

MCA (SEM- II)
Data Structures
(OCT-16)

Q.P. Code : 510601

(3 Hours)

[Total Marks: 100]

- N.B. : (1) Question No. 1 is compulsory.
(2) Answer any four questions out of the remaining six questions.
(3) Each question carries equal marks.

Q.1) (a) Define and explain the stack data structure with suitable example. Give algorithms for Push, Pop, Stackempty and Stackfull functions. **[10]**

(b) Given the set of symbols and corresponding frequency table as below, explain the steps to find the Huffman Code

Symbol	A	B	C	D	E	F	G	H	I
Frequency	7	6	4	6	5	1	10	7	8

[10]

Q.2) (a) What is Analysis of algorithm? Explain the Asymptotic Notations (Big O, Ω , θ) used while analyzing an algorithm. **[10]**

(b) Explain heap as a data structure. Build a Max Heap by investing the following data arriving as a sequential set
23, 7, 92, 6, 12 14, 40, 44, 20, 21. Show the heap after deleting 2 elements. **[10]**

Q.3) (a) What is the meaning of collision in hashing? Explain collision resolution techniques in context of hashing. **[10]**

(b) Write an algorithm for sorting the elements using shell sort. Show the contents of the array after it has gone through a one increment pass of the shell sort. The increment factor is $k=3$.

23, 3, 7, 13, 89, 66, 6, 44, 18, 90, 98, 57 **[10]**

Q.4) (a) What is a linked list? Give the data structure and write algorithms to-

- (i) Delete an element.
(ii) Count the number of elements. **[10]**

(b) Using modulo-division and linear probing method, store the keys given below in an array of 13 elements. How many collisions occurred and what is the density of the list after the keys are inserted.

28, 7, 846, 786, 431, 870, 612, 675, 876, 546, 34, 12 **[10]**

[TURN OVER]

Q.5) (a) What is a binary tree? The following binary tree has the following inorder and preorder traversal. Draw the tree and give the postorder traversal. Also write the algorithm for the same.
 Inorder ABCEDFJGIH
 Preorder JCBADEFIGH [10]

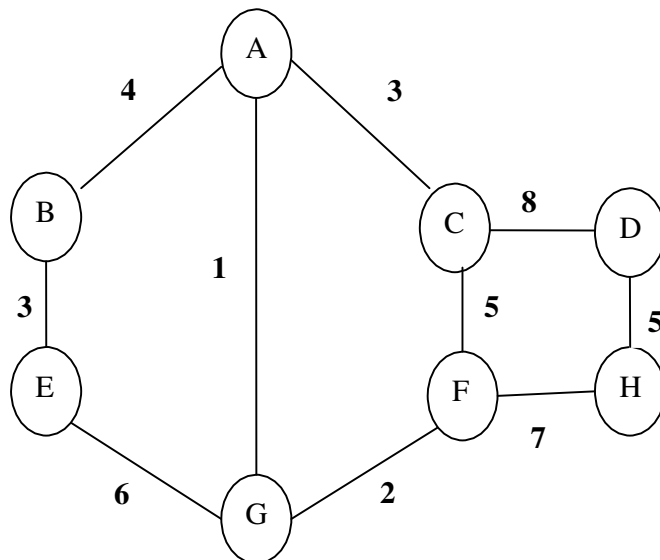
(b) Explain Dijkstra algorithm with suitable example. [10]

Q.6) (a) What is a height balanced tree? What are the advantages of AVL trees? Write an algorithm to Rotate AVL tree right and illustrate with the help of an example. [10]

(b) Define M-way trees. Build a B-tree of order 4 by inserting data in the sequence given below:
 92, 24, 6, 7, 11, 8, 22, 4, 5, 16, 19, 20, 78 [10]

Q.7) (a) Explain the following terms :- (any two)
 (i) Priority queue
 (ii) General trees
 (iii) Graph storage structures [10]

(b) What is a minimum spanning tree? Give Kruskal's algorithm to find a minimum spanning tree. Determine the minimum spanning tree of the following graph:- [10]



MCA (SEM- II)
Operating Systems
(OCT-16)

QP CODE : 510802

[Total Marks : 100]

(3 Hours)

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

1. (a) For the processes given in the table :- (10)

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

Using FCFS, SJF, SRT, RR (q=2) Scheduling algorithms :-

- 1) Draw Gantt chart
- 2) Calculate average waiting time and average turnaround time

- (b) What is Process? Explain Process states with suitable diagram (10)

2. (a) What is the use of Process Control Block (PCB). Discuss the contents of PCB. (10)
Discuss how the PCBs are chained together to form a list of ready processes.

- (b) Consider the following snapshot of a system :- (10)

Process	Allocation			Max			Available		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
P0	0	2	1	6	4	2	4	2	4
P1	0	0	1	2	2	1			
P2	2	1	0	3	2	1			
P3	2	0	0	6	0	3			
P4	3	1	1	4	2	2			
P5	1	1	1	2	2	2			

Using Bankers algorithm calculate need matrix, identify whether system is in safe state or not? If a request for P1 (1, 1, 0) arrives, can the request granted by system?

3. (a) Suppose a disk drive has 400 cylinders, numbered 0 to 399. The driver is currently serving a request at cylinder 120 and previous request was at cylinder 140. The queue of pending request in FIFO order is :- (10)

86,147,312,91,177,48,309,222,175,130

Starting from the current head position, what is the total distance in cylinders that the disk arm moves to satisfy all pending request for each of the following disk scheduling algorithm?

1. SSTF
2. SCAN
3. C-SCAN

- (b) What is Operating System? What are the services provided by Operating System (10)

[TURN OVER]

4. (a) What is Semaphore? Explain different types of semaphore. (10)
- (b) What is deadlock? What are the necessary conditions for a deadlock occurrence? How can you prevent a system from a deadlock? Explain. (10)
5. (a) What is difference between internal and external fragmentation? Discuss the techniques to overcome fragmentation. (10)
- (b) What is the difference between block oriented and stream oriented devices? Why would you expect improved performance using a double buffer rather than a single buffer I/O? (10)
6. (a) What is dynamic partitioning? Explain memory allocation algorithms used in dynamic partitioning (10)
- (b) What is Linux OS? What is shell? What are the different types of Shells in Linux? (10)
7. Write Short Notes on **any four** :- (20)
1. Direct Memory Access (DMA)
 2. Programmed I/O
 3. Monitor
 4. Multitasking Operating system
 5. Virtual memory
 6. Clock hardware and software

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MCA (SEM-II)
Accounting and Financial
Management
(OCT-16)

QP CODE : 511001

(3 Hours)

Total Marks: 100

N.B.

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 indicates full marks assigned to the question

- Q1 a What is Ratio Analysis? Explain the advantages and disadvantages of Ratio Analysis. (10)
- b Following is the trial balance and adjustments of M/s Mongia and Co. for the year ended 31st March, 2016. Prepare trading A/c and profit & loss A/c and Balance sheet as on 31st March, 2016 (10)

Trial Balance

Particulars	Debit Balance (Rs)	Particulars	Credit Balance (Rs)
Opening Stock	52,000	Bills Payable	4,000
Drawings	10,000	Return Outward	2,000
Purchases	1,00,000	Capital	2,50,000
Return Inward	6,000	Sales	2,00,000
Debtors	50,000	Discount Received	3,000
Carriage Inward	4,700	Commission Received	4,000
Import Duty	2,500	Creditors	40,000
Wages	33,400		
Salaries	41,400		
Printing and Stationary	5,000		
Legal Expenses	20,000		
Cash at Bank	16,300		
Plant & machinery	1,50,000		
Cash in Hand	11,700		
Total	5,03,000	Total	5,03,000

Adjustments :

1. Closing Stock was valued at Rs. 40,000.
2. Depreciate Plant & Machinery at 5%
3. Outstanding Salary Rs. 4,000/-

- Q2 a What is meant by ledger? Why is it necessary to prepare a ledger? (10)

[TURNOVER]

- b Journalize the following transactions in the books of M/s Dnyanada & Co. (10)
- 1 Apr Started business with cash Rs.60,000/-, Furniture costing Rs. 25,000/-
 - 4 Bought from Sujay goods worth 60,000 off 20% T. D.
 - 8 Sold half of the goods bought from Sujay to Vijay at 10 % profit.
 - 10 Withdrew from Bank Rs. 6,000 for self use.
 - 15 Uninsured Goods worth Rs. 10,000 were lost by theft.
 - 19 Received the amount due from Vijay in cash after deducting 5% cash discount.
 - 21 Paid advertisement charges Rs. 7,000.
 - 23 Received Commission Rs. 500 in cash.
 - 25 Deposited Rs. 6000/- in Bank.
 - 30 Paid salary Rs. 20,000.
- Q3 a What do you mean by Accounting Concepts.? Explain the different Accounting Concepts. (10)
- b What is an Account? What are the different types of Accounts? Explain the golden rules of accounting. (10)
- Q4 a What is cash book? Why we use triple column cash book? Why cash book is called journal as well as ledger? (10)
- b Prepare a Three column cash book from the following transactions of Mr. Saxena (10)
- 1 Cash in hand Rs. 55,000 and cash at Bank Rs. 25,000.
 - 2 Deposited into Bank Rs. 1,800.
 - 4 Bought furniture and issued cheque of Rs. 2,500.
 - 7 Purchased goods for cash Rs. 3,000.
 - 12 Bank has sent an advice informing the deduction of Rs. 100 as bank charges.
 - 14 Sold goods of Rs. 4,000 for cash at 5% C. D.
 - 20 Withdrew from Bank for Private expenses Rs. 1,000.
 - 23 Received Crossed Cheque from Vilas Rs. 3,000.
 - 27 Shubham deposited Rs. 5,000 directly on our account.
 - 30 Paid rent by cheque Rs. 1,000.
- Q5 a What are the various factors affecting working capital management? (10)

[TURNOVER]

- b From the following information calculate the following ratios. (10)
1. Current Ratio
 2. Gross Profit Ratio
 3. Net Profit Ratio
 4. Stock Turnover Ratio
 5. Debtors Turnover Ratio.

Particulars	Rs.	Particulars	Rs.
Opening Stock	1,50,000	Share Capital	7,00,000
Closing Stock	1,50,000	Reserves	50,000
Purchases	6,10,000	Bank Overdraft	35,000
Sales	7,50,000	Creditors	1,50,000
Gross Profit	1,50,000	Land & Building	5,50,000
Net Profit	70,000	Debtors	1,80,000
Sundry Expenses	80,000	Cash in Hand	1,20,000

- Q6 a Explain the format and importance of cash budget. (10)
- b What is cost Accounting? Classify cost on the basis of elements of cost. (10)
- Q7 a What do you mean by Cash Flow and Fund Flow Statement? Differentiate between Cash Flow and Fund Flow Statement. (10)
- b Prepare the cash budget for April, May and June for the company named Ganga Industries Ltd. Company has Rs. 35, 000 as in hand cash on April 1st. Further information is given below. (10)

Months (Rs.)	Sales (Rs.)	Purchase (Rs.)	Wages (Rs.)	Production Overhead (Rs.)	Selling Overhead (Rs.)
February	80,000	50,000	9,000	6,000	3,500
March	80,000	70,000	6,000	6,000	3,500
April	1,20,000	75,000	6,000	8,000	4,500
May	1,50,000	85,000	8,500	9,500	5,500
June	1,20,000	90,000	10,500	8,000	6,500

Information :

1. Credit Period allowed by suppliers – 1 month
 2. Credit period allowed to customers – 2 month. 50% sale is on cash basis.
 3. Delay in payment of wages is 1 month.
 4. Overheads have 2 month delay in payment.
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MCA (SEM- II)
Computer Graphics
(OCT-16)

(3 HOURS)

QP Code : 510701

TOTAL MARKS: 100

N.B: (1) Q.1 is compulsory.

(2) Answer any four questions from Q2 to Q7

(3) Figures to the right indicate marks.

(4) Assume any additional information, but justify the same

- Q1. a) What is a fractal? What are its Different Types? How is a fractal dimension measured? 10
b) Write the properties of B-Spline curves? How are they different from Bezier? 10
- Q2. a) Explain the algorithm for drawing an ellipse. 10
b) Construct the Bezier curve of the order three with four polygon vertices A(1,1) B(2,3), C(4,3) and D(6,4). 10
- Q3. a) Discuss DDA algorithm for line drawing with an example. 10
b) Explain shearing transformation and Reflection transformation. 10
- Q4. a) What are the projections? How are they useful? Explain different types of projections. 10
b) Discuss various color models used in the graphics system 10
- Q5. a) Explain the Cohen Sutherland line clipping algorithm with the help of an example. 10
b) Compare and Contrast Flood fill algorithm and Boundary fill algorithm. 10
- Q6. (a) What are the display files? Explain with examples. How are polygons and characters represented in display file? 10
(b) Explain and write Z buffer algorithm along with its advantages and disadvantages? 10
- Q7. Write short notes on any **four:** 20
a) Composite Transformation
b) Text Clipping
c) Computer Animation
d) Frame buffer
e) DVST
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MCA (SEM- II)
Probability and Statistics
(OCT-16)

Q.P. Code : 510902

(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 indicate full marks
 (5) Use of scientific calculator is allowed

Q1. (a) [10]

Age in years	20-25	25-30	30-35	35-40	40-45	45-50
No. of policy holders	2	7	5	2	4	5

For the above frequency distribution Find

- i) Inter Quartile Range
- ii) Quartile Deviation and its coefficient
- iii) Bowley's coefficient of skewness
- iv) Range and its coefficient

Q1. (b) What is the probability that all vowels come together in the word "COMMERCE"? [05]

Q1. (c) Prove that geometric distribution is memory less [05]

Q2. (a) The joint probability density function of two dimensional random variable (X, Y) is given by [08]

$$f(x,y) = 2-x-y \quad 0 \leq x \leq 1, 0 \leq y \leq 1$$

$$= 0, \quad \text{otherwise}$$

- i) Find marginal density functions of x and y .
- ii) Find the conditional density function of $x|y$ and $y|x$.
- iii) Find Expectation of (x) and Expectation (Y)

Q2. (b) If X and Y are independent Poisson variates show that the conditional distribution of X given $X+Y$ is binomial [07]

Q2. (c) Theory predicts that the proportion of beans, in four groups A, B, C, D should be 9:3:3:1. In an experiment among 1,600 beans, the number in the four groups was 882, 313, 287 and 118. Does the experimental result support the theory? [05]
 (tabulated value for χ^2 for 3 d.f. at 5% LOS is 7.81)

Q3. (a) Find the Karl Pearson's skewness coefficient for the following data [08]

Class Interval	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
frequency	11	25	61	93	70

TURN OVER

- Q3. (b) In manufacturing a certain component, two types of defects are likely to occur with respective probabilities 0.05 and 0.1. what is the probability that a randomly chosen component
- i) does not have either kind of defects
 - ii) Is defective?
 - iii) Has one kind of defect, given that it is found to be defective?
- Q3. (c) Trains arrive at the yard every 15 minutes and the service time is 33 minutes. If the line capacity of the yard is limited to 4 trains, find
- i) probability that the yard is empty
 - ii) The average number of trains in the system
- Q4. (a) In an experiment of tossing of four coins, if X denotes 'number of heads, find
- i) The probability mass function of X,
 - ii) The distribution function of X
 - iii) $P(X \leq 3)$
 - iv) Variance of X
- Q4. (b) The height of a group of 1000 students follows a normal distribution with mean 165cm and standard deviation 5 cm. Find the number of students having height
- (i) up to 171 cm,
 - (ii) below 165 cm
 - (iii) between 160 to 170
- [Given $P(0 \leq Z \leq 1.2) = 0.3849$, $P(0 \leq Z \leq 1) = 0.3413$ where Z is a standard normal variate]
- Q4. (c) A machine is designed to produce insulation washers for electrical devices of average thickness of 0.025 cm. A random sample of 10 washers was found to have an average thickness of 0.024 cm with a standard deviation of 0.002 cm. Test the significance of the deviation. Value of t for 9 degrees of freedom at 5% level is 2.262
- Q5. (a) A committee of 4 persons is to be appointed from 3 officers of the production department, 4 officers of purchase department, 2 officers of sales department and 1 chartered accountant. Find the probabilities of forming the committee in the following manner.
- i) There must be one from each category
 - ii) There must be at least one person from purchase department
- Q5. (b) In a sample of 12 fathers and their eldest sons gave the following data about their height in inches.
- | | | | | | | | | | | | | |
|--------|----|----|----|----|----|----|----|----|----|----|----|----|
| Father | 65 | 63 | 67 | 64 | 68 | 62 | 70 | 66 | 68 | 67 | 69 | 71 |
| Son | 68 | 66 | 68 | 65 | 69 | 66 | 68 | 65 | 71 | 67 | 68 | 70 |
- Calculate rank correlation coefficient.
- Q5. (c) The letters of the word 'failure' are arranged at random. Find the probability that the consonants may occupy only odd positions

- Q6. (a) X and Y are two random variables having joint density function [08]

X\Y	0	1	2
0	1/12	1/6	1/12
1	1/24	1/12	1/24
2	1/8	1/4	1/8

- i) Find the marginal Density functions of X and Y
 ii) Find the conditional distribution of Y for X=x.
 iii) Are X and Y independent?
 iv) Are X and Y uncorrelated?
- Q6. (b) Prove with example that three events may be mutually independent [07] but need not pair wise independent.
- Q6. (c) The size, mean and standard deviation of three samples is shown in the table below Find the combined mean and combined standard deviation. [05]

Sample -->	Sample1	Sample2	Sample3
Sample size	75	150	25
Mean	20	25	30
Standard Deviation	5	7	6

- Q7. (a) Suppose a random variable X takes on the values -3,-1,2 and 5 with probabilities [08]

x	-3	-1	2	5
p(x)	$\frac{2k-3}{10}$	$\frac{k-2}{10}$	$\frac{k-1}{10}$	$\frac{k+1}{10}$

- i) Determine k and pmf of x
 ii) Determine the distribution function of x
 iii) Find the expected value of x
 iv) Find the Variance of X
 v)
- Q7. (b) Find the mean and variance of beta distribution of first kind [07]
- Q7. (c) Calculate Modal marks for the following. [05]

Marks	10-30	30-50	50-70	70-90	90-110	110-130
No of students	4	10	14	12	8	6

MCA (SEM- II)
Communication and Soft Skills
(OCT-16)

Q. P. Code : 511100

(3 Hours)

Total Marks: 100

- N. B.: (1) Question number 1 is compulsory
(2) Attempt any 4 from question Nos. 2 to 7.
(3) Illustrate answers with sketches wherever necessary
(4) Do not reveal your identity in the letters and reports

- | | | | |
|----|-----|---|----|
| 1. | A] | What are 7 Cs of communication? Explain the communication process in brief. | 10 |
| | B] | Define Emotional Intelligence. State the importance of Emotional Intelligence in an industry? | 10 |
| 2. | A] | As General Secretary of the student's council, draft a notice along with the agenda for the meeting of Student's Council, to plan a week long annual festival to be held in your college. | 10 |
| | B] | Write the minutes of above said meeting. | 10 |
| 3. | A] | What is the role of body language and paralanguage in effective communication? | 10 |
| | B] | What qualities does an employer look for in a potential candidate while interviewing him? | 10 |
| 4. | A] | A friend of yours has cleared a Group Discussion and is due for her interview in half an hour. This is her dream company. What last minute ideas would you suggest to motivate her? Suggest any three do's and don'ts'. | 10 |
| | B] | Discuss the basic rules of conduct in a group discussion | 10 |
| 5. | A] | Define the term 'leadership'. According to you, how should a good leader communicate with his team members? | 10 |
| | B] | Discuss different measures of making written communication effective | 10 |
| 6. | A] | What is report? Why is report-writing essential to modern business? | 10 |
| | B] | A committee of professors is appointed by the principal of a college to submit a report on the causes of poor attendance at lectures and tutorials. Draft the committee's report outlining the causes and also recommend measures to improve the situation. | 10 |
| 7. | | Write short notes on: (any four) | 20 |
| | (a) | Netiquettes | |
| | (b) | Grapevine and its importance in organization | |
| | (c) | Assertiveness | |
| | (d) | Motivation | |
| | (e) | Ethical aspect of communication | |