

Total No. of Questions—**12**]

[Total No. of Printed Pages—**7**

Seat No.	
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[4857]-215

S.E. (IT) Second Semester) EXAMINATION, 2015

DATA STRUCTURES AND FILES

(2008 PATTERN)

Time : Three Hours

Maximum Marks : 100

N.B. :— (i) Answer Q. No. **1** or Q. No. **2**, Q. No. **3** or Q. No. **4**,
Q. No. **5** or Q. No. **6** from Section I and Q. No. **7** or
Q. No. **8**, Q. No. **9** or Q. No. **10**, Q. No. **11** or Q. No.
12 from Section II.

(ii) Answers to the two Sections should be written in separate
answer-books.

(iii) Neat diagrams must be drawn wherever necessary.

(iv) Assume suitable data, if necessary.

SECTION I

1. (a) Assume a hash table of size 15 and Hash function $H(x) = x \bmod 15$. Perform linear probing with and without replacement for the given set of values : [10]

10, 1, 2, 4, 72, 65, 85, 87, 90, 58, 52, 53, 42, 44, 91

(b) Explain the features of a sequential file. Write a 'C' program to copy contents of one file to another using command line arguments. [8]

P.T.O.

Or

2. (a) What are the characteristics of a good Hash function ? How collision can be resolved in a Hash table ? [10]
- (b) Explain various file opening modes with respect to text and binary files. [8]
3. (a) Clearly indicate the contents of stack during conversion of given infix expression to prefix : [8]
- $A + B * C - D + E/F/(G + H)$
- (b) Transform each of the following infix expression to postfix form using stack. Show clearly the contents of stack : [8]
- (i) $D - B + C$
- (ii) $A * B + C * D$
- (iii) $(A + B) * C - D * F + C$
- (iv) $(A - C) * (B + C - D * E) * F$

Or

4. (a) Imagine we have two empty stacks of integers, S1 and S2. Draw a picture of each stack after the following operations : [8]
- Pushstack(S1, 3);
Pushstack(S1, 5);
Pushstack(S1, 7);
Pushstack(S1, 9);
Pushstack(S1, 11);
Pushstack(S1, 13);
while (!emptystack(S1))
{
 Popstack(S1, x);
 Popstack(S1, x);
 Pushstack(S2, x);
}

(b) Clearly indicate the contents of stack for evaluating the following postfix expressions. Assume $A = 1$, $B = 2$, $C = 3$: [8]

(i) $AB + C - BA + C * +$

(ii) $ABC + * CBA - +*$

5. (a) Differentiate between a queue and an array. List down the applications of queues. [8]

(b) Write a pseudo C code for implementation of circular queue using array. [8]

Or

6. (a) Consider the following dequeue of characters where DEQUE is a circular array which is allocated six memory cells :

LEFT = 2, RIGHT = 4, DEQUE : -, A, C, D, -, -.

Describe the dequeue while the following operations take place :

(i) F is added to the right of the dequeue;

(ii) Two letter on the right are deleted from the dequeue;

(iii) K, L and M are added to the left of the dequeue;

(iv) One letter on the left is deleted from the dequeue;

(v) R is added to the left of the dequeue;

(vi) S is added to the right of the dequeue;

(vii) T is added to the right of the dequeue; [8]

- (b) Write a pseudo C code for implementation of priority queue using sequential organization and represent each pseudocode step diagrammatically. [8]

SECTION II

7. (a) Define the following with respect to trees with example : [8]

- (1) Internal node
- (2) Sibling
- (3) Ancestor
- (4) Height
- (5) Binary tree
- (6) Balance factor
- (7) Path
- (8) Level

- (b) For a binary tree, the inorder and postorder traversal is as follows : [8]

Inorder : H, D, I, B, E, A, J, F, K, C, G

Postorder : H, I, D, E, B, J, K, F, G, C, A

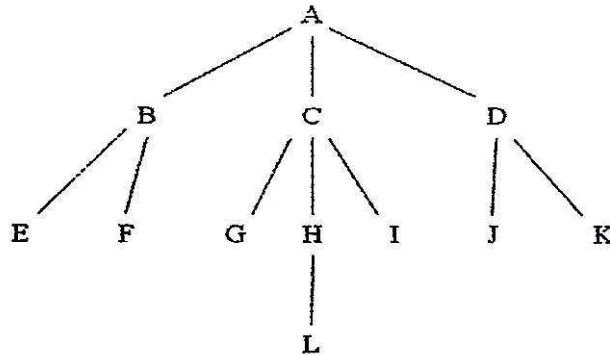
Draw the binary tree. Identify the non-leaf nodes of the tree and find height of the tree.

Or

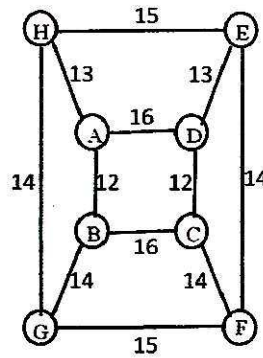
8. (a) Why is it necessary to convert a general tree into a binary tree ? Convert the given tree into binary tree and give the

steps for conversion :

[8]



- (b) What is Binary search tree ? Write a pseudo for deletion and insertion of a node in Binary search tree. [8]
9. (a) Find minimum spanning tree using Prim's method for the following graph. Show the intermediate steps. Write an algorithm for Kruskal's method. [8]

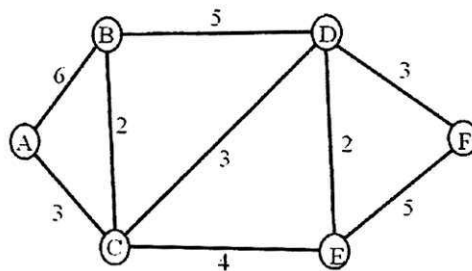


- (b) Define the following terms with respect to graphs : [8]
- (1) Digraph
 - (2) Weakly connected graph
 - (3) Degree of a vertex
 - (4) Cycle
 - (5) Loop

- (6) Spanning tree
- (7) Disjoint graph
- (8) Strongly connected graph.

Or

- 10.** (a) Find the shortest path using Dijkstra's algorithm from node A to every other node in the graph shown below : [8]



- (b) Give the applications of Minimum spanning tree and Dijkstra's algorithm with examples. [8]
- 11.** (a) Define a heap. With examples describe different types of heaps. Make a heap out of the following data read from the keyboard : 23, 7, 92, 6, 12, 14, 40, 44, 20, 21. Sort the heap in ascending order. [10]
- (b) Why is Huffman code used for data compression ? Draw a Huffman tree for the given data set and find the corresponding Huffman codes : [8]

A	9	G	3
B	4	H	9
C	2	I	11
D	4	J	6
E	10	K	7
F	3	L	4

Or

- 12.** (a) Construct an AVL search tree by inserting the following elements in the order of their occurrence. Show the balance factor and type of rotation at each stage : [10]

16, 25, 9, 12, 35, 58, 82, 68, 72

- (b) Write notes on : [8]

(1) Symbol table

(2) Optimal binary search tree.