

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III (OLD) EXAMINATION – WINTER 2017

Subject Code:130702

Date:17/11/2017

Subject Name: Data and File Structure

Time: 10:30 AM to 01:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

MARKS

Q.1 Short Questions

14

- 1 What is 2's complement representation for integer -4 in modulo 16?
- 2 What is normalization in floating point storage representation?
- 3 Write an expression for finding the address of matrix element A[i,j]?
- 4 Write suffix(reverse polish) and prefix(polish) notation for the following.
 - 1) $a*(b+c)$
 - 2) $a+b*c$
- 5 What is an ordered tree and a forest?
- 6 The post order traversal of binary tree is DEBFCA. Find out the pre order traversal.
- 7 For the division method, $H(x)=x \bmod m + 1$. For $m=31$. What problems arise?
- 8 One dimensional arrays and structures can each be thought of as a group of items. What are the principal differences between them?
- 9 What is the output of following function for start pointing to first node of following linked list? 1->2->3->4->5->6
void fun(struct node* start)
{
 if(start == NULL)
 return;
 printf("%d ", start->data);

 if(start->next != NULL)
 fun(start->next->next);
 printf("%d ", start->data);
}
- 10 The following postfix expression with single digit operands is evaluated using a stack:
 $8\ 2\ 3\ ^\ /\ 2\ 3\ * \ +\ 5\ 1\ * \ -$
 $\wedge$ is the exponentiation operator. What will be the top two elements of the stack after the first * is evaluated?
- 11 How to find smallest and second smallest element in Array?
- 12 What is a balanced binary tree?
- 13 What is a procedure to find out cycle in directed graph?
- 14 For what purpose hashing is performed?

Q.2 (a) Write a function to calculate $N!$ (Factorial) of nonnegative integer. Calculate Time complexity. **03**

(b) Write an algorithm that will change the INFO field of the kth node to the value given by Y. **04**

- (c) Write an algorithm for inserting an element and deleting an element in a stack. **07**
- OR**
- (c) How does an algorithm for inserting an element in queue and inserting an element in circular queue differ? Write algorithms. **07**
- Q.3** (a) Evaluate $3+4$, $-3+4$ and $-7-7$ using 1's complement representation and modulo 16 arithmetic. **03**
- (b) How lexically ordered binary tree looks like? Explain the process of creating lexically ordered tree. **04**
- (c) Explain with example breadth first search and depth first search. **07**
- OR**
- Q.3** (a) Which data structure is used to find greatest common divisor? Explain. **03**
- (b) Write an algorithm to traverse a tree in preorder manner. **04**
- (c) Explain collision resolution technique. **07**
- Q.4** (a) How linear search is performed? **03**
- (b) Write an algorithm to insert a node into a linked linear list. **04**
- (c) Which type of node is considered as doubly linked linear list? Explain insertion in doubly linked linear list. **07**
- OR**
- Q.4** (a) How binary search is performed? **03**
- (b) Write an algorithm to delete a node into a linked linear list. **04**
- (c) For what purpose external storage devices are used? Explain how storage of records is done on any one storage medium? **07**
- Q.5** (a) In height balanced tree, what is a critical node? **03**
- (b) Explain the difference between sequential and indexed file organization. **04**
- (c) What is sorting? Explain how sorting can be done (any one method)? **07**
- OR**
- Q.5** (a) Which data structures are considered as nonprimitive data structures? **03**
- (b) How adjacency matrix can be used to represent graph? **04**
- (c) What is a spanning tree? Explain any one method for creating minimum spanning tree. **07**
