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MID-SEM Examination
Academic Year 2021-22

Subject:-Data Structures and Algorithms Max Marks:-30

Instructions:

1. Total **30** questions
2. Each question carries **1** mark
3. Figures to right indicates CO, RBT Level and Marks
4. Use of scientific calculator(non programmable) is allowed

CO_1 Identify and articulate the complexity goals and benefits of a good hashing scheme for real-world applications

1. Assume that the hash function used is not producing any collisions and size of hash table is sufficiently large, what would be the worst case time requirement CO_1, L_1 [1]
   (a) $O(1)$ (b) $O(n)$ (c) $\Omega(n)$ (d) $\theta(n)$
2. Select one out of given functions as collision resolution techniques CO_1, L_1 [1]
   (a) Open Addressing (b) Division Method (c) Folding Method (d) Mid Square Method
3. Chained hashing is compared with open addressing scheme, which one of the statement best describes them CO_1, L_4 [1]
   (a) Space requirement of chained hashing is less than Open Addressing
   (b) Deletion is simple in chaining
   (c) Worst case complexity of chaining is less
   (d) Open addressing better in time requirement
4. The internet accessed through browsers on computers stores pages for short time in...that uses... CO_1, L_1 [1]
   (a) Linked List (b) Buffers (c) Arrays (d) Hashing
5. Collision resolution by open addressing infers CO_1, L_1 [1]
   (a) We look for memory outside the existing hash table
   (b) We look for free memory location in current hash table
   (c) We create a separate hash table newly
   (d) We invoke other collision detection function
6. Find out the packaging density if there are 75 records and size of the hash table 100 and all the records are unique CO_1, L_4 [1]
   (a) 0.75 (b) 0.30 (c) 0.70 (d) 0.30
7. Use the formula $P(x) = \frac{(\frac{r}{N})^x e^{(\frac{-r}{n})}}{x!}$ and find out how many of addresses should have no records assigned if packaging density is 0.5 CO_1, L_3 [1]
   (a) 607 (b) 706 (c) 670 (d) 770

8. Use the formula $P(x) = \frac{(\frac{r}{N})^x e^{(\frac{-r}{n})}}{x!}$ and find out how many of addresses should have one records assigned if packaging density is CO_1, L_3 [1]

(a) 304 (b) 305 (c) 203 (d) 303

9. Select the one who is open addressing scheme CO_1, L_1 [1]

(a) Linked List (b) Bucketing (c) Double Hashing (d) Linear Probing

10. The packaging density of certain hash table is 0.60, chose the correct count of number of places not occupied CO_1, L_3 [1]

(a) 548 (b) 584 (c) 600 (d) 1000

11. Packaging density is 0.60 and number of place where assignment of key is done is 452 find out the number of total records CO_1, L_4 [1]

(a) 500 (b) 1000 (c) 452 (d) 600

12. The packing density of certain hash table is 0.40 find out number of place occupied by at least one entry CO_1, L_4 [1]

(a) 303 (b) 330 (c) 670 (d) 570

13. The hash table of size 8 and using hash function $key\%8$, function. Try to store the values $\{8, 11, 14, 23, 27\}$. Find out the places of collision CO_1, L_4 [1]

(a) 1,2 (b) 1,2,3 (c) 2,3,4 (d) 3

14. The hash table of the size 8 and the hash function to be used is $M\%8$ Insert the values in hash table $\{10, 12, 20, 18, 15\}$ Use linear probing and find out the indices of empty places CO_1, L_3 [1]

(a) 0,1,6 (b) 1,6 (c) 1,2,6 (d) 2,5,6

15. Which of the following is hashing techniques makes use of bit prefix CO_1, $L_1\Upsilon$ [1]

(a) Chaining (b) Linear Probing (c) Quadratic Probing (d) Extensible Hashing

CO_2 Apply nonlinear data structures for solving problems of various domain

16. The maximum number of the nodes accommodated in a binary search tree with height h is equal to CO_2, L_2 [1]

(a) $2^h - 1$ (b) 2^{h-1} (c) 2^h (d) 2^{h+1}

17. There are n keys to be accommodated into a binary search tree what would be the minimum possible height of BST CO_2, L_3 [1]

(a) $\lg_2 n$ (b) $\lg_1 0n$ (c) $\lg_2 n - 1$ (d) $\log_1 0n$

18. The list of elements $L = \{4, 6, 8, 3, 5, 9, 11, 7\}$ are to treated as keys and to be organized with binary search tree to traverse multiple number of the times, what would be the post order traversal CO_2, L_3 [1]

(a) $\{3, 4, 5, 6, 7, 8, 9, 11\}$ (b) $\{4, 3, 6, 5, 8, 9, 11\}$ (c) $\{3, 5, 7, 11, 9, 8, 6, 4\}$ (d) $\{5, 3, 7, 11, 9, 8, 4, 6\}$

19. The worst case running time of the binary search tree is CO_2, L_2 [1]

(a) $O(n)$ (b) $O(1)$ (c) $O(\log n)$ (d) n^3

20. Binary Search Tree with in order as $\{3, 4, 6, 7, 8, 9, 12, 22\}$ and post order $\{3, 4, 7, 9, 22, 12, 8, 6\}$ what would be the pre order of that tree traversal CO_2, L_3 [1]

(a) $\{4, 6, 3, 8, 7, 12, 9, 22\}$ (b) $\{6, 4, 3, 8, 7, 12, 9, 22\}$ (c) $\{6, 4, 3, 8, 12, 7, 9, 22\}$ (d) $\{3, 6, 4, 8, 7, 12, 22, 9\}$

21. Select the appropriate recurrence relation for Binary Search Tree CO_2, L_2 [1]

(a) $T(n) = T(\frac{n}{2}) + c$ (b) $T(n) = T(k) + c$ (c) $T(n) = 2T(\frac{n}{2} + c)$ (d) $T(n) = T(n) + c$

22. We are hunting for missing entry in Binary Search Tree where inorder is $\{3, 4, 6, 7, 8, 9, 12, 22\}$ if you would have asked to find out the preorder but a lazy guy has missed key 8. You are being a sincere asked to open a campaign at least to search a place to place it CO_2, L_4 [1]

(a) Its after 3 and before 7
(b) Its after 3 and before 4
(c) Its a root
(d) Its after 12 and before 22

23. A Binary Search Tree was constructed with an input keys $L = \{11, 5, 6, 8, 3, 15, 4\}$, 11 has decided not to be part of the tree and came out who are the next eligible root to hold given tree as BST CO_2, L_4 [1]

(a) 8 or 15 (b) 5 or 15 (c) 4 or 5 (d) 6 or 8

24. There are 7 members elected in a village and numbered them 1 through 7, their binary search tree is constructed, which is COMPLETE binary search tree, A member number 4 has decided not to be part of gram panchayat and opted for resign the post, who will be most eligible to be a root of the binary search tree CO_2, L_4 [1]

(a) 3 or 7 (b) 2 or 6 (c) 1 or 3 (d) 5 or 7

25. There are 7 members elected in a village and numbered them 1 through 7, their binary search tree is constructed, which is COMPLETE binary search tree, A member number 1 has decided not to be part of gram panchayat and opted for resign the post, What would be effect on binary search tree CO_2, L_3 [1]

(a) Still its BST
(b) Not a BST
(c) Requires selection of new root
(d) Resign is not allowed

26. There are 7 members elected in a village and numbered them 1 through 7, their binary search tree is constructed, which is COMPLETE binary search tree, A member number 6 has decided not to be part of gram panchayat and opted for resign the post, who will be most eligible to be a root of the binary search tree CO_2, L_4 [1]

(a) 5 or 7 (b) 1 or 3 (c) 2 or 1 (d) 2 or 3

27. There are 7 members elected in a village and numbered them 1 through 7, their binary search tree is constructed, which is COMPLETE binary search tree, A member number 2 has decided not to be part of gram panchayat and opted for resign the post, who will be most eligible to be a root of the binary search tree CO_2, L_4 [1]

(a) 1 or 3 (b) 5 or 7 (c) 4,6 (d) 6 or 7

28. How many nodes will be there in complete binary search of level 5 CO_2, L_3 [1]

(a) 30 (b) 31 (c) 33 (d) 23

29. A binary search tree which completely left associated, then cost of deleting the node which is at largest depth is CO_2, L_3 [1]

(a) $O(n)$ (b) $O(\ln n)$ (c) n^2 (d) $O(1)$

30. There are n sorted(ascending order) elements and its BST was constructed and decided to delete the smallest element, what would be the cost of deletion CO_2, L_3 [1]

(a) $O(n)$ (b) $O(\lg n)$ (c) $O(1)$ (d) $O(n^2)$