MCA (SEM-II)
DATA STRUCTURES
**(DEC- 2019)**

Total Marks: 100

(3 Hours)

N.B.: (1) Q. No. 1 is compulsory.
    (2) Attempt any four from Q.2 to Q.7.
    (3) Figures and diagrams to right indicate marks.
   (4) All sub questions should be grouped and answered together.

1. A. What is priority queue? Write algorithms to (10)
    1. create priority queue.
    2. Delete from priority queue.

    B. Write an algorithm for rotateLeft and rotateRight. Create an AVL tree using the (10)
    following data:
    14 ,23,7 ,10 ,33 ,56 ,4 ,3 ,1 ,80 ,66 ,70.

2. A. Define stack. Write algorithms for push, pop, peep and display. (10)

    B. Write algorithm to evaluate the postfix expression. Evaluate the following postfix (10)
    expression :
    72 , 2 , / , 4 , + , 5 , *

3 A. Write algorithm for selection sort. Sort the following data using selection sort and (10)
    insertion sort:
    55,65,20,12,66,26,90

    B. Write an algorithm to create, count and display the linked list. (10)

4 A. Explain what is graph? Explain adjacency matrix. Given the following graph, draw (10)
    the adjacency matrix. Also, find out the Breadth First Traversal(BFT) and Depth
    First Traversal(DFT) :
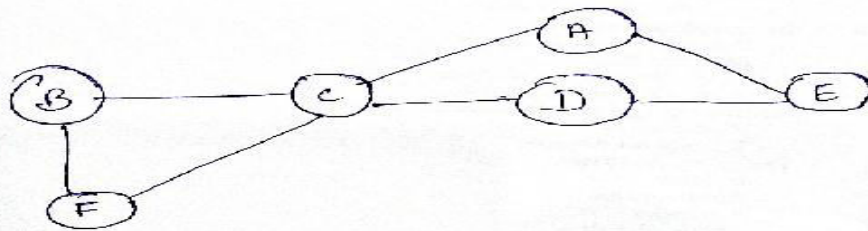
    B. What is hashing? Insert the keys **123456789, 987654321, 987654327, 766102100** (10)
    using fold shift and modulo division method into an array size of 10. In case of any
    collision, use the linear probing. How many collisions have occurred? Determine
    the density of the list.

5 A. Write the algorithm for the following ; (10)
    1. Creating BST
    2. Maximum node in a BST.

    B Explain strictly binary tree, complete Binary tree and nearly complete binary tree (10)
    with examples.

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6 A Explain B-tree? Build a b-tree of order 3 from the following data: (10)
77, 12, 48, 69, 33, 89, 97, 91, 37, 45, 83.

B Write Prims algorithm to find the minimum spanning tree. Given the following (10)
graph, determine the minimum spanning tree using Prims graph:
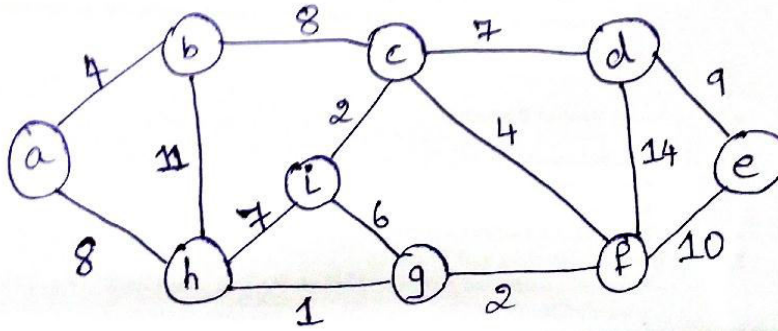
7 Write short notes on(Any four) (20)
1. Collision, Synonyms and load factor.
2. Linked list implementation of enqueue.
3. reheapUp and reheapDown algorithms.
4. Backtracking
5. Mid square method

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MCA (SEM-II)
OPERATING SYSTEMS
(DEC- 2019)

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

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	8	4
B	6	1
C	1	2
D	9	2
E	3	3

For the process listed in the above table, draw a Gantt chart and Find their Average waiting time and Average turnaround time using:-
  (i).   FCFS
  (ii).   SJF (Preemptive).
  (iii). Round Robin (quantum = 2)

(B) What are the different threats to the security of the system?   **10**

2. (A) What are the Necessary conditions for deadlock? How to prevent it?   **10**
     (B) Explain in details Belady's Anomaly.   **10**

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

Process	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	2	1	0	0
P1	2	0	0	0	2	7	5	0				
P2	0	0	3	4	6	6	5	0				
P3	2	3	5	4	4	3	5	6				
P4	0	3	3	2	0	6	5	2				

Using Bankers Algorithm.
  (i). What are the contents of matrix need?
  (ii).Is the system in safe state? Give the sequence

(B) Explain in details about Spooling Vs Simple Batch Systems.   **10**

4. (A) What is Domain Structure? How Access Matrix is used to provide system protection?   **10**
     (B) Explain Hardware Clock and Software Clock .   **10**

5. **(A)** What is Operating System? What are the various features provided by Operating System? **10**

(B) Given disk has 200 (0 – 199) cylinders. Suppose the disk queue contains the request **10**
for I/O to blocks on the cylinder in the following order:-Head Starting Point is 50.
91, 180, 34, 119, 11, 123, 62, 64
What is the Total head movement for the following algorithm?
 (i). SSTF
 (ii). SCAN
 (iii). C-SCAN
 (iv). FCFS

6. **(A)** Consider the pages are referenced in the following sequence. **10**
1 2 3 2 1 5 2 1 5 2 1 6 2 5 6 3 1 3 6 1 2 4 3
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**
 i) Semaphore.
 ii) Thrashing
 iii) Translation Look aside buffer (TLB).
 iv) Seek time.
 v) External and Internal Fragmentation.
 vi) Demand paging.

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MCA (SEM-II)
FINANCIAL MANAGEMENT
(DEC- 2019)

Q. P. Code: 39532

Total Marks: 100

(3 Hours)

N.B.   (1)   Question No. 1 is compulsory.
       (2)   Attempt any Four from the remaining Six questions.
       (3)   Answers to questions should be grouped and written together.

Q1 (A)   Following is the trial balance and adjustments of M/s Vibhuti and Co. for the year ended 31st   10
March, 2017. Prepare Trading A/c, Profit & Loss A/c and Balance sheet as on 31st March, 2017.

Trial Balance

Particulars	Debit Balance(Rs)	Particulars	Credit Balance(Rs)
Opening Stock	60,000	Bills Payable	19000
Drawings	35,000	Return Outward	2,000
Purchases	1,00,000	Capital	3,60,000
Return Inward	6,000	Sales	2,08,000
Debtors	72,000	Discount Received	13,000
Carriage Inward	4,700	Commission Received	24,000
Rent	2,500	Creditors	62,000
Wages	33,400		
Salaries	61,400		
Printing and Stationary	15,000		
Office expenses	20,000		
Cash at bank	16,300		
Machinery	2,50,000		
Cash in Hand	11,700		
Total	**6,88,000**	**Total**	**6,88,000**

Adjustments :
1. Closing Stock is Rs. 40,000.
2. Depreciate Plant & Machinery @ 5% p.a
3. Outstanding Salary Rs. 4,000/-

(B)   What do you mean by Ledger? Explain importance of Ledger.   10

Q 2 (A)   Journalize following transactions in the book of M/s Solarnium & Sons , for the month of   10
January 2017.
1st Jan   : Started business with cash Rs. 3,50,000/-,Furniture Rs.78,000/- and Laptop
             Rs.27,000/-
2nd Jan   : Purchased goods for cash Rs.1,75,000/-
9th Jan   : Goods sold worth Rs. 1,00,000/-
4th Jan   : Deposited cash Rs.30,000/- into State Bank of India.
16th Jan   : Purchased Machinery Rs. 30,000/- by cash.

Page **1** of **3**

17th Jan : Sold goods worth Rs. 40,000/- with trade discount of Rs.4000/-.
25thJan : Withdraw cash Rs.10,000 from bank for personal use.
27th Jan : Paid office rent Rs.12,000/- by cash.
28th Jan : Goods distributed as free sample Rs. 7,000/-
31st Jan : Paid salary of Rs.35,000/- to Mr. Ramesh Joshi by cheque.

(B) What is Bank Reconciliation statement? Explain any two reasons for disagreement in Bank Reconciliation statement   10

Q3 (A) What is an Account? What are the different types of Accounts? Explain the golden rules of accounting with suitable examples   10

(B) Differentiate between Cash Flow statement and Fund Flow Statement.   10

Q 4(A) What do mean by Ratio Analysis? Explain advantages and disadvantages of Ratio Analysis   10

(B) Prepare cash budget from following information for October - December 2016   10

Particulars	October 2016	November 2016	December 2016
Credit Sales	60,000	80,000	1,00,000
Salary	6,000	8,000	11,000
Raw Materials	5,000	7,000	9,000
Expenses	2,000	2,000	2,000

i. Opening balance for October 2016 is Rs.80,000/-
ii. Supplier is paid with a delay of one month.
iii. Delay by 1 month for credit Sales
iv. Additional consider Cash Sales to be equal to Credit Sales for given month.

Q 5(A) Prepare three Column Cash Book from the following transaction for M/s. Shree Mahdev & Co, November 2017.   10
Nov 1st Cash Balance Rs.70,000/- and Bank balance Rs.55,000/-
Nov 2nd Sold goods to Mr.Varun Sahani for Rs.10,000/- @5% cash discount and cash received.
Nov 3rd Paid Wages Rs.2,000/- by cash.
Nov 9th Rs.2,500/- withdrawn from bank for personal use.
Nov 15th Insurance Premium paid by cheque Rs.7,000/-
Nov 19th Deposited in Bank Rs.5,000/-.
Nov 22nd Cash Purchases Rs.12,000/-
Nov 25th Purchased Machinery Rs.8,000/- by cash.
Nov 28th Salaries paid by cheque Rs.7,000/- to Mr.Anmol Shetri.

Nov 30th   Paid office Rent by cash Rs.5,000/-

(B)   Explain the need for Working Capital and also explain different types of Working Capital with   10
       suitable examples

Q 6(A)   From the Following information of M/s Sulekha & Co

Particulars	Amount(Rs.)
Cash	1,00,000
Debtors	2,00,000
Creditors	1,00,000
Prepaid expenses	40,000
Bills Receivable	1,60,000
Gross Profit	1,00,000
Net Profit	70,000
Bills Payable	80,000
Closing Stock	60,000
Bank Overdraft	40,000
Outstanding Rent	20,000

       Calculate Gross Profit Ratio, Net Profit Ratio, Current Ratio, Liquid Ratio

(B)   Differentiate between Trade discount and cash discount with the help of example.   10

Q7 (A)   What is cost Accounting? Explain different methods of costing with suitable examples   10

(B)   What is meant by budgetary control? Explain importance of budgetary control   10

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**MCA (SEM-II)
COMPUTER GRAPHICS
(DEC- 2019)**

(3 Hours) (Total Marks: 100)

N.B (1) Question No1 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) What do you mean by hidden surface removal ? Develop A (10)
buffer algorithm. Write advantages and disadvantages.

(b) What are Projection? Explain various types of projection. (10)

2. (a) Use the Cohen-Sutherland outcode algorithm to clip two lines (10)
A1(40,15)- A2(75,45) and A3(70,20) –A4(100,10) against a
window P(50,10),Q(80,10),R(80,40),S(50.40).

(b) Write a midpoint circle drawing algorithm and rasterize a circle (10)
at origin with radius 5.

3. (a) What are display files? Explain with example how are polygons (10)
and characters represented in Display Files.

(b) Find the normalization transformation window to (10)
viewport,with window, lower left corner at (1,1) and upper
right corner at (3,5) onto a viewport with lower left corner at
(0,0) and upper right corner at (0.5, 0.5).

4. (a) Explain flood fill and boundary fill algorithms with suitable (10)
examples.

(b) Find the final transformation matrix when point p(x,y) is to be (10)
reflected about a line Y = mx + c.

5. (a) Explain the Mid-Point Subdivision Algorithm with an example. (10)
   Also list its advantages and disadvantages.

   (b) Calculate the coordinates after shearing transformation of an (10)
   object with coordinates A(1,0,0),B(2,2,2),C(3,3,3),D(4,0,0).The
   shearing factors are 2 and 4 in x and y direction due to z axis.

6. (a) Explain and write the comparison between halftone and (10)
   Dithering techniques.

   (b) Construct the Bezier curve of order 3 and with 4 polygon (10)
   vertices A(1,1), B(2,3), C(4,3) and D(6,4).

7. (a) Write short notes on the following (any four) (20)

   i) Shear Transformation

   ii) Random Scan Systems

   iii) Inverse Transformation

   iV) Phong Shading

   V) Animation

   Vi) Fractals

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MCA (SEM-II)
PROBABILITY & STATISTICS
(DEC- 2019)

[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) The average test marks in a particular class is 79. The standard deviation is 5. If the marks   (10)
        are distributed normally, how many students in a class of 200 did not receive marks
        between 75 and 82?
        Given: P(0≤Z≤0.7)=0.2580, P(0≤Z≤0.8)=0.2881 P(0≤Z≤0.6)=0.2527, where Z is a
        standard normal variate

Q1. b) Prove that Geometric distribution is memoryless   (05)

Q1. c) An incomplete frequency distribution is given below. The total of frequencies is 150   (05)

Class Intervals	1 - 2	2 - 3	3 - 4	4 - 5	5 - 6	6 - 7	7 - 8	8 - 9	9 - 10
Frequency	1	4	10	14	?	60	?	10	6

        If the median of the distribution is 6.35 find the missing frequencies

Q2. a) A market research firm is interested in surveying certain attitudes in a small community.   (10)
        There are 125 household broken down according to income, ownership of a telephone or
        ownership of a T.V.

	Household with monthly income with Rs. 8000/- or less		Household with monthly income above Rs. 8000/-	
	Telephone Subscriber	No Telephone	Telephone Subscriber	No Telephone
Own T.V. Set	27	20	18	10
No. T.V. Set	18	10	12	10

        i)   What is the probability of obtaining of a T.V. owner in drawing at random
        ii)   If the household has a monthly income over Rs. 8,000/ and is a telephone
              subscriber, what is the probability that it has a T.V.?
        iii) What is the conditional probability of drawing a household that owns a T.V.
              given that the household is a telephone subscriber.?
        Are the events 'Ownership of T.V. and 'telephone subscriber' statistically independent?

Q2. b) A function of the two dimensional random variable (X,Y) is given by (10)

$$f(x,y) = \begin{cases} \dfrac{x^3 y^3}{16}, & 0 \le x \le 2, \ 0 \le y \le 2, \\ 0, & otherwise \end{cases}$$

   i) Prove that the above function is a probability density function
   ii) Find the marginal density function of X and Y

Q3. a) how that the variance of Beta Distribution of first kind is (10)

$$\frac{mn}{(m+n)^2(m+n+1)}$$

Q3 b) For the following distribution find the first four moments about the mean (10)

Class Intervals	0 - 10	10 - 20	20 - 30	30 - 40
Frequency	1	3	4	2

Q4. a) For the following data find the Bowley's coefficient of skewness, Inter Quartile range, Quartile deviation and Coefficient of Quartile deviation (10)

Class Intervals	1 - 2	2 - 3	3 - 4	4 - 5	5 - 6	6 - 7	7 - 8	8 - 9	9 - 10
Frequency	10	20	40	80	100	25	10	5	10

Q4. b) Of all employees in a company, 60% are men and 40% are women. Suppose that 10% and 20% of the female and male population respectively smoke cigarettes. What is the probability that a randomly selected employee is a) a women who is smokes? b) A man who is a smoker? c) A smoker? (10)

Q5. a) Prove that mean median and mode of a normal distribution coincide (10)

Q5. b) The following table represents the scores for psychological tests (X) and arithmetical ability (Y) of children. Determine the ranks and calculate Spearman's rank correlation coefficient. Use correction factor for repeated ranks. (10)

X	105	104	102	101	100	99	98	98	93	93
Y	101	100	100	98	95	96	104	92	97	94

Q6. a) Following table shows the marks in physics and statistics (10)

Marks in Physics (X)	2	6	6	5	8	4	3	9	1	5
Marks in Statistics (Y)	2	5	7	4	6	4	2	8	1	5

   i) Obtain the two linear regression equations
   ii) Determine the statistics marks when the marks in Physics are 7
   iii) Determine the Physics marks when the marks in Statistics are 3
   Find the Karl-Pearson's correlation coefficient between X and Y

Q6. b) X and Y are two random variables taking values -1, 0 and 1 and having the joint probability distribution. (10)

Y X	-1	0	1
-1	0	0.2	0
0	0.1	0.2	0.1
1	0.1	0.2	0.1

Find
   i) Marginal probabilities of X and Y
   ii) Conditional probability distribution of X |Y and Y|X
   iii) Test whether X and Y are uncorrelated
   iv) Test the independence of X and Y

Q7. a) A self service store employees on cashier at its counter. Nine customers arrive on an average every 5 minutes, while the cashier can serve 10 customers in 5 minutes . Assuming Poisson distribution for arrival rate and exponential distribution for service rate, find (05)
   i) Average number of customers in the system
   ii) Average queue length
   iii) Average time a customer spends in the system
   iv) Average time a customer waits before being served.

Q7. b) If X is the Poisson variate such that $P(X = 2) = 9P(X = 4) + 90P(X = 6)$ (05)
Find the value λ and mean of X.

Q7. c) The following table gives the number of participants for a certain program during 10 days D1 to D10. Find whether they are uniformly distributed over 10 days. (05)

Days	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
No. of Participants	17	20	24	13	25	25	16	12	10	11

Given for 9 degrees of freedom at 5% LOS the critical value of χ² =16.9

Q7. d) A toothpaste manufacturing company was distributing a particular brand of toothpaste through large number of retail shops. Before a heavy advertising campaign the mean sales per week per shop was found to be 70 dozen. After the campaign the sample of 26 shops was taken and the mean sale was found to be 75 dozen with standard deviation of 16. Can you consider the advertisement effective? (05)
Given the value of tα at 5% level of significance for 25 degrees of freedom is 2.0595

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Subject Code: 54706 / Communication & Soft Skills

(Time: 3 Hours) [Total Marks : 100]

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

1. (a) Write a covering letter to USA embassy which states medical health of your (10)
parent and for which diagnosis is required. Consider following points while
drafting letter:
   - The diagnosis must be specific
   - The recommended treatment must be named and described in detail by a
licensed health care provider
   - Your provider must state a specific length of treatment. Lifetime or indefinite
lengths of treatment will not be approved (letter by provider required)

   (b) Write a job application and cv with respect to advertisement by 'Hello Bank' (10)
for the post of Business Development Manager.

2. (a) List and explain any five common barriers to effective communication. (10)

   (b) Explain process of communication with the help of diagram. (10)

3. (a) Explain any five modern communication media. (10)
   (b) Enlist in detail elements of report writing. (10)

4. (a) Explain any five qualities of a good listener. (10)
   (b) Explain 7 C's of effective communication. (10)

5. (a) Explain the role of body language during interviews. (10)

   (b) Differentiate between verbal and nonverbal communication. (10)

6. (a) Explain the role of team in an organization. (10)
   (b) Explain five steps on how to run a formal meeting. (10)

7. Write Short Notes on _**any four**_: - (20)
   a. Minutes of Meeting
   b. Time Management
   c. Conflict Resolution
   d. Grapevine
   e. Assertiveness

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