Q.P. Code :13172

Max Marks: 80 **Time Duration: 3 Hrs**

Note : Question number 1 is Compulsory. Solve any Three questions from Remaining.

Q1. Answer Following Questions (Any Four) 20M

a) What is backtracking Approach. Explain how it is used in graph coloring.
b) Explain Randomized algorithm with example.
c) What is Knuth Morris Pratt Method of Pattern Matching? Give Examples.
d) Explain in brief the concept of Multistage Graphs?
e) Merge sort and its complixity.

Q2. A) Derive and comment on the complexity of Quick Sort algorithm. 10M

b) Solve Following Knapsack problem using dynamic approach. 10M

N=4 items, capacity of knapsack M= 9

Item i	Value vi	Weight wi
1	18	2
2	25	4
3	27	5
4	10	3

Q3. A) What is sum of Subset problem? Write the Algorithm and solve following. 10M

array A = [2,3,5,6,7,8,9] and K = 15

b) Write the algorithm for finding strassens matrix multiplication and show how the complexity is being affected?. 10M

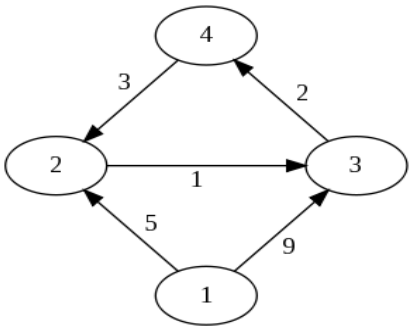
Q4. A) What is Longest Commom subsequence Problem? Find LCS for following. 10M

String x = **ACBAED**

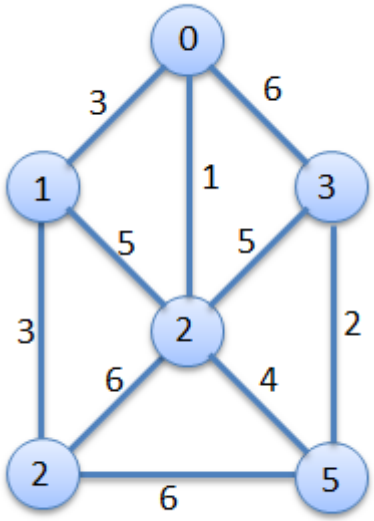
String y = ABCABE

b) Explain binary search Tree? How to generate an optimal binary search tree. 10M

Q5. A) What is all pairs shortest path algorithm? Apply the same on following Graph. 10M



b) Find MST of Following Graph using Prims and Prism's Algorithm. 10M



Q6. Write Short Notes on (Any Three) 20M

a) Optimal Storage on Tapes
b) 15 puzzle problem.
c) Binary Search and its complexity.
d) Problem of Multiplying Long Integers.

Q.P. Code :13083

[Time: Three Hours] **[Marks:80]**

Please check whether you have got the right question paper.

N.B:
1. Question no 1 is compulsory.
2. Attempt any three questions from remaining five questions.
3. Assume suitable data if required
4. Draw neat diagram wherever necessary.

Q.1 Solve any four 20

A. List different memory organization characteristics.

B. What is IO buffering?

C. In floating point representation how to identify sign of exponent?

D. What is virtual memory?

E. What is TLB?

Q.2 A. I) Draw the flow chart for Booth's Algorithm for two's complement multiplication. 4

II) Using Booth's algorithm Multiply 14 times -5. 6

B. Describe hard-wire control unit and specify its advantages. 10

Q.3 A. Compare interrupt driven I/O and DMA 10

B. Calculate the hit and miss using various page replacement policies LRU, OPT, FIFO for following sequence (page frame size 3) 4,7,3,0,1,7,3,8,5,4,5,3,4,7,534 state which one is best for above example? 10

Q.4 A. Explain set associative and associative cache mapping techniques 10

B. Explain Flynn's classification 10

Q.5 A. Explain six stage instruction pipeline with suitable diagram. 10

B. Differentiate between I. RISC and CISC II. SRAM and DRAM 10

Q.6 A. Explain different pipe lining hazards 10

B. Explain in brief cache coherency problem 10

Q. P. Code: 18508

(3 Hours) **Total Marks: 80**

N.B.: (1) Question No.**1** is **compulsory**.
(2) Solve any **three** questions out of the remaining questions.
(3) Make **suitable** assumptions if **needed**.

1. (a) Describe Data Independence. **5**
(b) Compare File System and Database System. **5**
(c) Explain ACID properties. **5**
(d) Explain Aggregate Functions in SQL. **5**

2. (a) Define Normalization. Discuss different Normalization Techniques with example. **10**
(b) Describe the overall architecture of DBMS with suitable diagram. **10**

3. (a) Explain types of integrity constraints with example. **10**
(b) Draw an ER Diagram and convert it into relational model for a Company, which has several Employees working on different types of Projects. Several Employees are working for one Department, every Department has a Manager. Several Employees are supervised by one Employee. **10**

4. (a) Discuss Data Definition and Manipulation Commands in SQL. **10**
(b) Explain Security and Authorization in DBMS. **10**

5. (a) Explain the following Relational Algebra Operations with example: **10**
i. Cartesian Product iii. Project
ii. Natural Join iv. Union

(b) Explain Log based recovery and shadow paging in detail. **10**

6. Write Short notes on: **20**
(a) Steps in Query Processing
(b) Role of Database Administrator
(c) Deadlocks
(d) Specialization and Aggregation

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QP CODE: 24607

Duration: 3 Hours **Total Marks assigned: 80**

N.B.: (1) Question No. **1 is compulsory**.
(2) Attempt any **three** of remaining **five** questions.
(3) Assume any suitable **data** if necessary and justify the same.

1. (a) What is antialiasing? Explain any one method of antialiasing. [05]
   (b) Define shearing and give example. [05]
   (c) Derive the transformation matrix for fixed point scaling. [05]
   (d) Explain inside outside test used in filling algorithm. [05]

2. (a) Explain the midpoint circle generation algorithm. [10]
   (b) Discuss all the steps used in reflection of an object about an arbitrary line with an example. [10]

3. (a) Explain the Cohen-Sutherland line clipping algorithm with suitable example. [10]
   (b) Explain any one polygon clipping algorithm. [10]

4. (a) Define window, viewport and derive window to viewport transformation. [10]
   (b) Discuss parallel and perspective projections. [10]

5. (a) Discuss Bezier curve with its properties. [10]
   (b) Explain Gouraud and Phong shading along with their advantages and disadvantages [10]

6. Write a short note on any **two** of the following [20]
   (a) 3-D representation methods.
   (b) Area Subdivision method
   (c) Fractals.

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(3 Hours) **[Total Marks: 80]**

N.B. (1)Question No. 1 is compulsory
(2) Attempt any three out of remaining five questions
(3) Assumptions made should be clearly stated

1. (a) Explain Chomsky Hierarchy 5
(b) Differentiate between DFA and NFA 5
(c) Explain Recursive and Recursively enumerable languages 5
(d) Define Regular Expression. Design R.E. for strings ending in consecutive 1's over $\sum=\{0,1\}$. 5

2. (a)Design a Finite State Machine to determine whether ternary number(base 3) is divisible 5. 10
(b) Give and Explain formal definition of Pumping Lemma for Regular Language and prove that following language is not regular. 10
$L=\{ a^n b^n \mid n >=1 \}$

3. (a) Design a PDA that checks for well -formed parenthesis. 10
(b) Consider the following grammar 10

$S \rightarrow i\ C\ t\ S \mid i\ C\ t\ S\ e\ S \mid a$

$C \rightarrow b$

For the string 'ibtibtaea' find the following:

(i) Leftmost derivation
(ii) Rightmost derivation
(iii) Parse tree
(iv) Check if above grammar is ambiguous.

4. (a) Design a Turing Machine that recognizes palindrome string where $\sum=\{a,b\}$. 10
(b) Reduce following grammar to GNF. 10

$S \rightarrow AB$

$A \rightarrow BSB|BB|b$

$B \rightarrow a$

(i) $S \rightarrow 01S|01$

$S \rightarrow 10S|10$

$S \rightarrow 00|\varepsilon$

5. (a) Convert $(0+\varepsilon)\ (10)^*(\varepsilon+1)$ into NFA with ε-moves and obtain DFA. 10
(b) Design a PDA to accept language $\{ a^{n-1} b^{2n+1} \mid n>=1 \}$ 10

6. Write short note on following (any 4) 20
(a) Closure properties of Context Free Language
(b) Applications of Regular expression and Finite automata
(c) Rice's Theorem
(d) Moore and Mealy Machine
(e) Differentiation between DPDA and NPDA