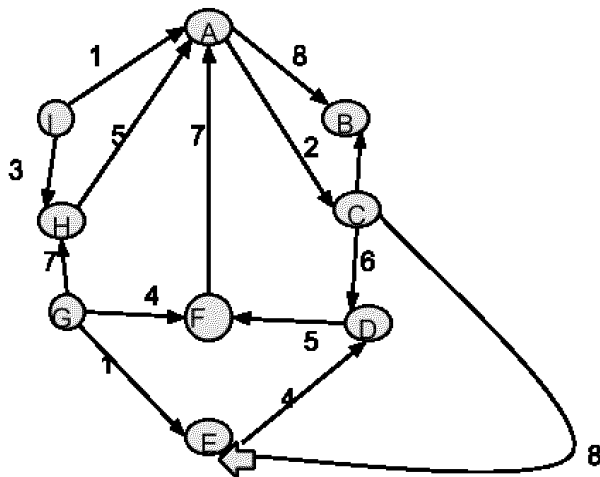


**ADVANCED DATA STRUCTURES AND ALGORITHM***Time: three hours Maximum Marks: GS: 70 GS:100***Note:** Attempt any Five questions ,All questions carry equal marks.

1. (a) What are Templates ? Explain the following with suitable example program:  
 (i) Class templates with multiple parameters (ii) Overloading of Templates function  
 (b) Describe the role of ADT in Algorithm design. What is meant by algebraic specification of ADT ? Give Specification for the list ADT. [rgpvonline.com](http://rgpvonline.com)
2. (a) Provide cursor implementation of ADT doubly linked list.  
 (b) Prepare a set of algorithm for accessing an item of given priority P at the depth of d in a priority queue . Use circular storage model for the queues and separate sub queue at each priority level.
3. (a) What are Splay Trees? Discuss Splay operation. Start with a Splay tree that is a 15-node full binary tree. The keys are 1-15. Remove the keys in order 11, 14, 13, 15, 9,12, 2, 3 and 1 Draw your tree immediately after each rotation. Also label rotation with rotation type.  
 (b) Write non- recursive postorder tree traversal algorithm and calculate its time complexity.
4. (a) What are the properties of a B-tree ? Write a program to insert a new vertex into a 2-3 tree, Assuming that the levels are ordered. Draw the 2-3 tree the following , each insertion of the keys 20, 40,30,10,25,28,27,32,36,34,35,8,6,2 and 3 in order.  
 (b) What is heap Short strategy ? Prove that heap short requires  $O(n \log n)$  time. Also compare binary and binomial heap.
5. (a) Describe the following memory management issues :  
 (i) Storage allocation for objects with different sizes (ii) Storage compaction procedure  
 (b) Describe depth first search technique. Find the depth first spanning forest for the following directed graph. Also find the strongly connected components.



6. (a) Write bubble sort algorithm . how many comparisons does it do it worst case ? Prove that if there is no pair of consecutive entries out of order then the entire array is sorted.  
 (b) Modify bubble sort algorithm so that alternate passes go in opposite directions .
7. (a) Write radix algorithm for sorting strings of varying length lexicographically. Explain your algorithm with suitable example.  
 (b) Write and Explain polyphase sorting with suitable example.
- 8 Explain the following :  
 (i) Guidelines for developing dynamic programming algorithm  
 (ii) Dijkstra's single source shortest path algorithm