

SUMMER-2016

UNIT 1

Q.1 a) A hospital maintains a patient's file in which each records contains the following data: Name, Admission Date, Social security Number, Room, Bed Number and Doctor.

i. Which item can be served as primary key?

ii. Which pair of item can be served as a primary key?

iii. Which item can be group items? (7)

b) Write an algorithm for linear search and obtain an expression for its complexity. (6)

Q.2 a) Let S and T be the character variables such that S = 'MAKE IN INDIA' and T = 'A THING OF BEAUTY IS A JOY FOREVER'. Find

i. SUBSTRIBG (S, 4, 8), **ii.** SUBSTRING (T, 10 5),

iii. INDEX (s, 'JO'), **iv.** INDEX (T, 'A'). (7)

b) State and explain slow pattern matching algorithm. Also obtain expression for its worst case complexity. (6)

UNIT 2

Q.3 a) Using bubble sort algorithm, find the no. of comparisons and no. of interchanges which alphabetize the letters in CINCINATTI. Show all steps in each pass. (8)

b) Write short note on pointer and pointer arrays. (6)

Q.4 a) Consider the arrays A(5:50), B(- 5:10) and C(18).

i. Find number of elements in each array.

ii. Suppose base of array A is 300 and w = 4 words per memory cell for A. find address of A[15], A[35], A[55]. (8)

b) Consider following elements stored in array. A: 32, 51, 27, 85, 66, 23, 13, 57. Apply binary search to array A for searching ITEM = 85. Note: modify array if necessary. (6)

UNIT 3

Q.5 a) Give the meaning of each of the following terms and show how each of these is handled.

i. Garbage collection, **ii.** Overflow, **iii.** Underflow. (7)

b) Let $P(x) = 2x^8 - 5x^7 - 3x^2 + 4$ give the diagram to represent $P(x)$ by header list. Draw array representation of the same. (6)

Q.6 a) Suppose a linked list is in memory. Give algorithm that deletes the last node from list. (7)

b) Consider following linked list of patients stored as a linear array BED and LINK i.e. patient in bed K is assigned to BED (K).

	Khan	7
		6
	Deol	11
START	Malini	12
5	Aamir	3
		0
AVAIL	Lara	4
10	Ganesh	1
	Samir	0
		2
	Fardeen	8
	Nana	9
	BED	LINK

Determine and show the changes in the data structure if

i. Priyanka is added to the list and then.

ii. Lara is deleted from the list. (6)

UNIT 4

Q.7 a) Consider following arithmetic infix expression

$$Q: a + (b * c - (d/e \uparrow f) * g) * h$$

Transform this expression into its equivalent postfix expression using stack. Tabulate all steps showing symbol scanned, stack position and the expression. (8)

b) What is stack? Give procedure to push an ITEM into stack. (6)

Q.8 a) Suppose a queue is maintained by a circular array QUEUE with $N = 12$ memory cells. Find the number of elements in QUEUE if (6)

i. FRONT = 4, REAR = 8,

ii. FRONT = 10, REAR = 3,

iii. FRONT = 5, REAR = 6 and then two items are deleted.

b) What is deque? Give method of representing a deque in memory? Give and explain an algorithm to insert an element in deque. (8)

UNIT 5

Q.9 a) Draw binary tree for following expression and give preorder and postorder traversals of the tree.

$[a + (b - c)] * [d - e] / (f + g - h)$. (7)

b) Consider A, B, C, D, E, F, G and H are 8 items with their probabilities shown

Item	A	B	C	D	E	F	G	H
Probability	22	5	11	19	2	11	25	5

Apply Huffman's algorithm obtain an efficient binary coding of the items. (6)

Q.10 a) A binary tree T has 9 nodes. The inorder and preorder traversals of T yield the following sequences of nodes.

Inorder	E	A	C	K	F	H	D	B	G
Preorder	F	A	E	K	C	D	H	G	B

Draw the tree T and give its postorder traversal string. (7)

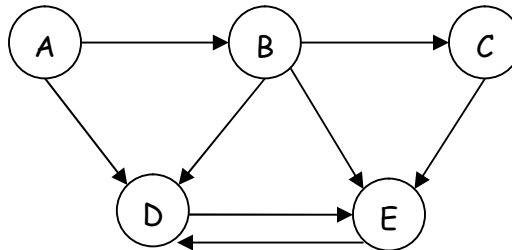
b) Consider following six numbers are inserted in order into an empty binary search tree: 40, 60, 50, 33, 55, 11.

Draw six stages of development of this tree. (6)

UNIT 6

Q.11 a) Consider 9 cards punched as follows: 384, 143, 361, 423, 538, 128, 321, 543, 366. Apply radix sort method to arrange cards in ascending order of the numbers. Show intermediate passes with result. **(7)**

b) Consider graph G as shown below



i. Obtain the linked representation of this graph.

ii. Find the changes in linked representation of the graph G if a node F is added to the graph, Edge (A, F) is added to the graph. Redraw the resultant graph. **(6)**

Q.12 a) Consider following 4 digit employee numbers 9614, 5882, 6713, 1825. Find the 2 digit hash address of each number using folding method without reversing and folding method with reversing. **(7)**

b) Suppose array A contains 8 elements as follows: 77, 33, 44, 11, 88, 22, 66, 55. Apply insertion sort algorithm to arrange this list in ascending order. Show all passes and result. **(6)**