12108123 Special exam

Sardar Patel Institute of Technology

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(Autonomous College of Affiliated to University of Mumbai)

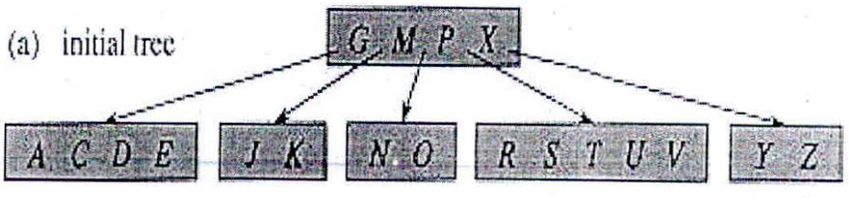
Special Examination

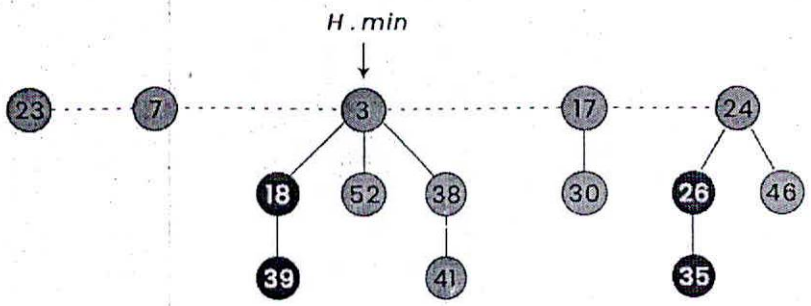
Augustr 2023

Maxi Marks : 100 | Duration : 3 hours
Class : S.E | Semester : III
Course code: CE202 | Branch :COMP/DS/AIML
Name of the course : Data Structures

Q No		Max Mks	CO	BL
Q1	a. Define and explain the stack data structure with suitable examples. b. Give algorithms for Push, Pop, Stackempty and Stackfull functions.	05 05	CO1	2
Q2 a	Write a function to do the following task. Given an unsorted singly linked list(which is already created with **data** and **link** as members of the structure node), Write the function with a supportive diagram to remove duplicates from the list. **OR** Write a program to implement a Doubly Linked List. Provide the following operations: (i) Insert a node in the beginning (ii) Delete a node from the end (iii) Display the list	10	CO1	3
Q2b	What is a Generalized linked list? What are its applications? Give sample declaration in C language for Generalized linked list representation of multivariable polynomial expression. Represent the following polynomial expression with the help of GLL. Draw a supportive diagram $10x^4 z^5 + 4xy^3 z^2 + 3yz + 4$	10	CO1	3
Q.3. a	What is a height balanced tree? What are the advantages of AVL trees? Write an algorithm to Rotate AVL tree right(RR Rotation) and illustrate it with the help of an example.	03 07	CO2	3
Q.3 b -i	Write a function to do post order traversal of a given binary tree.	03	CO2	3

[PTO]

Q3 b-ii	Write a function to print if the given key is present in binary tree if it is present then it should print if it is a left child or right child of its parent. For example If given key is 4 , then it should print "it is present and it is left child of its parent. If given key is 1 then I should print "it is present and is a root". If key is say 10 , it should print "no , it is not present in tree" 1 / \ 2 3 /\ 4 5	07		
Q3c	Show the results of inserting the keys *F,S,Q,K,C,L,H,T,V,W,M,R,N,P,A,B,X,Y,D,Z,E* in order into an empty B-tree with degree 3. Draw only the configurations of the tree just before some node must split, and also draw the final configuration. **OR** Given an initial B-tree with order 6, insert B, F, H, I, L, Q ,W in the given order. Show the Updated B tree. (a) initial tree 	10 10	CO2	3
Q.4 a	Write a recursive program to Check if a given integer array represents a max heap or not.For example, if the array is 16 11 4 3 2 1 then it is max-heap. Support your answer with an example.	10	CO3	3
Q.4 b	Consider the following Fibonacci heap and perform the delete minimum operation and show the resulting Fibonacci heap. Also, explain the various steps performed. Note: that 18, 39, 26 and 35 are marked nodes.	10	CO3	3



Q5 a-i	1- Write an adjacency list for the graph in Fig.2. 2-Draw the breadth-first search tree traversal of the graph in Fig.2. with a neat diagram. Assume the starting vertex is S. 3- Show the distance, and parent matrix of BFS traversal.	06	CO2	3
Q.5. a-ii	Compute the DFS tree for the given graph. Show the discovery and finishing time for each vertex and classify the edges. Take the starting vertex U.	04		

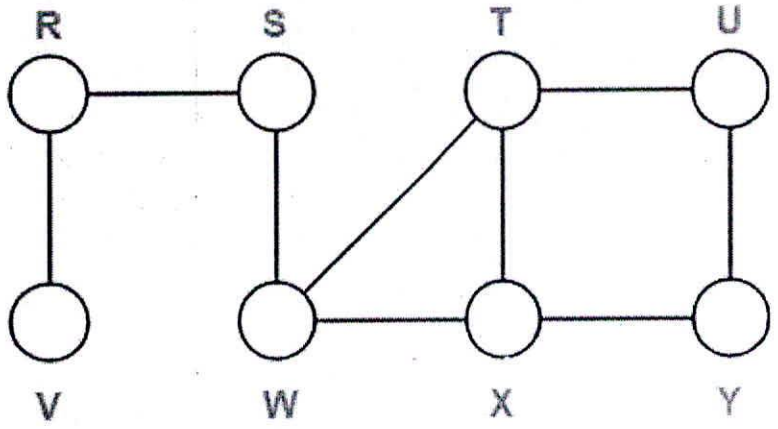
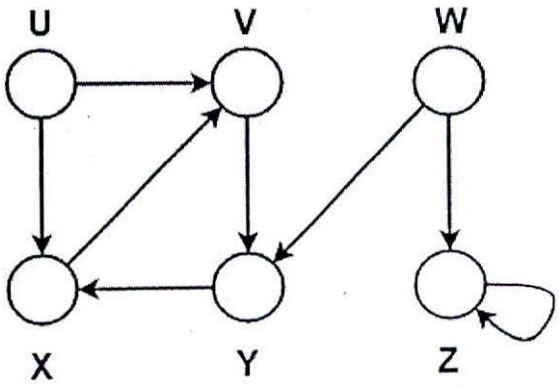


Fig.2.



Q.5. b	Consider the hash table with 9 slots. The hash function is h(K) = k mod 9. The collision are resolved by chaining. The following 9 keys are inserted in the order: 5, 28, 19, 15, 20, 33, 12, 17, 10. The maximum, minimum, and average chain lengths in the hash table, respectively are?	10	CO4	4

All the Best