

Please check whether you have got the right question paper.

- N.B: 1) Question No. 1 is compulsory.
2) Attempt any four questions out of remaining six questions.

Q1(A) Explain the different method of sorting techniques used in data structure [10]

Q1(B) Given the set of symbols and corresponding frequency table as below, explain the steps to find Huffman Code [10]

Symbol	A	E	C	F	B	G	D	H
Frequency	12	65	23	11	55	21	45	90

Q2(A) Explain collision resolution and its techniques in context of hashing. [10]

Q2(B) Define the efficiency of an algorithm. Explain the process of analysis of an algorithm as well as the notations used (Big O, θ , Ω Notation.) [10]

Q3(A) What is sorting? Sort the following elements using selection sort method [10]

22, 12, 32, 2, 15, 25, 10, 12

Also give the algorithm and efficiency for the same.

Q3(B) Define an expression tree. For the following infix expression, draw the expression tree and find prefix and postfix expression. [10]

$A * B / (C - D) + E * (G - S)$

Q4(A) What is AVL Tree? Explain the detail. [10]

Q4(B) What is heap? Write an algorithm for ReheapUp. [10]
Construct a Max heap for the following data values arriving in sequence

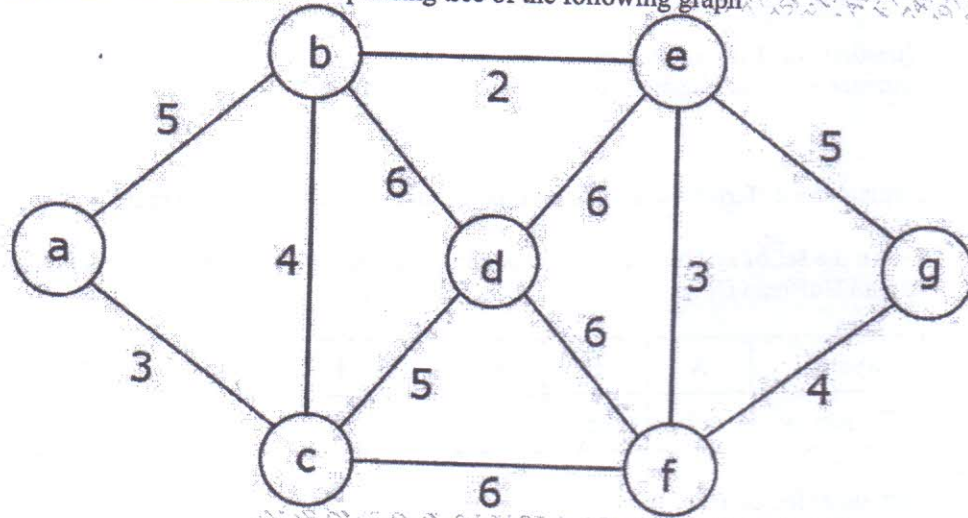
25, 13, 52, 10, 14, 29, 22, 41, 92, 31.

Q5(A) What is a Binary Search Tree (BST)? Write an algorithm to [10]
i) Insert a node in BST
ii) Find the smallest node in the BST

Q5(B) Write short note on (any two) [10]
i) Doubly linked list
ii) Dijkstra's algorithm
iii) General trees

Q6(A) What is hashing? Explain the method of hashing with suitable example. [10]

Q6(B) What is minimum spanning tree? Write Prim's algorithm to find minimum spanning tree and determine minimum spanning tree of the following graph. [10]



Q7(A) Define M-way trees. Construct a B-Tree of order 3 by inserting numbers from 1 to 10. [10]

Q7(B) Explain the Stack with Push Pop operation algorithm implementation. [10]

Total Marks: 100

Time: 3 Hrs

NOTE:

- I. Question No. 1 is **Compulsory**.
- II. Attempt any four out of remaining six
- III. Elaborate each answer with the help of an example

1. (A) Consider the following process arrival times, and run time requirements: **10**

Process Name	Arrival Time	Processing Time
A	0	5
B	1	3
C	2	8
D	3	6

For the process listed in the above table, draw a Gantt chart and Find their Average waiting time and Average turnaround time using:-

- 1) FCFS, 2) SJF (Preemptive and Non-Preemptive).
- 3) Round Robin (quantum=2)

- (B) What is thread? Explain are user level threads and Kernel level threads? **10**

2. (A) What is Deadlock? Explain the methods for Deadlock Prevention? **10**

- (B) What is Linux Operating System? What is shell? What are the Different types Of shells in Linux? **10**

3. (A) Consider the following snapshot of the system:- **10**

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P0	0	1	0	7	5	3	3	3	2
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	2	4	3	3			

Using Bankers Algorithm.

- I) What is the contents of matrix need?
- II) Is the system in safe state? Give the sequence.
- III) Is the request from P1 arrives for (1, 0, 2), can be the request be granted immediately?

- (B) Draw a diagram for Five State Process model and Explain each state transition in it. **10**

4. (A) Differentiate between fixed partitioning and dynamic partitioning. **10**

- (B) What is virtual memory? Explain in brief translation look aside table. **10**

5. (A) What is Operating System? what are the various services provided by Operating System 10
 (B) Given the disk has 200 (0 – 199) cylinders. Suppose the disk queue contains the request for I/O to blocks on the cylinder in the following order:- 10
 95,180,34,119,11,123,62,64
 What is the Total head movement for the following algorithm?
 (I)SSTF (II)SCAN (III)CSAN (IV)LOOK
 6. (A) Consider the pages are referenced in the following sequence. 10
 1,2,6,12,0,0 page size is 100.
 How many page faults will occur for the following page replacement algorithm,
 assuming three frames?
 I)LRU replacement
 II)FIFO replacement
 III) Optimal replacement.
 (B) Explain different types of process scheduling 10
 7. Write short notes on any four: 20
 (A) Android OS.
 (B) Compiler.
 (C) Assembler.
 (D) Thrashing.
 (E) Segmentation.
 (F) Semaphore.

Sem-II

[3 hours]

Marks:100

- N.B (1) Question No1 is compulsory.
 (2) Attempt any four questions out of remaining six questions.
 (3) Assume any necessary data but justify the same.
 (4) Figures to the right indicate full marks.
 (5) Use of scientific calculator is allowed.

- Q1. a) What is clipping? What are the different types of clipping? Explain the Midpoint subdivision algorithm for the same. (10)
- Q1. b) Derive the DDA line drawing algorithm and use it to rasterize the line AB with A(10,20), B(20,22) (10)
- Q2. a) Generate the points on a 2D quadratic Bezier curve with control points A(10,10), B(15, 20), C(40, 5). Use the parameter values $u=0, 0.2, 0.4, 0.6, 0.8, 1$ (10)
- Q2. b) Derive the matrix for 2D Reflection in an arbitrary line (10)
- Q3. a) What are fractals? What is fractal dimension explain in detail (10)
- Q3 b) Explain the Raster scan and Random scan techniques. (10)
- Q4. a) Explain A-buffer algorithm. What are its advantages over Z-buffer algorithm (10)
- Q4. b) Derive the matrix for pivot point rotation. Use it to rotate a rectangle ABCD about its center by 90 degrees in anticlockwise direction. The coordinates of the rectangle are A(10,10) B(30,10), C(30,20) and D(10,20). (10)
- Q5. a) What is shading? Explain in detail Gourad shading shading technique (10)
- Q5. b) What is animation? Explain he steps in the animation process. (10)
- Q6. a) Derive the Bresenham's circle drawing algorithm (10)
- Q6. b) Explain the scanline polygon filling algorithm (10)
- Q7. Write short notes on
- a) Color models (05)
 - b) Parallel Projection (05)
 - c) Display file structure (05)
 - d) Halftoning technique (05)

Sem- II.

(3 Hours)

Total Marks: 100

- N.B (1) Question No.1 is compulsory.
 (2) Attempt any four questions out of remaining six questions.
 (3) Assume necessary data but justify the same
 (4) Figures to the right in parenthesis indicate full marks
 (5) Use of scientific calculator is allowed

1. (a) Find Bowley's coefficient of skewness for the following data: (10)

Weekly wages	20-40	40-60	60-80	80-100	100-120	120-140	140-160
No. of people	8	12	20	30	40	35	18

- (b) X is normally distributed and the mean of X is 12 and standard deviation is 4. (10)
 Find the probability of the following:

1) $X \geq 20$

2) $X \leq 20$

3) $0 \leq X \leq 12$

$P(0 \leq z \leq 2) = 0.4772$

$P(0 \leq z \leq 3) = 0.49865$

2. (a) Find Spearman's rank correlation coefficient for the following data: (10)

Marks in COA	53	98	95	81	75	61	59	55
Marks in OOP	47	25	32	37	30	40	39	45

- (b) A box contains 6 red, 4 white and 5 black balls. A person draws 4 balls from the box at random. Find the probability that among the balls drawn there is atleast one ball of each colour? (10)

3. (a) 10 coins are thrown simultaneously, Find the probability of getting at least 7 heads (10)

- (b) Calculate the mean and standard deviation of the following: (10)

Age	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No. of workers	3	61	132	153	140	51	2

4. (a) Find the mean and variance of Beta distribution of first kind (10)

- (b) The first of the 2 samples has 100 items with mean 15 and standard deviation 3. If the whole group has 250 items with mean 15.6 and variance 13.44. Find the standard deviation of the second group. (10)

5. (a) The mean weekly sales of soap bars in departmental stores was 146.3 bars per store. After an advertising campaign, the mean weekly sales in 22 stores for a typical week increased to 153.7 and showed a standard deviation of 17.2. Was the advertising campaign successful? (t_{tab} at 5% LOS is 1.71) (10)

- (b) In a random arrangement of the letters of the word "COMMERCE", find the probability that all the vowels come together (10)

6. (a) The chances that doctor A will diagnose a disease X is correctly is 60%. The chances that the patient will die by his treatment after correct diagnosis is 40% and the chance of death by wrong diagnosis is 70%. A patient of doctor A, who had disease X, died. What is the chance that his disease was diagnosed correctly? (10)

- (b) Following is the age distribution of 125 families. Find the coefficient of variation (10)

Age	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Number of people	15	15	23	22	25	10	5	10

7. (a) Find the expectation of the number on a dice when thrown. Also find the variance. (10)

- (b) It is believed that the precision (as measured by the variance) of an instrument is no more than 0.16. There are 11 measurements on the instrument. Carry out the test for the belief. (10)
 2.5, 2.3, 2.4, 2.3, 2.5, 2.7, 2.5, 2.6, 2.6, 2.7, 2.5
 Chi Square tabulated value is 23.2