[Total Marks: 100]

(3 Hours)

N.B. : 1) Question No.1 is **compulsory.**
2) Attempt any **four** from the remaining questions.

1. (a) Write an algorithm for the following (10)
   i. Insert a node in sorted Linked List
   ii. Delete first node from the Linked List.

1. (b) What is a stack? Give algorithm to push and pop element in stack. List the applications of stack. (10)

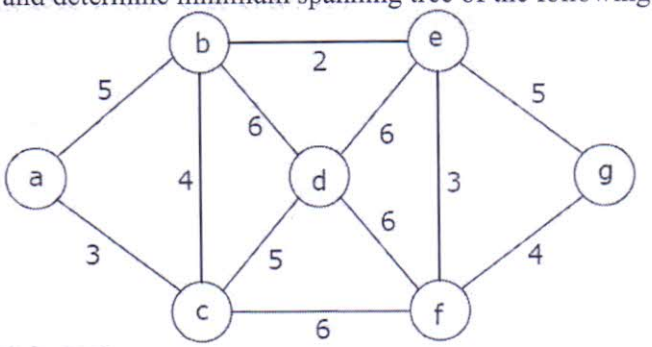
2. (a) In order and post order traversal of a binary tree are as follows (10)
   Preorder ABDG CEHIF
   Inorder DGBAHEICF
   Show a step wise reconstruction of the binary tree

2. (b) For circular queue write algorithms to (10)
   i. Insert an element in the queue
   ii. Search for an element in the queue

3. (a) Write Short notes on (10)
   i. Analysis of Algorithm
   ii. Priority Queue

3. (b) Consider the following list of numbers- 67, 12, 89, 26, 38, 45, 22, 79, 53, 9, 61 (10)
   Sort these numbers using heap sort

4. (a) What is minimum spanning tree? Write Kruskal's algorithm to find minimum spanning tree and determine minimum spanning tree of the following graph (10)



4. (b) Explain Graph and its terminology also explains in brief adjacency matrix and adjacency list for Graph Storage. (10)

5. (a) What is Huffman Coding? Given the set of symbols and corresponding (10)

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frequency table as below, explain the steps to find Huffman Code

Symbol	A	B	C	D	E
Frequency	20	10	10	30	30

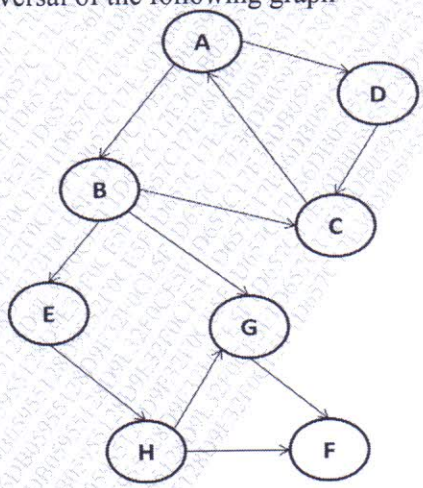
5. (b) Hash the following in a table of size 11. Use linear probing and quadratic probing collision resolution techniques: 23, 55, 10, 71, 67, 32, 100, 18, 10, 90, 44. (10)

6. (a) Define B-tree. Construct B-tree of order 4 with following data 5, 3, 21, 9, 1, 13, 2, 7, 10, 12, 4, 8 (10)

6. (b) Write a short note on (10)
   i) Binary Search Tree
   ii) Doubly linked list

7. (a) What is AVL tree? Construct AVL tree for the following data. Mention the type of rotation for each case. 50, 25, 10, 5, 7, 3, 30, 20, 8, 15 (10)

7. (b) Give BFS and DFS traversal of the following graph (10)



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(3 Hours) [Total Marks: 100]

NB:

1) Q1 is compulsory
2) Attempt any 4 from Q.2 to 7.
3) Assumptions should be made whenever required and should be clearly stated.
4) Answers to sub questions should be answered together.
5) Draw neat diagram whenever required.

Q1(a) For the processes listed below the table, draw Gantt chat and calculate average waiting time and average turnaround time using :- (12)

i) FCFS (first come first serve)

ii) SJF (Shortest Job First) in both condition preemptive and non-preemptive

iii) Round – robin (Quantum = 2)

Processes	Arrival Time(ms)	Burst Time(ms)
P1	0	5
P2	1	7
P3	2	2
P4	4	1

Q1(b) What is process? Explain about five-state Process model in detail. (08)

Q2(a) Which criteria's are important in choosing a file organization? List and briefly explain any three file organizations. (10)

Q2(b) Differentiate between (10)

i) Paging and Segmentation

ii) Monolithic kernel and Micro kernel

Q3(a) Suppose a disk drive has 200 cylinders, numbered 0 to 199. The driver is currently serving request at cylinder 50 and previous request was a cylinder 100. The queue is pending request in FIFO order is: - (10)

95, 180, 34, 119, 11, 123, 62, 64

What is the total head movement under following scheduling algorithm?

i) FCFS ii) SSTF iii) SCAN iv) C-SCAN

Q3(b) What is Dynamic and Fixed Partitioning? What are the problems with them and how can we solve these problems? Explain. (10)

Q4(a) What do you mean by concurrency control? Explain the use of semaphore and monitors in concurrency control with example. (10)

Q4(b) Given a reference string to the following pages by a program (10)
2, 3, 4, 1, 2, 3 , 0, 3, 2, 4, 1, 5 , 3, 2, 1
How many page faults will occur for the following page replacement algorithms, assuming four frames?

i) LRU replacement
ii) FIFO replacement
iii) Optimal replacement

Q5(a) Consider the following snapshot of the system: (10)

Processes	Allocation			Max			Available		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
P0	2	1	0	2	1	1	0	1	1
P1	1	2	0	2	4	2			
P2	0	1	1	1	4	2			
P3	0	0	1	2	0	1			

Using Banker's algorithm

i) What is the context of matrix need?
ii) Is the system in safe state? Give the sequence.
iii) Consider the request from process P1 arrives for (1,0,0). Can the request be immediately granted?

Q5(b) Explain the access matrix model of protection. How does it serve a useful abstraction for reasoning about protection mechanisms in a computer system? (10)

Q6(a) What is deadlock? Explain in brief deadlock prevention methods. (10)

Q6(b) What is the principle of locality? What is the purpose of Translation Look aside buffer? How to calculate number of bits in logical address and physical address when logical address space of 8 pages of 1024 word each, mapped to physical memory of 32 frames? (10)

Q7 Write short notes on **any four** (20)

i) Process Control Block
ii) Buffering
iii) Multiprogramming, Multitasking, Multiprocessing
iv) Clock Hardware and clock software
v) Features of LINUX operating system
vi) Password selection strategies

(3 Hours) **Total Marks: 100**

Please check whether you have got the right question paper.

Note : 1. Question No. 1 is compulsory.
2. Attempt any two questions from question no. 2-4
3. Attempt any two questions from question no. 5-7
4. Answer to questions should be grouped and written together.
5. Figures to the right indicate full marks assigned to the question.

Q.1 A From the following trial balance prepare Trading, Profit & Loss account and the balance sheet of Mica & Sons for the year ended on 31st March, 2018. **[10]**

Particulars	Rs.
Advertisement	4,500
Furniture	22,500
Salaries	35,000
Bills receivable	20,000
Sundry creditors	20,000
Bank loan	1,00,000
Sundry debtors	10,000
Insurance premium	2,500
Sales	2,40,000
Drawings	1,000
Carriage outward	1,000
Purchases	25,000
Building	2,50,000
Sales return	500
Opening stock	50,000
Bad debts	750
Capital	2,86,750
Trade expense	1,250
Bank balances	1,25,000
Purchases return	8,250
Wages	2,500
Interest received	1,000
Plant and Machinery	1,00,000
Carriage inward	4,500

Closing stock is valued at Rs. 45,000

B Explain Causes of Disagreement Between Cash Book and Pass Book in Bank Reconciliation statement. **[10]**

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Q.2 A. Journalize the following transactions in the books of Pin & Bros. [10]

1st Nov : Invested Cash in business Rs 40,000/-

4th Nov : Purchased Goods for cash Rs 10,000/-

7th Nov : Goods sold for cash. Product worth Rs 20,000/- which includes Trade Discount Rs 2,000/- and Cash Discount Rs 1,000/-

9th Nov : Took loan from Abha of Rs 2,000/-

10th Nov : Sold goods to Mr. Vada on credit Rs 10,000/-

12th Nov : Purchased Machinery worth Rs 1,00,000/-

14th Nov : Sold personal Motorcycle at Rs 10,000/-

19th Nov : Lost goods worth Rs 20,000/-

25th Nov : Mr. Vada paid cash

29th Nov : Paid to bank as cash against commission Rs 500/-

B. Explain Flexible and Master Budget in detail. [10]

Q.3 A Explain Meaning, Significance and Limitations of Ratio Analysis [10]

B Explain different cost elements in detail. [10]

Q.4 A. Prepare Cash Book with Discount, Cash and Bank as Column for Nov. 2018 of M/s. Dida Bros. [10]

1. Cash balance Rs. 40,000/- and bank balance Rs 50,000/-
2. Purchased goods from Zyan worth Rs.5,00,000/- on credit
4. Bank has charged Interest Rs.100/-
10. Purchased goods for Rs 70,000/- paid Rs 20,000/- by cash and rest by cheque
14. Paid Wages by cheque Rs 5,000/-
16. Sale of Rs 20,000/- and received bearer cheque.
20. Sold goods for cash Rs 30,000/-
22. Dim has directly deposited cash in bank Rs 50,000/-
30. Deposit into bank all in excess of Rs.1,000/-

B. Explain Fixed capital and Working capital. [10]

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Q.5 A. Mat Ltd. gives the following Balance sheet. Compute both ratios. [10]

- Liquid Ratio
- Solvency Ratio

Balance Sheet

Liabilities	Rs.	Assets	Rs.
12% Debentures	6,00,000	Debtors	4,00,000
Reserve fund	2,00,000	Stock	10,00,000
Overdraft	2,00,000	Cash	2,00,000
Creditors	4,00,000	Fixed Assets	28,00,000
Equity share capital	30,00,000		
Total	**44,00,000**	**Total**	**44,00,000**

B. Explain Cash and Fund flow in detail. [10]

Q.6 A. From the following forecasts of income and expenditure, prepare a cash budget for the month Jan. to Mar 2019. [10]

	Nov' 18	Dec'18	Jan'19	Feb' 19	Mar'19
Expenses	2,000	5,000	2,000	1,000	2,000
Wages	1,000	2,000	3,000	4,000	5,000
Overhead	2,000	1,000	1,000	3,000	4,000
Cash Sales	40,000	60,000	80,000	20,000	30,000
Purchases	10,000	10,000	10,000	10,000	10,000

1. Opening balance for Jan'19 is Rs 3,50,000/-
2. Delay in wages by two months
3. Expenses are to be realized in same month and rest all are delayed by month.

B. Explain any five Determinants of Working Capital. [10]

Q.7 Write Short Note on (**ANY FOUR**) [20]

i) Batch costing
ii) Accrued Income
iii) Unearned Income
iv) Further Bad Debts(FBD)
v) Liquid Assets

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[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 scaling transformation? Derive the matrix for two-dimensional fixed point scaling. (10)

Q1. b) Use Liang Barsky's line clipping algorithm to clip the line XY X(-350, -450), Y(450, 400) with respect to the window with lower left corner : (-300, -300), Upper right corner (400, 250) (10)

Q2. a) Write the Properties of Bspline Curve (10)

Q2. b) What is Reflection? What are the different types of reflections (10)

Q3. a) Derive the DDA line drawing algorithm, also compare it with Bresnham's line drawing algorithm (10)

Q3 b) Explain the Phong's illumination model . (10)

Q4. a) What is viewing? Explain the 2D viewing transformation (10)

Q4. b) Write all the homogeneous matrices for 3D rotation . Rotate the 3D PYRAMID A(10,0,10),B(20,0,10), C(20,0,20),D(10,0,20),E(15,40,15) by 60 degrees about y axis and determine the new coordinates (10)

Q5. a) Explain in detail the Halftoning and dithering techniques (10)

Q5. b) Differentiate between Parallel and Perspective Projections. (10)

Q6. a) Derive the midpoint circle drawing algorithm (10)

Q6. b) Compare and contrast between flood fill and boundary filling techniques (10)

Q7. Write short notes on

a) Fractal Dimension (05)

b) Ray Tracing (05)

c) Area-fill attributes and -fill styles (05)

d) Surface Rendering (05)

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(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 paranthesis indicate full marks

(5) Use of scientific calculator is allowed

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

Class Intervals	0-4	4-8	8-12	12-16	16-20	20-24	24-28
Frequency	10	12	18	7	5	3	4

(b) X is normally distributed and the mean of X is 30 and standard deviation is 5. Find the probability of the following: (10)

1) $X \geq 45$ 2) $26 < X < 40$

$P(0 \leq z \leq 2) = 0.4772$ $P(0 \leq z \leq 8) = 0.2881$ $P(0 \leq z \leq 3) = 0.4986$

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

Marks in DM	68	64	75	50	64	80	75	40
Marks in WT	62	58	68	44	81	60	68	48

(b) An urn contains 6 white, 4 red and 9 black balls. A person draws 3 balls from the box at random. Find the probability that among the balls drawn none is red? (10)

3. (a) If X is a Poisson variate such that (10)

$P(X=2) = 9P(X=4) + 90P(X=6)$

Find the value of λ

(b) The first of the two 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)

4. (a) Find the mean and variance of Binomial distribution (10)

(b) Obtain the median for the following frequency distribution. (10)

Wages (in Rs)	2000-3000	3000-4000	4000-5000	5000-6000	6000-7000
Number of workers	3	5	20	10	5

5. (a) A machinist is making engine parts with axle diameters of 0.7 inch. A random sample of 10 parts shows a mean diameter of 0.742 inch with a standard deviation of 0.04 inch. Test if the work is meeting the specifications. Tabulated value of t is 1.833. (10)

(b) In a random arrangement of the letters of the word "MISSISSIPPI", find the probability that all the I's come together (10)

6. (a) A continuous random variable x has the following probability density function: (10)

$f(x) = ax \quad , 0 < x < 1$
$= a \quad , 1 < x < 2$
$= -ax + 3a \quad , 2 < x < 3$
$= 0 \quad$, otherwise

Compute $P(x < 1.5)$

(b) The scores of 2 cricketers A and B in a series are: (10)
A: 50 34 70 27 19
B: 81 0 15 68 25
Find out who is more consistent using coefficient of variation

7. (a) Find the expectation of the number on a dice when thrown. Also find the variance. (10)
(b) Weights in kilograms of 10 students is given below: (10)
38, 40, 45, 53, 47, 43, 55, 48, 52, 49
Can we say that the variance of the distribution from which the above sample is drawn is 20 kg? (Tabulated value of Chi Square is 16.99)
