

(Time: 3 hours)

Total marks: 80

1. Q1 is compulsory
2. Attempt any Three from remaining Five questions

Q.1(a) Given a set of symbols & corresponding frequency table as below explain the steps to find the Huffman's code. 10

P	Q	R	S	T	U	V	W	X
24	18	7	10	13	22	8	12	6

- (b) Define Binary search tree? Write an algorithm for the following. 10
1. Find smallest number
 2. Search an element.

Q.2(a) Define Singly linked list. Write the algorithms for 10

- i. Insert an element into singly linked list
- ii. Delete the element from singly linked list.

- (b) Define Heap .State and explain it's types. Construct a Max heap for the following array of numbers. 10
- 35, 28, 33, 45, 33, 54, 12, 20, 65

Q.3(a) Define Expression tree? Draw an expression tree for the following expression and also Write it's prefix and postfix traversal. 10

$((P/Q) + (M+N)) / (Y*Z)$

- (b) Define Collision in hashing list. Implement hashing with modulo division (listsize=11) and key offset method for following keys: 23, 54, 35, 79, 80 and 102 . 10

Q.4(a) Define Binary tree? Explain types of Traversal of Binary tree. Reconstruct the binary tree using following traversal 10

Inorder: D B F E G A C I H
Preorder: A B D E F G C H I

After construction also write post- order traversal of the binary tree .

- (b) Define linear queue with functions possible on queue. Explain circular queue. 10

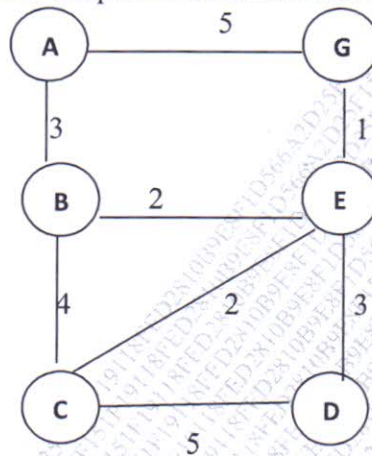
Q.5(a) Define B-tree and B* tree. Build a B-tree of order 4 by inserting the data in the sequence 10

41 13 65 7 75 26 39 88 55 14 22 62 19 32 50

- (b) Explain difference between:
 i. Sequential search and Binary Search
 ii. Stack and Queue

Q.6(a) Write algorithm for Insertion sort. Implement insertion sort for following list. Show the tracing for passes.
 34, 89, 85, 30, 45, 50, 28, 25

- (b) Explain types of Graph. Find out Minimum spanning tree using Prim's algorithm.



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A/Son - II
Choice based

(Time: 3 hours)

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Note:

1. Q1 is compulsory
2. Attempt any three from remaining questions
3. Answers to sub questions should be answered together
4. Illustrate answers with diagram wherever necessary

Consider the following snapshot:

(10)

Q1(a)

Processes	Allocation				Max				Available			
	R1	R2	R3	R4	R1	R2	R3	R4	R1	R2	R3	R4
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

Using Banker's algorithm

- What is the context of matrix need?
- Is the system in safe state? Give the sequence.
- Consider the request from process P1 arrives for (0, 4, 2, 0).
- Can the request be immediately granted?

(b) Describe the differences among short-term, medium-term and long-term schedulers. (10)

Q2(a) What do you mean by concurrency control? Explain the use of semaphore and monitors in concurrency control with example. (10)

(b) What is an operating system? What are its services and components? (10)

Q3(a) Given a reference string to the following pages by a program 2,1,3,3,2,8,7,8,1,2,3,1,4,1,5,6,2,6,3,5,6,7,8,7,8,3,5,3,8,4,4,3,4. How many page faults will occur for the following page replacement algorithms, assuming three frames? (10)

- LRU replacement
- FIFO replacement
- Optimal replacement

(b) Explain the Access Matrix model of protection. How does it serve a useful abstraction for reasoning about protection mechanism in a computer system? (10)

Q4(a) Suppose a disk drive has 200 cylinders, numbered 0 to 199. The driver is currently serving request at cylinder 140 and previous request was a cylinder 150. The queue is pending request in FIFO order is :- 148, 65, 15, 58, 60, 33, 165, 175 (10)

What is the total head movement under following scheduling algorithm?

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

(b) What is thread? Explain various kinds of threads in detail. (10)

Q5(a) For the processes listed below the table, draw Gantt chart and calculate average waiting time and average turnaround time using :-

- FCFS (first come first serve)
- SJF (Shortest Job First) in both condition preemptive and non-preemptive
- Round – robin (Quantum = 2)

Processes	Arrival time(ms)	Burst time(ms)
P1	0	9
P2	1	5
P3	2	7
P4	3	3

(b) Explain the different method of file access. Explain the mechanisms of free space management.

Q6 Write short notes on: (Any four)

- Buffering and Spooling
- Process Control Block
- Clock Hardware and clock software
- Linker and Loader
- Swap-space management

[Time: 3 Hours]

[Total marks: 80]

N.B. (1) Question 1 is compulsory.

(2) Attempt any three from remaining five questions.

1. (a) Explain different types of transmission impairments. 10
- (b) Explain HTTP and SMTP protocols in application layer. 10
2. (a) Explain four way handshaking for TCP connection termination. 10
- (b) Differentiate between 10
 - i) RIP and OSPF
 - ii) ARP and RARP
3. (a) Explain the terms: Intranet, Internet and Extranet 10
- (b) Given the Class C network 192.168.10.0 uses the subnet mask 255.255.255.192 to create subnets, on this basis answer the following: 10
 - i) How many subnets are created?
 - ii) How many hosts per subnet?
 - iii) Design the address allocation of each subnet.
4. (a) What is topology? What are different types of topologies? List the advantages and disadvantages of each type. 10
- (b) Calculate the CRC for the following bit stream 1101011011 using divisor 10011 and write codeword 10
5. (a) What are the different types of transmission media? Explain types of various types of unguided media? 10
- (b) What is interdomain routing? Explain BGP routing protocol in detail. 10
6. Write short notes on any FOUR. 20
 - a) Domain Name System
 - b) Source Routing Bridge
 - c) Code Division Multiple Access
 - d) Optimality Principle
 - e) Asynchronous Transfer Mode

(3 Hours)

Marks: 80

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- i. Question No 1 is compulsory of 20 Marks
- ii. Attempt any Three from Q2 to Q6
- iii. Figures to the right indicate marks full marks
- iv. Answers to the Questions should be grouped and written together

- Q1 a From the Following Trial Balance of Moon Traders prepare Trading & Profit & Loss A/c for the year ended 31/12/2018 and Balance Sheet as on that date. 10

Trial Balance as on 31/12/2018

Particulars	Debit Rs.	Credit Rs.
Capital		19,000
Loans		1,000
Sales		38,000
Creditors		19,000
Purchases Return		2,000
Plant & Machinery	13,000	
Buildings	17,000	
Debtors	9,650	
Purchases	18,000	
Discount allowed	1,200	
Wages	3,000	
Salaries	7,000	
Traveling Expenses	750	
Rent	200	
Insurance	300	
Commission paid	100	
Cash on hand	100	
Bank	1,600	
Legal charges	500	
Advertisement	600	
Opening Stock	6,000	
Total	<u>79,000</u>	<u>79,000</u>

Adjustments

- i. Closing Stock as on December 31st, 2018, Rs. 8,000
 - ii. Outstanding Rent Rs. 100
- b Explain Cash Flow Statement and funds flow statement 10

- Q2 A Journalise the following transactions in the Journal of Shri Apte Bros, for the month of September 2018

September 2018	
1	Started business with cash of Rs. 50,000
2	Opened a account with Bank by depositing Rs. 5,000
3	Purchased goods worth Rs. 5,000 form Ms. Laxmi subject to trade discount of 5%
7	Sold goods to Ms. Radha on credit for Rs. 2,000
8	Withdrew cash for personal use Rs. 500
9	Paid Commission Rs. 400
10	Purchased furniture of Rs. 5,000
19	Sold goods Rs. 1,000
20	Purchased Horse Rs. 25,000
29	Paid Salary by cheque Rs. 5,000

- B Explain the meaning and goals of Financial management

- Q3 A From the following data prepare a cash budget for three months from May to July.

Month	Sales (Rs.)	Purchases (Rs.)	Wages (Rs.)	Office Expenses (Rs.)	Other Expenses
March	75,000	36,000	10,500	6,500	5,000
April	62,000	38,000	8,000	9,500	7,000
May	64,000	33,000	10,000	11,500	-----
June	58,000	35,000	8,500	9,000	-----
July	26,000	49,000	14,500	13,500	-----
August	80,000	44,000	7,500	2,500	8,000

Additional Information

- Cash balance on 1st May Rs. 8,000/-
 - Sales and Purchases are all on credit.
 - Furniture costing Rs. 16,000 is due for delivery in July, Rs. 1,600 is to be paid on delivery and the balance after 3 months.
 - Advance Tax installment of Rs. 5,000 is payable in March and of Rs. 8,000 in June
 - Period of credit allowed by suppliers is two months and allowed to customer is one month
 - Lag in payment of wages and office expenses is one month
 - No lag in payment of Other expenses
- B Explain the concept of Break Even Analysis, Margin of Safety and P/V Ratio

Q4 - A You have been furnished with the financial information of Vishnu mills Limited 10
as under. Compute the following ratios for the year 2017

- i. Current ratio
- ii. Stock Turnover's Ratio
- iii. Debtor's Turnover Ratio
- iv. Gross profit Ratio
- v. Net Profit Ratio

Statement of Profit for the year 31st December 2017

Particulars	Rs.
Credit Sales	40,00,000
Less COGS	<u>28,00,000</u>
Gross Profit	12,00,000
Less Interest	80,000
Less other expenses	40,000
Less Selling expenses	<u>40,000</u>
Net Profit	10,40,000

Extracts Of Balance sheet as on 31st December 2017

Particulars	Rs
Cash	1,60,000
Sundry Debtors	4,00,000
Short term Investments	3,20,000
Stock	21,60,000
Prepaid Expenses	12,000
Total current assets	30,52,000
Current Liabilities	8,00,000
10% debentures	16,00,000
Equity Share Capital	20,00,000
Retained earnings	9,04,000

Additional Information:

Opening Sundry Debtors are Rs. 3,20,000 and Opening Stock is Rs. 1,84,000

B Explain any five principles of Accounting

10

- Q5 A A Company is considering to install a machine at the cost of Rs. 50,000 .The estimated cash flows after tax before depreciation from Machine A and Machine B are as follows:

	Machine A	Machine B
Year	CFATBD (Rs.)	CFATBD (Rs.)
1	20,000	10,000
2	20,000	30,000
3	30,000	30,000
4	40,000	40,000
5	50,000	40,000

Evaluate and recommend whether the company should invest in Machine A or Machine B by computing Net Present Value at 10% discount rate

Present Value at 10 % discount rate

Year	1	2	3	4	5
Discount Factor @ 10%	0.909	0.826	0.751	0.683	0.621

- B Explain Operating Leverage and Financial leverage

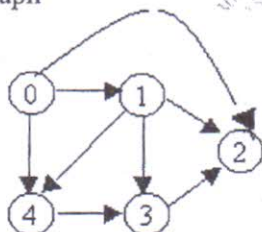
- Q6 A Write short notes on:

- Cost of Capital
- Working Capital

- B Explain the concept of Capital Budgeting and Pay Back Method

- N.B. (1) Question 1 is compulsory
 (2) Attempt any 3 from the from remaining 5 question
 (3) Use of Scientific calculator is not allowed.
 (4) Figures to right indicate full marks.

- Q.1 (a) Consider the following relations on $\{1,2,3,4\}$, Determine (10)
 whether the given relation is reflexive, symmetric, and
 transitive? Also determines whether the relation is equivalence
 or not .
 $R = \{(1,1),(1,2),(2,1),(2,2),(3,4),(4,3),(3,3),(4,4)\}$
 (b) Check whether the following are logically equivalent or not (5)
 using truth table
 $p \rightarrow (q \vee r) \equiv (p \rightarrow q) \vee (p \rightarrow r)$
 (c) Write the difference between MCDM and MADM (5)
- Q.2 (a) Using mathematical induction prove that the sum of first (10)
 positive integers is $n^2 + n$ i.e. $2+4+6+8+\dots+(2n) = n^2 + n$
 (b) Find adjacency lists and adjacency matrix for the following (5)
 graph



- (c) A term life insurance policy will pay a beneficiary a certain sum (5)
 of money on the death of the policy holder. These policies
 have premiums that must be paid annually. Suppose a life
 insurance company is considering selling a \$250,000 one-year
 term life insurance policy to a 49-year-old female for \$550.
 According to the National Vital Statistics Report, the probability
 the female will survive the year is 0.99791. Compute the
 expected value of this policy to the insurance company.

- Q.3 (a) Let $A = \{1,2,3,4\}$. Consider a relation R on A as (10)
 $\{(2,1),(3,1),(3,2),(4,1),(4,2),(4,3),(1,1),(2,2),(3,3),(4,4)\}$ Show
 that R is partial order relation.
 (b) Use SAW method to determine the best car . The beneficiary (10)
 criteria are durability in
 Year and resale value, other are non beneficiary criteria . The
 measures of different criteria are given in the following table,

Types of Car	Maintenance cost in Rs.	Purchase price in Rs.	Durability in Year	Resale value in Rs.
Car1	800	35000	6.5	100000
Car2	1000	1000000	10	450000
Car3	1250	650000	10	290000

The weights for different criteria are,

Types of Car	Maintenance cost in Rs.	Purchase price in Rs.	Durability in Year	Resale value in Rs.
Weight	0.15	0.4	0.25	0.2

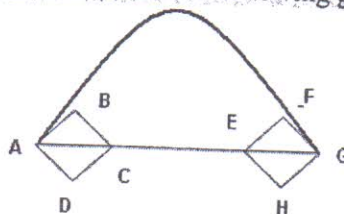
- Q.4 (a) If Horses fly or cows eat grass, then the Mosquito is the national birds. If Mosquito is national birds then peanut butter taste good on hot dogs. But peanut taste terrible on hot dogs. There for cow don't eat grass. Check argument is valid or not. (10)
- (b) Derive an expression maximum number(L_n) of regions define by n lines in the plane. (10)

- Q.5 (a) Find solution of the recurrence relation $d_n = 4d_{n-1} - 4d_{n-2}$, with initial condition $d_1=1, d_2=7$ (10)
- (b) A nature cream ltd wants to introduce new bran of ice cream in to market. The following alternatives are available to the company. (10)

- (i) **Open five new outlets:** In this case if a demand is high, a profit of Rs. 70,000 p.m. is expected. If the demand is medium, a profit can be Rs. 52,000 and for low demand, it can be Rs. 35,000 only.
- (ii) **Open ten new outlets:** In this case the profit can be Rs. 1,40,000, Rs. 1,05,000 and Rs. 55,000 for demands being a high, medium, and low.

Past experience shows the probability of these demands as 0.25, 0.45 and 0.3 respectively. Suggest the optimal decision for the company using Decision Tree method.

- Q.6 (a) Find particular solution of the recurrence relation $a_n + 5a_{n-1} + 6a_{n-2} = 42 \cdot 4^n$ (10)
- (b) Find Euler circuit of following graph (5)



- (c) Calculate WSM for the following data and suggest the best alternative (5)

Weights	0.50	0.15	0.20	0.15
	C1	C2	C3	C4
A1	20	20	15	20
A2	10	30	20	35
A3	30	10	30	10
A4	25	35	15	20
