic if Basic>1000 & Basic<=3000
  - 20% of Basic if Basic >3000
- **DA** Fixed for all employees, 30% of Basic
- **Conveyance Allowance** Rs. 50/- if Basic is <=1000Rs.
  - 75/- if Basic >1000 & Basic<=2000
  - Rs. 100 if Basic >2000
- **Entertainment Allowance** NIL if Basic is
  - <=1000Rs. 100/- if Basic > 1000


Deductions

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

Calculate the following:
Gross Salary = Basic + HRA + DA + Conveyance + Entertainment
Total deduction = Provident Fund + Group Insurance Premium
Net Salary = Gross Salary – Total Deduction

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

<table>
<thead>
<tr>
<th>No. of Instalments</th>
<th>5%</th>
<th>6%</th>
<th>7%</th>
<th>8%</th>
<th>9%</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
</tr>
<tr>
<td>4</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
</tr>
<tr>
<td>5</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
</tr>
<tr>
<td>6</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Rate of Interest</th>
<th>8%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>5 Years</td>
</tr>
<tr>
<td>Principal</td>
<td>Simple Interest</td>
</tr>
<tr>
<td>1000</td>
<td>?</td>
</tr>
<tr>
<td>18000</td>
<td>?</td>
</tr>
<tr>
<td>5200</td>
<td>?</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Salesman</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>10000</td>
<td>12000</td>
<td>20000</td>
<td>50000</td>
</tr>
<tr>
<td>S2</td>
<td>15000</td>
<td>18000</td>
<td>50000</td>
<td>60000</td>
</tr>
<tr>
<td>S3</td>
<td>20000</td>
<td>22000</td>
<td>70000</td>
<td>70000</td>
</tr>
<tr>
<td>S4</td>
<td>30000</td>
<td>30000</td>
<td>100000</td>
<td>80000</td>
</tr>
<tr>
<td>S5</td>
<td>40000</td>
<td>45000</td>
<td>125000</td>
<td>90000</td>
</tr>
</tbody>
</table>

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

8. Enter the following data in Excel Sheet

**PERSONAL BUDGET FOR FIRST QUARTER**

**Monthly Income (Net): 1,475**

<table>
<thead>
<tr>
<th>EXPENSES</th>
<th>JAN</th>
<th>FEB</th>
<th>MARCH</th>
<th>QUARTER TOTAL</th>
<th>QUARTER AVERAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rent</td>
<td>600.00</td>
<td>600.00</td>
<td>600.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>48.25</td>
<td>43.50</td>
<td>60.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utilities</td>
<td>67.27</td>
<td>110.00</td>
<td>70.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Credit Card</td>
<td>200.00</td>
<td>110.00</td>
<td>70.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil</td>
<td>100.00</td>
<td>150.00</td>
<td>90.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AV to Insurance</td>
<td>150.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable TV</td>
<td>40.75</td>
<td>40.75</td>
<td>40.75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Monthly Total**

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

9. Enter the following data in Excel Sheet

**TOTAL REVENUE EARNED FOR SAM'S BOOKSTALL**

<table>
<thead>
<tr>
<th>Publisher name</th>
<th>1997</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Rs. 1,000.00</td>
<td>Rs. 1,100.00</td>
<td>Rs. 1,300.00</td>
<td>Rs. 800.00</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Rs. 1,500.00</td>
<td>Rs. 700.00</td>
<td>Rs. 1,000.00</td>
<td>Rs. 2,000.00</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Rs. 700.00</td>
<td>Rs. 900.00</td>
<td>Rs. 1,500.00</td>
<td>Rs. 600.00</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Rs. 1,200.00</td>
<td>Rs. 500.00</td>
<td>Rs. 200.00</td>
<td>Rs. 1,100.00</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Rs. 800.00</td>
<td>Rs. 1,000.00</td>
<td>Rs. 3,000.00</td>
<td>Rs. 560.00</td>
<td></td>
</tr>
</tbody>
</table>

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

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

Programming in C Language

Objective: This course provides students with a comprehensive study of the C programming language, which provides programmers with the means of writing efficient, maintainable, and portable code. The lectures are supplemented with non-trivial lab exercises.

Unit I
C-basic: C character set, Identifiers and keyword data types, constants, variables and arrays, declarations, expression statements, symbolic constants, compound statements, assignment operation, conditional operators, bit operators.
C-Constructs: - If statement, if-else statement, Nested if statement, While statement, do….. while, for statement, switch statement, else-if ladder, noted control statement, break operator, continue operator, comma operator, GOTO statement.

Unit II
C-Functions: - Function declaration, definition & scope, recursion, call by value, call by reference.
Arrays: - Arrays, declaring arrays, initializing array, 1 Dimensional array, 2 Dimensional array, multi-dimensional array.
Storage class: - Automatic external (global) static & registers.
Structure & Union – Introduction of structure, union array within structure, structure passing to functions, into of union.

Unit III
Pointers – Introduction to pointers features of pointers, utilizing a pointer, declaring a pointer, scale factor, chain of pointer, pointer expression, pointer to an array, an array of pointers, pointers to functions, an array of pointer to function. Pointer to structure, pointer within the structure.
DMA – Introduction to Dynamic memory allocation, calloc (), malloc (), realloc (), free (), alloc. h

Unit IV
String manipulation
String, pointer to string, 2D array of characters, an array of pointers of strings, limitation of array of pointers to string, NULL pointer, accessing string without pointers, accessing strings using pointers, string manipulation without string functions, palindrome of string, header files of string and characters.
File handling – Introduction to file handling, text vs Binary file. Various files handling functions getc (), putc (), getc (), fprintf (), fscanf (), fgets (), fputs (), fread (), fwrite (), Random access file, fseek (), ftell () and rewind ().

Unit V
Preprocessor – Macro substitution, file inclusion conditional compilation preprocessor, directive, miscellaneous directives.
Graphics programming – initgraph (), Drawing objects in graphics – line, rectangles, ellipse, circle, polygon, filling colors, text formatting functions.

Text Books

Reference Book
Programming using C Lab:

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

```
*  
*** 
***** 
******* 
********* 
```
10. WAP to perform following actions on an array entered by the user:
   i) Print the even-valued elements
   ii) Print the odd-valued elements
   iii) Calculate and print the sum and average of the elements of array
   iv) Print the maximum and minimum element of array
   v) Remove the duplicates from the array
   vi) Print the array in reverse order
The program should present a menu to the user and ask for one of the options. The menu should also include options to re-enter array and to quit the program.
11. WAP that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.
12. Write a program that swaps two numbers using pointers.
13. Write a program in which a function is passed address of two variables and then alter its contents.
14. Write a program which takes the radius of a circle as input from the user, passes it to another function that computes the area and the circumference of the circle and displays the value of area and circumference from the main() function.
15. Write a program to find sum of n elements entered by the user. To write this program, allocate memory dynamically using malloc() / calloc() functions or new operator.
16. Write a menu driven program to perform following operations on strings:
   a) Show address of each character in string
b) Concatenate two strings without using strcat function.
c) Concatenate two strings using strcat function.
d) Compare two strings
e) Calculate length of the string (use pointers)
f) Convert all lowercase characters to uppercase
g) Convert all uppercase characters to lowercase
h) Calculate number of vowels
i) Reverse the string

17. Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered array.

18. WAP to display Fibonacci series (i)using recursion, (ii) using iteration
19. WAP to calculate Factorial of a number (i)using recursion, (ii) using iteration
20. WAP to calculate GCD of two numbers (i) with recursion (ii) without recursion.
21. WAP for call by value.
22. WAP for call by reference.
MCA Semester: I
DIGITAL ELECTRONICS

Objective: This subject covers combinational and sequential logic circuits. Topics include number systems, Boolean algebra, logic families, and other related topics. Upon completion, students should be able to construct, analyze, verify and troubleshoot digital circuits using appropriate techniques.

Unit I
Number systems and Arithmetic Different number systems and their inter conversions. Binary arithmetic: Binary addition, subtraction, multiplication and division. Hexadecimal arithmetic: Addition, subtraction, multiplication and division. Binary subtraction using 1’s complement, 2’s complement method, overflow, underflow, codes, fixed point representation, floating point representation.

Unit II
Boolean algebra and logic gates postulates of Boolean algebra theorems of Boolean algebra: Complementation, commutative, AND, OR. Associative, Distributive, Absorption laws, demurrage’s theorems. Reducing Boolean expressions. Logic gates: AND, OR, NOT, Ex-OR, EX-NOR NAND and NOR as Universal gates.

Unit III
Minimization techniques Introduction to SOP and POS minterms, midterms, K-map, Kmap for 2,3,4,5 variables, don’t care condition. Combinational and Arithmetic logic Circuits Half Adder and full Adder Binary Parallel Adder Half Subtract or, full subtract or Multiplexer and Demultiplexer.

Unit IV
Flip Flops Introduction: RS FF Clocked RS FF, DFF Triggering preset and clear JK FF, TFF, Race around condition Master Slave FF

UNIT V

Text Books:
1. R.K Gaur, Digital Electronics and microprocessor

Reference book
1. R. P. Jain, Digital Electronics
MCA Semester: I
ADVANCED OPERATING SYSTEM

OBJECTIVE: This subject deals with the important aspects of a computer operating system, including processes, scheduling algorithms, and memory management. Concepts such as deadlocks, memory management, and file management are detailed.

Unit I

Unit II
Thread—Concept of thread, multithreading, context switching, Scheduling criteria, Types of Scheduling, long term, short term and medium term Scheduling. Scheduling algorithms. Multiple processor scheduling

Unit III
Process Synchronization—Critical section problem, Synchronization hardware, Semaphores.
Deadlock—Definition, deadlock characterization, handling of deadlock, deadlock prevention, avoidance, detection and recovery.

Unit IV
Secondary storage Structure—Disk structure, disk Scheduling, disk management, swap space management, disk reliability.

UNIT V
File System—Directory structure, access control verification, logical file system, physical file system. File space allocation, free space management, File locking, file protection and distributed file systems.

Advanced topics in operating system: - Real time operating system, distributed operating system, comparison among sun solaris, Apple, Mac OS, Windows, Linux systems.

Text Books
1. Galvin, Operating system concepts, Wiley Publications
## MCA 2nd semester

<table>
<thead>
<tr>
<th>S. NO.</th>
<th>SUBJECT/PAPER</th>
<th>#L</th>
<th>#T</th>
<th>#P</th>
<th>TOTAL CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>THEORY</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Office Automation Tools</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Advance Programming in C Language</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Computer Organization and Architecture</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Discrete Mathematical Structure</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Cyber Security and Laws</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>SSD-Functional English-II</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRACTICAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Office Automation Tools LAB</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Advance Programming in C Language LAB</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TOTAL CREDIT</td>
<td>18</td>
<td>6</td>
<td>4</td>
<td>28</td>
</tr>
</tbody>
</table>
Objective: This subject will give the student the basic knowledge of computer like its terminology, overview of the operating system.

Unit I : Introduction to Computers
Types of Programming Languages: Machine Languages, Assembly Languages, High Level Languages.
Memory: Types of Memory (Primary and Secondary): RAM, ROM, PROM, EPROM, EEPROM, Secondary S

Unit II : Operating System and Services in O.S. 7
DOS – Overview, Windows Operating Environment

Unit III
Computer Viruses, Types of Viruses, Ways to catch Computer Virus, virus detections and preventions, Worms. Security in IT- Attacks, hackers, crackers, cryptology, encryption and decryption, firewall etc.

Unit IV
MS Word 2007: – Word basics, formatting text and documents, working with headers, footers and footnotes, tabs, tables and sorting. Working with graphics, templates, wizards and sample documents, introduction to mail merge and macros.

UNIT V
MS Power Point 2007: - PowerPoint basics, creating presentation the easy way, working with graphics. Inserting various objects (Picture, Organizational Chart, Audio, Video etc.) in the slide. Adding Animation effects in the slide.

MS Excel 2007: - Excel basics, rearranging worksheets, excel formatting tips and techniques. Introduction to functions, Excel chart features, working with graphics. Using worksheet as a Database.

Text Books
1. Fundamental of Computers – By V. Rajaraman B.P.B. Publications

Reference book
1. Fundamental of Computers – By P. K. Sinha
Unit – 1
C-basic: C character set, Identifiers and keyword data types, constants, variables and arrays, declarations, expressions statements, symbolic constants, compound statements, certainty operations, assignment operation, conditional operators, bit operators.
C-Con structs:- If statement, if-else statement, Nested if statement, While statement, do…..while, for statement, switch statement, else-if ladder, noted control statement, break operator, continue operator, comma operator, got statement.

Unit – 2
Structure & Union – Intro of structure, union array within structure, structure passing to functions, into of union.

Unit – 3
Pointers – Introduction to pointers features of pointers, utilizing a pointer, declaring a pointer, scale factor, chain of pointer, pointer expression, pointer to array, array of pointers, pointers to function, array of pointer to function. Pointer to structure, pointer within structure.
DMA – Intro to Dynamic memory allocation, colic ( ), Malay ( ), really ( ), free ( ), allot.

Unit – 4
File handling – Intro to file handling, text us Binary file. Various file handling functions get ( ), put ( ), get, put, gets, puts, forint, scan, frets, puts, field, write, Random access file, freek, ftell and rewind.
Graphics programming – Intergraph, Drawing objects in graphics – live, rectangles ellipse, circle, polygon, filling hours, text formatting functions.

Unit – 5
Preprocessor – Macro substitution, file inclusion conditional compilation preprocessor, directive, miscellaneous directives.
Introduction to Objective C

Reference Books:
Unit – 1
Introduction:
Additional Reading/Working Topics/Indicative lists: Experiments on different logic gates and flip-flop.

Unit – 2
Basic Computer organization:
Instruction, types of instruction, instruction cycle, instruction format, PSW, ALU, subroutine, interrupt, interrupt cycle, control memory, design of control unit, types of control unit, RISC, CISC, addressing modes.
Additional Reading/Working Topics/Indicative lists: Execution cycle/CPU cycle numerical

Unit – 3
I/O organization:
I/O ports, I/O interface, Isolated I/O and memory mapped I/O, I/O data transfer, PIO, , I/O interfacing chips, I/O controller, I/O characteristics, DMA, modes of transfer, strobe and handshaking, peripheral devices, Daisy chaining, IOP.
Additional Reading/Working Topics/Indicative lists: study of integrated chips useful in I/O system.

Unit – 4
Memory Organization:
Memory Hierarchy, main memory, types of ROM and RAM, auxiliary memory, associative memory, cache memory, virtual memory, memory mapping, replacement algorithm, principle of locality of reference, flash memory, BIOS.
Additional Reading/Working Topics/Indicative lists: memory organization of flash memory devices and micro SD memory cards

Unit – 5
Processor organization:
Parallel processing, types of parallel processing, pipelining, types of pipelining, Amdahl’s law, speedup computation, history of computer processors, 8086, block diagram of 8086, flag register of 8086, overview of Pentium processor, differences among 8086, 80186, 80286, 80386, 80486, and Pentium.
Additional Reading/Working Topics/Indicative lists: Study of latest microprocessors and collect information about AMD processors.

Text books:

References:
Unit-1
Sets, Relations & Functions: Property of binary relations, equivalence, compatibility, partial ordering relations, functions, inverse functions, composition of functions, recursive functions.
hashing functions, characteristic functions, floor functions, ceiling functions, subjective control, injunctive (one-to-one) Inverse functions Infinite sets and compatibility Properties of countable sets Non-denumerable sets.

Unit-2
Mathematical Logic: Logic operators, Truth tables, Propositions (Statements) Logical connectivity’s, Compound statements form, truth tables, tautology, implications and equivalence of statements forms logical identities Normal forms: disjunctive normal form and simplification Theory of inference and deduction, mathematical calculus, predicate calculus, predicates and quantifiers.

Unit-3
Groups & Subgroups: Group axioms, Monoids , semi groups, Isomorphism, homomorphism , automorphism. Lattices & Boolean Algebra: Truth values and truth tables, the algebra of propositional functions, Boolean algebra of truth values. Group codes: Weight and Hamming distance, minimum distance of code , generation of codes using parity checks – even parity, odd parity , parity check matrix – Hamming code, for detection and correction errors , formation of encoding function

Unit-4
Lattices & Boolean Algebra: Truth values and truth tables, the algebra of propositional functions, Boolean algebra of truth values.
Combinatorics& Recurrence Relations: Permutation, Combination, Principle of Inclusion and Exclusion, Recurrence Relations, Generating Functions

Unit-5
Graph Theory: Basic Concepts of Graphs and Trees, Basic terminology, simple and weighted graph Adjacency and Incidence Matrices, complete graph, regular graph, bipartite graph connected graphs, paths-simple, elementary circuit, Transitive Closure, Shortest Path, Eularian and Hamiltonian graphs, Concept of Tree, Spanning Tree Applications of Graph Theoretic Concepts to Computer Science.

Reference Books:
3. N. Deo, Graph Theory with Applications to Engineering and Computer Science, PHI.
MCA SEM-II  
CYBER SECURITY AND LAWS

Objectives:
The aim of this course is to provide attendees with a thorough understanding of the issues associated with the design, provision and management of security services for modern communication and information systems. Students will learn the different aspects of information and network security and you will be able to speak about a multitude of security attacks and the defensive strategies used to combat them.

Unit-1

Unit-2
Authentication and access control: Identification, Authentication, Authentication by passwords, Access control structures, Types of access control.

Unit-3
Legal and Ethical Issues: Protection of data and Information Laws, Employees rights, Software failure, Computer Crime, Privacy, and Ethics

Unit-4

Unit-5
Hacking: Introduction of hacking, hacking, criminal hacking vs. Ethical hacking.
IPR: Ethical Issues in intellectual property right, copy right and related rights, patent and related rights, Trade Marks and rights arising from Trademark registration, software piracy, plagiarism. Indian Legislations for the protection of various types of Intellectual Properties

Advance topic: Database, web and Mobile Security, Authentication in distributed systems

TextBooks:
1. Cyber laws and syber security in developing and emerging economies, Zeinab Karake-Shalhoub, Luna Al Qasimi
2. Computer Security, Dicertgouman, John Wiley & Sons

Reference Books

<table>
<thead>
<tr>
<th>S. NO.</th>
<th>PAPER CODE</th>
<th>SUBJECT/PAPER</th>
<th>#L</th>
<th>#T</th>
<th>#P</th>
<th>TOTAL CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>THEORY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>44CA308</td>
<td>JAVA Programming</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>44CA307</td>
<td>Computer Graphics</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>44CA303</td>
<td>Theory of Computation</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>44CA304</td>
<td>Data Structure Using C</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>44CA305</td>
<td>Advanced Software Engineering</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>44MS306</td>
<td>Discrete Mathematical Structure</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>PRACTICAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>44CA355</td>
<td>JAVA Programming LAB</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>44CA354</td>
<td>Project LAB</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>44CA353</td>
<td>Data Structure Using C LAB</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>TOTAL CREDIT</strong></td>
<td>18</td>
<td>6</td>
<td>9</td>
<td>30</td>
</tr>
</tbody>
</table>
SUBJECT NAME: JAVA PROGRAMMING

Unit – 1
History and evolution of Java: Creation of Java, Java Byte Code, Java Virtual Machine, Difference between Java and C++, Java program structure, Java Tokens. Overview of Java: First simple program of Java, Implementing Java program. Data types, variables and constants: Primitive and non primitive data type, Type conversion and casting, Operators.

Unit – 2

Unit – 3
Interfaces: Introduction, Defining Interfaces, Implementing Interfaces. Packages: Java API Packages, Adding classes to package. Exception handling: Exception classes in Java, Type of errors, Compile time errors, Run time errors, Use of TRY and CATCH

Unit – 4
Multithreading, Basic idea of multithreaded programming, the life cycle of a thread, Creating thread with the thread class and runnable interface, Thread synchronization, Thread scheduling. IO package: Inputstreams, Outputstreams, Object serialization, Deserialization.

Unit – 5
GUI-Introduction to AWT programming, Layout and component managers, Event handling, Applet class, Applet life-cycle, passing parameters embedding in HTML. AWT- Overview of AWT, AWT Components, Menu and Dialogs, Layout Manager

Text Books:
1. Herbert Scheldt, The Complete Reference for Java, TMH publication

Reference book
1. E. Balagurusamy, Fundamental of Java programming
LIST OF PRACTICALS:
1. To find the sum of any number of integers entered as command line arguments
2. To find the factorial of a given number
3. To learn use of single dimensional array by defining the array dynamically.
4. To learn use of length in case of a two dimensional array
5. To convert a decimal to binary number
6. To check if a number is prime or not, by taking the number as input from the keyboard
7. To find the sum of any number of integers interactively, i.e., entering every number from the keyboard, whereas the total number of integers is given as a command line argument
8. Write a program that show working of different functions of String and StringBuffer classes like setCharAt(setLength()), append(), insert(), concat() and equals().
9. Write a program to create a —distancel 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 —distancel class by creating constructor for assigning values (feet and inches) to the distance object. Create another object and assign second object as reference variable to another object reference variable. Further create a third object which is a clone of the first object.
11. Write a program to show that during function overloading, if no matching argument is found, then java will apply automatic type conversions(from lower to higher data type)
12. Write a program to show the difference between public and private access specifiers. The program should also show that primitive data types are passed by value and objects are passed by reference and to learn use of final keyword
13. Write a program to show the use of static functions and to pass variable length arguments in a function.
14. Write a program to demonstrate the concept of boxing and unboxing.
15. Create a multi-file program where in one file a string message is taken as input from the user and the function to display the message on the screen is given in another file (make use of Scanner package in this program).
16. Write a program to create a multilevel package and also creates a reusable class to generate Fibonacci series, where the function to generate fibonacci series is given in a different file belonging to 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 multithread communication by implementing synchronization among threads (Hint: you can implement a simple producer and consumer problem).
23. Write a program to create URL object, create a URL Connection using the openConnection() method and then use it examine the different components of the URL and content.
24. Write a program to implement a simple datagram client and server in which a message that is typed into the server window is sent to the client side where it is displayed.
25. Write a program that creates a Banner and then creates a thread to scrolls the message in the banner from left to right across the applet’s window.
26. Write a program to get the URL/location of code (i.e. java code) and document(i.e. html file).
27. Write a program to demonstrate different mouse handling events like mouseClicked(), mouseEntered(), mouseExited(), mousePressed, mouseReleased() and mouseDragged().
28. Write a program to demonstrate different keyboard handling events.
29. Write a program to generate a window without an applet window using main() function.
30. Write a program to demonstrate the use of push buttons.
SUBJECT NAME: COMPUTER GRAPHICS

Unit - 1
Fundamental of Computer Graphics:- Definition, classification and application, Development of hardware and software for computer graphics, Display Devices, hardcopy devices, Interactive input devices, display processor, line drawing , various algorithms and their comparisons, circle generation:- Bresenham’s midpoint circle drawing algorithm, midpoint ellipse drawing algorithm.
I/O Devices:- Random and Raster scan display, frame buffer, persistence, resolution, character generation

Unit - 2
Scan Conversion:- scan conversion line, circle ,ellipse, arcs, sectors, polygon, region filling, area filling, scan line algorithm, boundary fill, flood fill algorithms, aliasing effects and ant aliasing.
Transformations:- 2D and 3D transformation:- scaling, rotation, shearing, reflection, homogeneous coordinate system, composite transformation, rotation about arbitrary point(2D), rotation about arbitrary axis(3D)

Unit - 3
2D viewing and clipping:- concept of window , viewport, window to viewport transformation, graphic pipeline, panning , zooming
Line clipping algorithms, Cohen Sutherland polygon clipping, Sutherland Hodgeman algorithm, Wailer Atherton
3D clipping:- Normalized view volumes, viewport clipping, clipping in homogeneous coordinate. Liang Barsky algorithm.
Projection:- Parallel and perspective projection and different types of projections, 1,2 vanishing points.

Unit - 4
Hidden surface:- Depth Buffer(Z buffer, A buffer) back face , painters algorithm , area sub division, depth sorting method, BSP trees
Shading and illumination model-Light sources, diffuses, peculiar reflection, reflected light intensity level, surface shading, phong shading, gourard shading, color model. RGB, CYMK, YIQ, HSV.

Unit - 5
Curves and Fractals-Generation, classification and dimension, basic fractal images, Koch curve, spearpinski triangle, mandelbort and Julia set, applications of fractals.

Text Book:

Reference Book:
SUBJECT NAME: THEORY OF COMPUTATION

Unit – 1

Unit – 2
Finite Automata (FA): Definition, transition function, transition diagram, transition table, String/Language acceptability by FA, Types of FA, NFA to DFA conversion, Minimization of DFA, Application of FA, Myhill-Nerode Theorem.
Regular Language (RL): Definition, closure properties, regular grammar (RG), regular expression, rules of expression, transformation of regular expression to Finite automata, Arden’s Theorem, DFA to regular expression transformation, Pumping Lemma for regular language.

Unit – 3
Pushdown Automata (PDA): Definition, String/Language acceptability by PDA, Types of PDA, design of PDA, Application of PDA.

Unit – 4
Linear Bounded Automata (LBA): Definition, String/Language acceptability by LBA, Types of LBA, design of LBA, Application of LBA.
Context Sensitive Grammar (CSG): Definition, closure properties, Context Sensitive Grammar (CSG), Pumping Lemma for CFL

Unit – 5
Turing Machine: Definition, String/Language acceptability by TM, representation to TM, Types of TM, Universal Turing Machine (UTM), two-way infinite TM, multi-tape TM, design of TM, Application of TM, halting problems of TM, Decidability.
Recursive Enumerable Language (REL): Definition, closure properties, Recursive Enumerable Grammar.


Textbooks:
1. K.L.P Mishra, Theory of Computer Science

Reference Book
1. Aho, Ullmann, Theory of Computation
SUBJECT NAME: DATA STRUCTURE USING C

Unit – 1
**Introduction to Data structures:** Definition, Classification and Operations on data structures, DMA, asymptotic notation, Algorithm complexity. Big O notation.

**Linked List:** Linked List-Types of linked list, singly linked list, doubly linked list, circular linked list, Circular doubly linked list. Application of linked list-Polynomial representation and addition.

Unit – 2
**Stack and Queue:** Stack-Array and linked list representation of stack, operations on stack, PUSH and POP. Applications of stack, Conversion from infix to postfix and prefix. Evaluation of prefix and post fix expression using stack. Recursion. Queue-Array and linked list representation of queue. Types of Queue, various operations on queue. Applications of Queue.

Unit – 3
**Graphs:** Graphs-related definition, graph representation-adjacency matrix, adjacency list, adjacency multilist, traversal DFS, BFS, minimum spanning tree, shortest path algorithm, Kruskal and Prim’s algorithm.

Unit – 4
**Trees:** Basic terminology, binary tree, binary tree representation, complete binary tree, Extended binary tree, Array and linked list representation of binary tree, Traversing binary trees, Threaded binary tree, B-tree, 2-3 tree, AVL tree, Insertion and deletion in binary search tree, forest, conversion of forest into tree, heap definition, max heap and min heap.

Unit – 5
**Sorting and Searching:** sorting- types of sorting, inplace sorting, stable sorting, Bubble sort, selection sort, insertion sort, quick sort, merge sort, shell sort, heap sort, Radix sort, counting sort Searching-Linear and Binary search, Hashing basics, methods, collision resolution, chaining, linear probing, rehashing. Lexicographical ordering, LCP computation, suffix tree, splay tree, treaps, red-black tree

**Text Books:**
1. G.S. Baluja, Data Structure and Algorithms
2. Advanced Data structures, Peter Bras
List of practical:
1. Program to create, insert, delete and display operations on single linked list.
2. Program to create, insert, delete and display operations on double linked list.
3. Program to create, insert, delete and display operations on circular single linked list.
4. Program to split a single link list.
5. Program to reverse a single linked list.
6. Program to implement insertion sort.
7. Program to implement PUSH and POP operations on Stack using array method.
8. Program to implement PUSH and POP operations on Stack using Linked List method.
9. Program to implement insert and delete operations on Queue using array method.
10. Program to implement insert and delete operations on Queue using Linked List method.
11. Program to implement insert and delete operations on Priority Queue.
12. Program to implement insert and delete operations on Double Ended Queue.
13. Program to evaluate postfix expression by using Stack.
14. Program to construct Binary Search Tree and implement tree traversing techniques.
15. Program to delete a leaf node from binary search tree.
16. Program to implement Selection Sort.
17. Program to implement Bubble Sort.
18. Program to implement Operations on Circular Queue.
19. Program to implement Quick Sort.
20. Program to Find number of Leaf nodes and Non-Leaf nodes in Binary Search Tree.
SUBJECT NAME: ADVANCED SOFTWARE ENGINEERING

Unit – 1

Unit – 2

Unit – 3

Unit – 4
Testing: Testing Techniques: software testing, functional and non-functional testing: white box, black box testing, different types of testing: static, structural, desk checking, code walk through, beta, stress, code inspection, code coverage, code complexity, statement, path, condition, function coverage, cyclomatic complexity, compatibility, integration, acceptability.

Unit – 5
Software Quality Assurance: Quality Concepts, software quality Assurance, Garvin’s Quality Dimensions, McCall’s Quality factors, Software Reviews, formal technical reviews, formal approaches to SQA, Software reliability, Information to ISO – Standard. Function point, Metrics Challenges of software engineering for distributed systems. CASE tools.

Text Books:

Reference Books:
SUBJECT NAME: DISCRETE MATHEMATICS STRUCTURE

Unit-1
Set Theory: Element of set, Types of set, Operation on Sets, Union, Intersection and Complement of Sets, Cartesian product, Venn diagram, Different Laws on sets.

Unit-2
Combinatorics: Mathematical inductions, Strong induction and well ordering, The basics of counting, The pigeonhole principle, Permutations and combinations, inclusion and exclusion and applications.

Unit-3
Preposition: Preposition, First Order Logic, Basic Logic Operation, Logical Equivalence, Truth Table, Normal Forms, Predicates and Quantifiers, POSET, Hasse Diagram, Well Ordered Set, Complete Order.
Lattices and Boolean algebra: Properties of lattices, Complete Lattice, Distributive Lattice, Bounded Lattice, Lattice Homomorphism, Lattices Isomorphism, Least Upper Bound, Greatest Lower Bound

Unit-4
Dimensional Geometry: Graph Theory, Concepts Graph, Sub graph, Isomorphic Graph, Homomorphic Graphs, Weighted Graphs, Shortest Paths in weighed graphs (Dijikstra’s algo), Operations on Graphs, Directed Graph, Matrix Representation On Graphs, Cyclic Graphs, Tree, Rooted Tree, Labeled Graph, Weighted Graph, Decision trees or Sorting Tree, Spanning Tree, Binary Trees, Algorithms- Prim’s, Kruskal.

Unit-5
Algebraic Structures: Properties, Binary operation, groupoid, semi group, monoid, Group, abelian group, Subgroup, cyclic group, homeomorphism and isomorphism of group, Definition and examples of rings and field.

Text Books:
1. Elementary Abstract Algebra 1996  B.R. Thakur Ram Prasad And Sons
2. Discrete Mathematics Aug-2006 Dr.D.C. Agrawal Shree Sai Prakeshan

Reference Books:
1.Naive Set Theory  1960  Paul Richard Halmos
### MCA 4th semester

<table>
<thead>
<tr>
<th>S. NO.</th>
<th>PAPER CODE</th>
<th>SUBJECT/PAPER</th>
<th>#L</th>
<th>#T</th>
<th>#P</th>
<th>TOTAL CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>THEORY</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>44CA401</td>
<td>Analysis and Design of Algorithm</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>44CA402</td>
<td>Web Technology</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>44MS403</td>
<td>Applied Mathematics (Calculus &amp; Statistics)</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>44CA404</td>
<td>Database Management System with Oracle</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Elective-1</td>
<td></td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>44CA406</td>
<td>Compiler Design</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PRACTICAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>44CA451</td>
<td>Database Management System with Oracle LAB</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>44CA452</td>
<td>Web Technology LAB</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>44CA453</td>
<td>Project LAB</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TOTAL CREDIT</td>
<td>18</td>
<td>6</td>
<td>9</td>
<td>30</td>
</tr>
</tbody>
</table>

**Elective 1: (Choose any one of these)**

- **a.** Artificial Intelligence  
  44CA405-A
- **b.** Cryptography and Network Security  
  44CA405-B
- **c.** Entrepreneurship  
  44EN405-C
- **d.** Fuzzy logic and Neural Network  
  44CA405-D
- **e.** Digital Image Processing  
  44CA405-E
SUBJECT NAME: ANALYSIS AND DESIGN OF ALGORITHMS

Unit-1
Introduction to Algorithm:
Definition, Criteria of Algorithm, Time and Space complexity, asymptotic notation: Big Oh, Omega and Theta, Worst, Average and Best case analysis, Recurrence relation: Master method, Substitution method, Analysis of algorithm, Design of Algorithm, Types of algorithm strategies, case study of insertion sort

Unit-2
Brute-force approach: Sequential search, Selection sort
Divide-and-Conquer: Binary search, Merge sort, Quick sort, Matrix Multiplication using Stassen’s method.

Unit-3
Dynamic Programming: Elements of dynamic programming, Matrix-chain multiplication, longest common subsequence, Fibonacci sequence, Floyd-Warshall Algorithm
Greedy Algorithms:
Elements of Greedy Algorithm, Minimal spanning tree Algorithm (Prim and Kruskal), Shortest distance Algorithm (Dijkstra), Huffman trees for optimal encoding.

Unit-4
Backtracking: Elements of Backtracking, Knapsack problem, 8-Queens Problem, Graph coloring, Travelling-Salesman Problem.
BRANCH AND BOUND: Basic method, 0/1 knapsack problem, Travelling Salesman problem

Unit-5
Complexity Classes: P, NP, NP-hard, NP-complete, P vs. NP Problem, Relation among P, NP, NPC and NPH.

Text Books:

Reference Books:
SUBJECT NAME: WEB TECHNOLOGIES

Unit-I : HTML

Unit-II
Cascading Style Sheet- Introduction, Levels of CSS inline style sheet, External style sheet, classes, class and ID method, DIV and SPAN tags, introduction to CSS3.
JavaScript- Introduction, Language Basics-Variables, operators, statements, functions, JavaScript Events, Such as on click, mouse out, mouse over etc, form validation.

Unit-III
XML-Introduction, XML Fundamentals, XML Syntax, Accessing Data from XML Documents.
J Query- Introduction, J query Syntax, J query selectors, Events.

Unit-IV
PHP – Introduction to Scripting Language PHP, Installation and Configuration of PHP, Data types in PHP, PHP Syntax, Comments, Variables and Constants, Embedding PHP in HTML.
PHP Functions: user defined functions, Strings Concatenation, Strings functions.
Arrays: Creating Array and Accessing Array Elements, Control statements, Loops, form validation.

Unit-V
Working with forms: - CRUD – Select statements, Creating Database/Tables, Inserting values, Updating and Deleting, PHP with MYSQL, Creating Connections, Selecting Database, Perform Database (Query).

Text Books:

Reference Books:

List of practical:
1. Create a web page by making use of the following tags: Head, Body, Bgcolor, text and submit.
2. Write a html program applying inline css.
3. write a html program using class based external style sheet
4. Write a java script program to design the simple Calculator
5. Write a java script program to find the factorial of given number
6. Write a javascript program to form validation in html.
7. Create a web form using php for login page.
8. Create a simple xml document with following details: Rollno, Sname, Contact, Email and Address.
9. Write a simple php script to perform crud operations.
10. Create a web form using php for enquiry details.
SUBJECT NAME: APPLIED MATHEMATICS (CALCULUS & STATISTICS)

Unit-1
**Differential equation of first Order and first Degree:** Linear Equations, Bernoulli’s equation, Exact differential Equations.

**Differential equation of first Order and Higher Degree:** First Order Higher Degree Equations Solvable for x, y, p. Clairaut’s form and Singular Solutions.

Unit-2
**Linear Differential Equations of Higher order with Constant Coefficients:** Auxiliary equation, Auxiliary equation having equal roots, Auxiliary equation having Imaginary roots, Particular Integral by general method, Particular Integral By special method, Homogeneous Linear ordinary Differential Equations.

Unit-3
**Statistics:** Introduction to statistics, Measures of central tendency-Mean, Median and Mode, Measures of dispersion, Mean deviation, Standard deviation and Coefficient of variation.

Unit-4
**Correlation and Regression:** Types of correlation, Method of studying correlation, Scatter diagram, Correlation graph, Coefficient of correlation, Compression of correlation and Regression studies, Method of least squares.

Unit-5
**Probability:** Definitions, Addition law of probability, Multiplication law of probability, Conditional probability, Baye’s theorem.

Text Books:

References Books:
SUBJECT NAME: DATABASE MANAGEMENT SYSTEM with ORACLE

Unit – 1
Purpose and advantages of DBMS, view of data, DBMS architecture and data independence, database languages. Classification of DBMS, schema and sub schema. Database administrator and users, data dictionary, data modeling using ER model, Entities, attributes and relationships, different types of attributes, ER diagrams, specialization and generalization, relationship, types of degree higher than two

Unit – 2
Domains, relations, kinds of relations, various types of keys, candidate, primary, alternate and foreign keys. Codd’s rule
Relational algebra,: - relational algebra with extended operations, tuple relational calculus, domain relational calculus, set operation, aggregate functions, null values, join relations.

Unit – 3:
Relational database design: Pitfalls in relational database design, trivial and non trivial dependencies, closure set of dependencies and of attributes.
Introduction to normalization, lossless decomposition, Functional dependency, 1st, 2nd, 3rd BCNF, 4NF, 5NF
Basic SQL: - DDL, DML and DCL commands, specifying constraints in SQL, select statement, additional features of SQL, PL/SQL, cursor, trigger, view

Unit – 4: Transaction management
Basic concepts, ACID properties, transaction states, implementation of atomicity and durability. Basic idea of serializibility. Concurrency control- lock based protocols, time stamp based protocols, and validation based protocols.

Unit – 5: Advance topics in DBMS
Meaning of deductive databases, Internet technology and its relevance to the DBMS, Technology of multimedia databases, Overview of digital libraries, Mobile databases, Distributed and parallel DBMS. Use of B+ tree is in the database.

Text Books:
1. Korth, Sudarshan, Database system concepts, McGraw hill

Reference books:
1. Ivan Byross, Programming in PL/SQL,
SUBJECT NAME: ARTIFICIAL INTELLIGENCE (ELECTIVE-1-a)

Unit-I
Introduction of Artificial intelligence:- various definition of AI, application and AI technique. Production system, control strategies, reasoning, forward and backward chaining.
Intelligent Agents:- Definition of a rational agent, reflex model based, utility based agents, The environment in which particular agent operates.

Unit-II
Problem solving search and control strategies:- General problem solving, production system, control strategies, exhaustive search. DFS, BFS matching, Indexing.

Unit-III
Knowledge Representation:- General concepts of knowledge, Approaches of knowledge representation, predicate logic to represent knowledge, Resolution, Unification Algorithm, First order predicate Calculus, Skolemization, Horn’s Calculus, Semantic network, frame system and value inheritance, scripts and conceptual dependency.
Symbolic reasoning under Uncertainty:- Non Monotonic Reasonic Statistical Reasoning:- Probability and Bayes Theorem, Certainty factors and Rule based system, Bayesian network, fuzzy logic and application.

Unit-IV
Natural Language Processing:- Introduction, steps, syntactic processing, semantic analysis, parsing techniques.
Planning:- Overview an example, domain the block word, component of planning systems, goal stack planning, non-linear planning, Symbolic centralized VS reactive distributed, partial order planning algorithm.

Unit-V
Uncertainty: different types of uncertainty, degree of belief and degree of truth, various probability constructs, prior probability, conditional probability, probability axioms, probability distribution and joint probability distribution. Baye’s rule, Other approaches to modeling uncertainty such as Dampster-Shafer theory.
Learning And Expert system:- Meaning, role learning, learning by taking advice, learning from examples. Explanation based learning. Expert system and its architecture, various expert systems shell, Vidwan framework, Knowledge acquisition, case studies.
PROLOG:- Introduction , converting English to Prolog, Facts and rules, goals, Prolog terminology, variables, control structure, arithmetic operator, inputs/output and streams.

Text Books:

Reference Books:
SUBJECT NAME: CRYPTOGRAPHY AND NETWORK SECURITY (ELECTIVE-1-b)

Unit-I

Unit-II
Modern Techniques: Simplified DES, Block Cipher Principles, DES Standard, DES Strength, Differential & Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher, Modes Of Operation.

Unit-III

Unit-IV
Key Management & Distribution And User Authentication

Unit-V
Network & Internet Security:

Text Books:

Reference Books:
SUBJECT NAME: ENTREPRENEURSHIP (ELECTIVE-1-c)

Unit-I
Meaning, elements, determinants and importance of entrepreneurship and creative behavior. Entrepreneurship and creative response to the society “problems and at work. Dimension of entrepreneurship: entrepreneurship, techno premiership, cultural entrepreneurship, international entrepreneurship, net premiership, eco premiership and social entrepreneurship,*each with case studies etc.

Unit-II
Entrepreneurship and Micro, small and medium enterprise. Concept of business groups and role of business houses and family business in India. The contemporary role models in Indian business: their values, business philosophy and behavioral orientations. Conflict in family business and its resolution.

Unit-III
Public and Private system of stimulation, support and sustainability of entrepreneurship. Requirement, availability and access to finance, marketing assistance, technology and industrial accommodation etc. Role of industries/entrepreneur’s association and self help groups. The concept, role and functions of business incubators, angel investors, venture capital and private equity funds.

Unit-IV
Sources of business ideas and tests of feasibility. Significance of writing the business plan/project proposal. Contents of business plan/project proposal. Designing business processes, location, layout, operation, planning & control: preparation of project report (various aspects of the project report such as size of investment, nature of product, market potential etc. may be covered).Project submission/presentation and appraisal thereof by external agencies such as financial/non financial institutions.

Unit-V
Financial: Preparation of budgets, integrated ratio analysis, assessing business risks(leverag e analysis).Marketing : product planning & development, creating and protecting market niche, sales promotion, advertising and product costing and pricing policies.HR issues in small business.

Text Books:
1. Management of small scale enterprise, Desai ,Vasant, Himalaya Publishing house

Reference Books:
1. The 10 Commandments for building a Growth Company, Brandt,Steven C, Macmillan Business books, New delhi
SUBJECT NAME: FUZZY LOGIC AND NEURAL NETWORK (ELECTIVE-1-d)

Unit – 1
Introduction: Definition of ANN-Biological Neural Networks-Applications of ANN-Typical Architectures-Setting the weights-Common Activation functions-Development of Neural Networks-McCulloch-Pitts Neuron Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and synaptic)

Simple Neural Nets For Pattern Classification: General discussion - Hebb net – Perceptron-Adaline

Unit - 2
Multilayer Feed Forward Neural Networks: Credit Assignment Problem, Generalized Delta Rule, Derivation of Back propagation (BP) Training, Summary of Back propagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements

Unit - 3

Unit - 4
Crisp Sets and Fuzzy Sets: Crisp sets: overview – Notion of Fuzzy sets- Basic concepts-Classical Logic-Fuzzy Logic – Operations on Fuzzy sets- Fuzzy complement- Fuzzy Union – Fuzzy Intersection- Combinations of operations- General Aggregation operations
Fuzzy Relations: Crisp and Fuzzy relations- Binary relations – Binary relations on a single set – Equivalence and similarity relations- compatibility or tolerance relations – orderings – morphism – Fuzzy relation equations.

Unit - 5

Advance Topics: -Applications in Engineering, Medicine, Management and decision making in Computer Science.

Text Book

References
Unit 1
**Digital Image Fundamental** – Introduction, components of image processing systems, image sensing and acquisition, image sampling and quantization, pixel operation, Light, Brightness adaption and discrimination, Imaging Geometry, Perspective Projection, Spatial Domain Filtering.

Unit 2

Unit 3

Unit 4
**Image Compression**-Encoder-Decoder model, Types of redundancies, Lossy and Lossless compression, Entropy of an information source, Shannon's 1st Theorem, Huffman Coding, Arithmetic Coding, Golomb Coding, LZW coding, Transform Coding.

Unit 5
**IMAGE SEGMENTATION AND REPRESENTATION**: Edge detection – Thresholding, Region Based segmentation, Boundary representation: chair codes- Polygonal approximation, Boundary segments, boundary descriptors: Simple descriptors, Fourier descriptors, Regional descriptors, Simple descriptors, Texture.

**Text Books**
1. Digital Image processing, 3rd edition, Rafael C. Gonzalez and Richard E. Woods

**Reference book**
1. Fundamental of Image processing, Anil K. Jain, Prentice Hall
SUBJECT NAME: COMPILER DESIGN

Unit - 1
Introduction to Compiling
Compilers – Analysis of the source program – Phases of a compiler – Cousins of the Compiler –
Grouping of Phases – Compiler construction tools - Lexical Analysis -Role of Lexical Analyzer
– Input Buffering – Specification of Tokens, Symbol Table .LEX.

Unit - 2
Syntax Analysis
Role of the parser –Context-Free Grammars – Top Down parsing - Recursive Descent Parsing -
Predictive Parsing – Bottom-up parsing - Shift Reduce Parsing – Operator Precedent Parsing –
LR Parsers - SLR Parser - Canonical LR Parser - LALR Parser, FIRST-and –FOLLOW, YACC.

Unit - 3
Intermediate Code Generation
Intermediate languages – Declarations – Assignment Statements – Case Statements – Back
patching – Procedure calls, Three Address Code Generation

Unit - 4
Code Generation
Issues in the design of code generator, The target machine, Runtime Storage management , Basic
Blocks and Flow Graphs , Next-use Information , A simple Code generator ,DAG representation
of Basic Blocks ,Peephole Optimization.

Unit - 5
Code Optimization
Introduction– Principal Sources of Optimization – Optimization of basic Blocks – Introduction to
Global Data Flow Analysis – Runtime Environments – Source Language issues – Storage

Advance topics: C# Compiler

Text Book

Reference Book
2. D. M. Dhamdhere, Compiler Construction--Principles and Practice, Second edition,
   Macmillan India, 1997
### MCA 5th semester

<table>
<thead>
<tr>
<th>S. NO.</th>
<th>PAPER CODE</th>
<th>SUBJECT/PAPER</th>
<th>#L</th>
<th>#T</th>
<th>#P</th>
<th>TOTAL CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>THEORY</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>44CA506</td>
<td>Operational Research</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>44CA502</td>
<td>Data Warehousing and Data Mining</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>44CA503</td>
<td>Linux and shell programming</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>44CA507</td>
<td>Python Programming</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Elective-2</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>44CA508</td>
<td>Cloud Computing</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PRACTICAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>44CA551</td>
<td>Linux and shell programming LAB</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>44CA555</td>
<td>Python Programming LAB</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>44CA553-A/B/C/D/E</td>
<td>Elective-2 LAB</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>44CA554</td>
<td>Minor Project LAB</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TOTAL CREDIT</td>
<td>18</td>
<td>6</td>
<td>10</td>
<td>30</td>
</tr>
</tbody>
</table>

**Elective 2: (Choose any one of these)**

- a. Advance Java Programming
  - 44CA505-A
- b. ASP.NET with C#
  - 44CA505-B
- c. Android Programming
  - 44CA505-C
- d. System and Network Programming
  - 44CA505-D
- e. MATLAB programming
  - 44CA506-E
SUBJECT NAME: OPERATIONAL RESEARCH

Unit-1

Unit -2

Unit -3

Unit -4
Sequencing models: Solution of Sequencing Problem , Processing n Jobs through 2 Machines, Processing n Jobs through 3 Machines , Processing 2 Jobs through m machines , Processing n Jobs through m Machines.

Unit -5
Dynamic programming: Characteristics of dynamic programming. Dynamic programming approach for Priority Management employment smoothening, capital budgeting, Stage Coach/Shortest Path, cargo loading and Reliability problems. Games Theory, Replacement Models

Text books:

Reference Books:
SUBJECT NAME: DATA WAREHOUSING AND DATA MINING

Unit – 1
Overview and Concepts: Need for data warehousing, Basic elements of data warehousing, Differences between database systems and data warehouse, Planning and Requirements: Project planning and management, Collecting the requirements.

Unit -2
Architecture and Infrastructure: Data warehouse architecture and its components, Infrastructure and metadata, Data design and data representation, Principles of dimensional modeling, Data extraction, Transformation and loading, Data quality. Information access and delivery: OLAP in data warehouse, Data warehousing and the web.

Unit – 3
Data Mining Introduction: Basics of data mining, Different definitions of data mining and related concepts, Data mining process, Data preparation, Data cleaning and Data visualization, KDD process.

Unit – 4
Data Mining Techniques: Classification, Clustering, Association rules and Decision trees.

Unit – 5
Web Mining: Web content Mining, Web Usage Mining, Spatial Mining, Temporal Mining, Trends in Data Mining

Text Books:
1. J. Han and M. Kamber, Data Mining: Concepts and Techniques, Morgan Kaufmann.

Reference Books:
1. A.K. Puzari, Data Mining Techniques, University Press.
OBJECTIVE: An introduction to shell programming in a Linux environment, this course is designed for system administrators or technical users with little or no programming background. Understanding shell programming gives a user full power of the LINUX environment. Topics include use of a text editor, the features of the Bash shell, variables, control structures, functions, file access and basic programming style.

Unit-I
Introduction: What is LINUX, basic architecture of unix, different flavor, CUI and GUI LINUX vs windows File system: boot block, data block, super block, Inode block & Inode table, kernel login to linux. Linux file access. basic utilities.

Unit-II
File related commands: cat, cp, wc, ls, rm, mv, cmp, comm, diff, head, tail etc.
Directory related command: pwd, cd, mkdir, rmdir etc. File permission: chmode command, setting initial permission with umask editing with vi, pipe, back grund jobs, mounting and un mounting, link and unlink, Mathematical commands: bc, expr. more and less command

Unit-III
Text manipulation: grep, egrep, sed, cut, paste, sort, split User to user communication: write, mail, mesg, wall
Process: structure of process and process control, process states and transition, process context Process command: ps, kill, nice etc, scheduling commands: at and crontab, sleep, wait

Unit-IV
Shell programming: shell, different types of shell, default assigned shell. Shell variable, key words, environment variable, shell script, Parameter passing, positional parameter & shifting, for loop, while loop, until loop, if statement, case statement.

Unit-V
AWK: AWK pattern scanning, BEGIN and END pattern, awk arithmetic, variables, and operations and function.
Advance Topics: Resolving IP addressing, TELNET, FTP, ping, tracerout. IPC & socket programming, Introduction to perl.

Reference Books
1. MJ Bach “Design of Unix OS”
3. Y kanetkar “Unix shell programming” BPB Pub
List of Practical

1. Study of requirement and Linux installation.
2. Working with File related commands.
4. Mounting of file system and command.
5. Editing a file with Vi.
6. Working with Linux Filter.
8. Shell script to add two number.
9. Shell script to print the greatest of three numbers.
10. Shell script to print the factorial of a given number.
11. Program to add two numbers using parameter passing.
12. Program to implement AWK.
13. Program to implement IPC.
14. Telnet server configuration.
15. Working with PING and Trace route command.
SUBJECT NAME: PYTHON PROGRAMMING

Unit – 1
Introduction: History, Features, Setting up path, Working with Python, Basic syntax, Variable and Data Types, Operator. Conditional Statements, Looping, Control Statements, String Manipulation

Unit – 2
Lists: Introduction, Accessing list, Operations, Working with lists, Function and Methods
Dictionaries: Introduction, Accessing values in dictionaries, working with dictionaries, Properties, Functions.
Modules: Importing module, Math module, Random module, Packages, Composition.

Unit-3
Input-Output: Printing on screen, Reading data from keyboard, Opening and closing file, Reading and writing files, Functions
Exception Handling: Exception, Exception Handling, Except clause, Try ??? finally clause, User Defined Exceptions.

Unit-4
OOPs concept: Class and object, Attributes, Inheritance, Overloading, Overriding, Data hiding.
Regular expressions: Match function, Search function, Matching VS Searching, Modifiers, Patterns
CGI: Introduction, Architecture, CGI environment variable, GET and POST methods, Cookies, File upload.
Database: Introduction, Connections, Executing queries, Transactions, Handling error.

Unit-5
Networking: Socket, Socket Module, Methods, Client and server, Internet modules.
Multithreading: Thread, Starting a thread, threading module, Synchronizing threads, Multithreaded Priority Queue.
GUI Programming: Introduction, Tkinter programming, Tkinter widgets Sending email

Text Book:

Reference Books:
**LIST OF PYTHON PRACTICALS**

1. SIMPLE PROGRAM TO RETRIEVE STRING IN REVERSE AS WELL AS NORMAL FORM.

2. WRITE A PYTHON PROGRAM FOR SWAPCASE.

3. WRITE A FUNCTION THAT TAKES AS INPUT TWO NUMBERS REPRESENTED AS STRINGS, AND RETURNS THE PRODUCT OF THE NUMBERS OF A STRING.

4. WRITE A FUNCTION THAT TAKES AN INTEGER AND RETURNS THE SMALLEST NUMBER THAT IS GREATER THAN THE GIVEN NUMBER WHICH IS A PALINDROME.

5. MAKE A PYTHON PROGRAM TO UPDATE ELEMENTS OF A LIST.

6. MAKE A PYTHON PROGRAM FOR TUPLE SLICING.

7. WRITE A PYTHON PROGRAM TO DELETE DICTIONARY ELEMENTS.

8. PROGRAM TO READ AND WRITE DATA FROM A FILE.

9. HOW DO WE USE BUILT-IN CLASS ATTRIBUTES IN PYTHON PROGRAM.

10. MAKE A PYTHON PROGRAM FOR MATCH AND SEARCH FUNCTION.

11. PROGRAM TO MULTITHREADED PRIORITY QUEUE.

12. MAKE A PYTHON PROGRAM TO UPDATE RECORDS FROM OUR COMPANY TABLE WITH THE USE OF PYTHON SQLITE3 MODULE.

13. HOW DO WE CREATE A SIMPLE SERVER AND A SIMPLE CLIENT IN PYTHON.

14. MAKE A PYTHON PROGRAM TO CREATE A CALCULATOR WITH THE USE OF TKINTER.

15. WRITE A PROGRAM TO STORE STUDENTS’ NAME AND MARKS AS A PAIR OF N STUDENTS IN A DICTIONARY AND LATER SORT THIS DICTIONARY IN THE ASCENDING ORDER OF MARKS.
Unit-1
Introduction to JFC and Swing- Button class, JRadioButton class, JTextArea class, JComboBox class, JTable class, JColorChooser class, JProgressBar class, JSlider class, Digital Watch, Graphics in swing, Displaying image, Edit menu code for Notepad, OpenDialog Box, Layout Managers, Java Reflection API, Serialization and De serialization.

Unit -2
Networking and Multithreading - Socket Programming (Connection-oriented), URL class, Displaying data of a webpage by URL Connection class, InetAddress class, Datagram Socket and Datagram Packet. Life Cycle of a Thread, Synchronization with synchronized method, Deadlock Inter-thread communication. Introduction to RMI, Steps involved in running the RMI

Unit -3
JDBC- Introduction, JDBC Drivers, DB Connectivity Steps, Store image, image, Store Retrieve, Callable Statement, Transaction Management, Batch Processing, Row Set Interface.

Unit -4
JavaServer Pages (JSP): Introduction, JSP Scriptlet tag, Implicit Objects, JSP directives, Exception Handling, Action Tags, MVC.

Unit -5

Text books:
1. J2EE, Complete Reference, Herbert Schildt.

Reference Books:
1. Advanced Programming in Java 2, K. Somasundaram, Jaico publication,
SUBJECT NAME: ASP.NET WITH C# (ELECTIVE-2-b)

Unit-1

Unit-2
C#: C-Sharp Language (C#): Introduction, Data Types, Identifiers, Variables, Constants, Literals, Array and Strings, Object and Classes, Inheritance and Polymorphism, Operator Overloading, Interfaces, Delegates and Events. Type conversion.

Unit-3

Unit-4
Web based software development: Introduction to Web servers, IIS configuration, ASP.NET Controls, ASP.NET Web Form Controls, accessing controls Buttons, Text Box, Labels, Checkbox, Radio Buttons, List Box, calendar etc.
Validation controls: RequiredFieldValidator, Range validator, RegularExpressionValidator, CompareValidator etc., creating and using web services.

Unit-5

Text Book:
1. Asp.net 3.5 black book (covers c# and vb 2008 codes) - dreamtech publication
2. The complete reference asp.net by mathew macdonald - tmh
3. Professional asp.net- wrox publication

Reference Book:
List of Practicals:

1. Write a VB.Net program for calculator.
2. Write a VB.Net program for implementation of class.
3. Write a program to implement MDI.
4. Implementation of dialog boxes.
5. Write C# code to implement inheritance.
6. Write C# program to implement operator overloading.
7. Create a web page with use of different validation controls.
8. Write code for ADO implementation.
9. Write a program to access data from XML file.
SUBJECT NAME: ANDROID PROGRAMMING (ELECTIVE-2-c)

UNIT 1
JAVA Concepts: OOPs Concepts Inheritance in detail, Exception handling, Packages & interfaces, JVM & .jar file extension, Multi-threading (Thread class & Runnable Interface).

UNIT 2

UNIT 3

UNIT 4
Basic UI design: Form widgets, Text Fields, Button controls, Toggle buttons, Alert dialog Toast, CheckBox, AlertDialog, Spinner, AutoComplete, TextView, RatingBar, DatePicker, TimePicker etc. Android Menu: Option Menu, ContextMenu, Popup Menu.

UNIT 5
Content Providers: SQLite Programming, SQLiteOpenHelper, SQLiteDatabase, CRUD using SQLite.

Text Books:

Recommended Books:

LIST OF PRACTICALS:
1. Create —Hello World application. That will display —Hello World in the middle of the screen in the emulator. Also display —Hello World in the middle of the screen in the Android Phone.
2. Create spinner with strings taken from resource folder (res >> value folder) and on changing the spinner value, image will change.
3. Create a menu with 5 options and selected option should appear in text box.
4. Create a list of all courses in your college and on selecting a particular course teacher-in-charge of that course should appear at the bottom of the screen.
5. Create an application with three option buttons, on selecting a button color of the screen will change.
6. Create and Login application. On successful login, pop up the message.
7. Create an application to Create, Insert, update, Delete and retrieve operation on the database.
8. Create an application for camera with flash and other options.
9. Create an application for music player.
10. Create an application for video player.
SUBJECT NAME: SYSTEM AND NETWORK PROGRAMMING (ELECTIVE-2-d)

UNIT 1

UNIT 2
**Scanning and Parsing**: Programming Language Grammars, Classification of Grammar, Ambiguity in Grammatical Specification, Scanning, Parsing, Top Down Parsing, Bottom up Parsing, Language Processor Development Tools, LEX, YACC

UNIT 3
**Macro and Macro Processors**: Introduction, Macro Definition and Call, Macro Expansion, Nested Macro Calls, Advanced Macro Facilities, Design Of a Macro Preprocessor, Design of a Macro Assembler, Functions of a Macro Processor, Basic Tasks of a Macro Processor, Design Issues of Macro Processors, Features, Macro Processor Design Options, Two-Pass Macro Processors, One-Pass Macro Processors

UNIT 4
**Inter process Communication**: Introduction - Message passing (SVR4), pipes, FIFO, message queues, Synchronization (SVR4), Mutexes, condition variables, read, write locks, file locking, record locking, semaphores, Shared memory(SVR4).
**Sockets**: Introduction, transport layer, socket introduction, TCP sockets, UDP sockets, raw sockets, Socket options, I/O multiplexing, Name and address conversions.

UNIT 5
**APPLICATIONS**: Debugging techniques - TCP echo client server, UDP echo client server, Ping, Trace route, Client server applications like file transfer and chat.

**Text Books**
1. W.Richard Stevens, Advanced programming in the UNIX environment, Addison Wesley, 1999.(Unit 1,2 & 3)

**Reference Books**
LIST OF PRACTICAL:
1. Implement following commands of DOS in C:
   a. mkdir
   b. dir
   c. copy

2. Write a simple ‘C’ program and generate the following codes for that.
   a. Preprocessed code
   b. Assembly Code
   c. Object Code
   d. Executable Code

3. Use macro features of C language and demonstrate the following types macro with example:
   a. Simple Macro
   b. Macro with arguments

4. Write a program to create a process and display its process identification number and parent process identification number.

5. Write a program to print process identification numbers of parent process and ten of its child processes.

6. Write a program to implement file server using Pipes.

7. Write a program to implement file server using FIFO (with related processes).

8. Write a program to implement file server using FIFO (with unrelated processes).

9. Implement TCP echo server (iterative) and client.

10. (a) Implement TCP echo server and client (concurrent) and also catch SIGCHLD signal to prevent zombies.
    (b) Modify TCP client of part (a) such that it establishes five connections with server and server should use waitpid ( ) to take termination status of its childs.

11. Implement TCP daytime server (iterative & concurrent) and client.


13. Implement TCP client and server in which you pass binary structures between them.


15. Implement UDP daytime server and client.
UNIT 1
Introduction to Programming: Components of a computer, working with numbers, Machine code, Software hierarchy
Programming Environment: MATLAB Windows, A First Program, Expressions, Constants, Variables and assignment statement, Arrays

UNIT 2
Graph Plots: Basic plotting, Built in functions, Generating waveforms, Sound replay, load and save
Procedures and Functions: Arguments and return values, M-files, Formatted console input-output, String handling

UNIT 3
Control Statements: Conditional statements: If, Else, Else if, Repetition statements: While, For, Planning a large program, working with stubs
Manipulating Text: Writing to a text file, Reading from a text file, Randomising and sorting a list, searching a list

UNIT 4
GUI Interface: Attaching buttons to actions, Getting Input, Setting Output
Discrete Linear Systems: Characterisation of linear systems, Finite Impulse Response filters, Infinite Impulse Response filters, Frequency response

UNIT 5
Spectral Analysis: Filter bank analysis, Fourier analysis, Spectrograms, Filter bank synthesis
Speech Signal Analysis: Fundamental frequency estimation – frequency domain, Fundamental frequency estimation – time domain, Formant frequency estimation

Text Book:

Reference Books:
LIST OF PRACTICAL:
1. Write a program to assign the following expressions to a variable A and then to print out the value of A.
   a. \( \frac{3+4}{5+6} \)  b. \( 2x^2 \)  c. \( \sqrt{2} \)  d. \( (0.0000123 + 5.67 \times 10^{-3}) \times 0.4567 \times 10^{-4} \)
2. Celsius temperatures can be converted to Fahrenheit by multiplying by 9, dividing by 5, and adding 32. Assign a variable called C the value 37, and implement this formula to assign a variable F the Fahrenheit equivalent of 37 Celsius.
3. Set up a vector called N with five elements having the values: 1, 2, 3, 4, 5. Using N, create assignment statements for a vector X which will result in X having these values:
   a. 2, 4, 6, 8, 10  b. 1/2, 1, 3/2, 2, 5/2  c. 1, 1/2, 1/3, 1/4, 1/5  d. 1, 1/4, 1/9, 1/16, 1/25
4. A supermarket conveyor belt holds an array of groceries. The price of each product (in pounds) is [0.6, 1.2, 0.5, 1.3]; while the numbers of each product are [3, 2, 1.5]. Use MATLAB to calculate the total bill.
5. The sortrows(x) function will sort a vector or matrix X into increasing row order. Use this function to sort a list of names into alphabetical order.
6. The identity matrix is a square matrix that has ones on the diagonal and zeros elsewhere. You can generate one with the eye() function in MATLAB. Use MATLAB to find a matrix B, such that when multiplied by matrix A=[1 2; -1 0] the identity matrix I=[1 0; 0 1] is generated. That is A*B=I.
7. Create an array of N numbers. Now find a single MATLAB statement that picks out from that array the 1,4,9,16,…,\( \sqrt{N} \)th entries, i.e. those numbers which have indices that are square numbers.
8. Draw a graph that joins the points (0,1), (4,3), (2,0) and (5,-2).
9. The seeds on a sunflower are distributed according to the formula below. Plot a small circle at each of the first 1000 co-ordinates:
   \[
   r_n = \sqrt{n} \\
   \theta_n = \frac{137.51}{180} \pi n 
   \]
10. Calculate 10 approximate points from the function \( y=2x \) by using the formulae:
    i. \( x_n = ny_n = 2n + \text{rand} - 0.5 \)
    Fit a line of best fit to these points using the function polyfit() with degree=1, and generate co-ordinates from the line of best fit using polyval(). Use the on-line help to find out how to use these functions. Plot the raw data and the line of best fit.
11. Calculate and replay 1 second of a sine wave at 500Hz with a sampling rate of 11025Hz. Save the sound to a file called "ex35.wav". Plot the first 100 samples.
12. Calculate and replay a 2 second chirp. That is, a sinusoid that steadily increases in frequency with time, from say 250Hz at the start to 1000Hz at the end.
13. Build a square wave by adding together 10 odd harmonics: 1f, 3f, 5f, etc. The amplitude of the nth harmonic should be 1/n. Display a graph of one cycle of the result superimposed on the individual harmonics.
14. Write a function called FtoC (ftoc.m) to convert Fahrenheit temperatures into Celsius. Make sure the program has a title comment and a help page. Test from the command window with:
    i. F to C(96)  ii Look for Fahrenheit  iii help F to C
15. Write a program to input 2 strings from the user and to print out (i) the concatenation of the two strings with a space between them, (ii) a line of asterisks the same length as the concatenated strings, and (iii) the reversed concatenation. For example:
    i. Enter string 1: Mark  ii Enter string 2: Huckvale
    iii Mark Huckvale  iv *************
SUBJECT NAME: CLOUD COMPUTING

Objectives: The objective and goal of this course is to provide students fundamental concepts of Cloud Computing which is one of the emerging trends in the field of Computer Science and Engineering.

Unit-1

Unit-2
Introduction to Cloud Technologies: Study of Hypervisors, Compare SOAP and REST, Web-services, AJAX and mashups-Web services: SOAP and REST, SOAP versus REST, AJAX: asynchronous 'rich' interfaces, Mashups: user interface services Virtualization Technology: Virtual machine technology, virtualization applications in enterprises, Pitfalls of virtualization, Multitenancy.

Unit-3
Data in the Cloud: Relational databases Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo. Map-Reduce and extensions: Parallel computing, The map-Reduce model, Parallel efficiency of Map-Reduce, Relational operations using Map-Reduce, Example/Application of Map-reduce, Features and comparisons among GFS,HDFS etc, Map-Reduce model.

Unit-4

Unit-5

Text Books:

Reference Books:
### MCA 6th semester

<table>
<thead>
<tr>
<th>S.NO.</th>
<th>PAPER CODE</th>
<th>SUBJECT/PAPER</th>
<th>#L</th>
<th>#T</th>
<th>#P</th>
<th>TOTAL CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PRACTICAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>44CA651</td>
<td>Major Project LAB</td>
<td>0</td>
<td>0</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>44CA652</td>
<td>Seminar and presentation</td>
<td>0</td>
<td>0</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TOTAL CREDIT</td>
<td>0</td>
<td>0</td>
<td></td>
<td>14</td>
</tr>
</tbody>
</table>

**TOTAL CREDIT**: 14