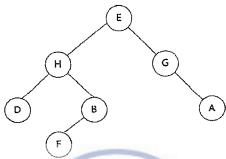
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I. Multiple Choice (40%, 5 points for each)											
1. An OS may put resource restrictions on processes to prevent; however, if an OS puts too many								o many			
restrictions, may occur.											
a. starvation, deadlock											
b. deadlock, starvation											
c. segmentation, paging							:				
•	d. p	agi	ng	, segmentation							
c. segmentation, paging d. paging, segmentation 2. Swapping in OS, multiprogramming with swapping is called; whereas multiprogramming without swapping is called a. partitioning, demand paging b. demand segmentation, framing c. demand paging, partitioning d. framing, demand segmentation 3. In the key method, key is publicly known. a. asymmetric, decryption b. symmetric, decryption c. asymmetric, encryption d. symmetric, encryption						without					
	SS	Itiple An rest a. s b. c c. s d. p Swa a. p b. c d. f In th a. a b. s c. a d. s In t resp a. s b. a c. n	Itiple Cl An OS restrict a. starv b. dead c. segn d. pagi Swappi a. parti b. dem c. dem d. fram In the a. asyn b. sym c. asyn d. sym In the respon a. sess b. appl c. netw	Itiple Choice. An OS man restriction and starvath be deadlooned by the control of the control o	Itiple Choice (40%, 5 points for An OS may put resource restrictions, may occur. a. starvation, deadlock b. deadlock, starvation c. segmentation, paging d. paging, segmentation Swapping in OS, multiprogram swapping is called a. partitioning, demand paging b. demand segmentation, framing. c. demand paging, partitioning d. framing, demand segmentation In the key method, kas a symmetric, decryption b. symmetric, decryption c. asymmetric, encryption d. symmetric, encryption In the TCP/IP protocol, responsible for source-to-destination. In the TCP/IP protocol, responsible for source-to-destination. In the TCP/IP protocol, responsible for source-to-destination.	Itiple Choice (40%, 5 points for each) An OS may put resource restrictions or restrictions, may occur. a. starvation, deadlock b. deadlock, starvation c. segmentation, paging d. paging, segmentation Swapping in OS, multiprogramming wis swapping is called a. partitioning, demand paging b. demand segmentation, framing c. demand paging, partitioning d. framing, demand segmentation In the key method, key is puthal asymmetric, decryption b. symmetric, decryption c. asymmetric, encryption d. symmetric, encryption In the TCP/IP protocol, layer is responsible for source-to-destination deta. session, data link b. application, transport c. network, session	Itiple Choice (40%, 5 points for each) An OS may put resource restrictions on processes to restrictions, may occur. a. starvation, deadlock b. deadlock, starvation c. segmentation, paging d. paging, segmentation Swapping in OS, multiprogramming with swapping is swapping is called a. partitioning, demand paging b. demand segmentation, framing c. demand paging, partitioning d. framing, demand segmentation In the key method, key is publicly known. a. asymmetric, decryption b. symmetric, decryption c. asymmetric, encryption d. symmetric, encryption In the TCP/IP protocol, layer is responsible for source-to-destination delivery. a. session, data link b. application, transport c. network, session	Itiple Choice (40%, 5 points for each) An OS may put resource restrictions on processes to prevent restrictions, may occur. a. starvation, deadlock b. deadlock, starvation c. segmentation, paging d. paging, segmentation Swapping in OS, multiprogramming with swapping is called a. partitioning, demand paging b. demand segmentation, framing c. demand paging, partitioning d. framing, demand segmentation In the key method, key is publicly known. a. asymmetric, decryption b. symmetric, decryption c. asymmetric, encryption d. symmetric, encryption In the TCP/IP protocol, layer is responsible for node-to responsible for source-to-destination delivery. a. session, data link b. application, transport c. network, session	Itiple Choice (40%, 5 points for each) An OS may put resource restrictions on processes to prevent; however restrictions, may occur. a. starvation, deadlock b. deadlock, starvation c. segmentation, paging d. paging, segmentation Swapping in OS, multiprogramming with swapping is called; whereas swapping is called a. partitioning, demand paging b. demand segmentation, framing c. demand paging, partitioning d. framing, demand segmentation In the key method, key is publicly known. a. asymmetric, decryption b. symmetric, decryption c. asymmetric, encryption d. symmetric, encryption d. symmetric, encryption d. symmetric, at a layer is responsible for node-to-node deliver responsible for source-to-destination delivery. a. session, data link b. application, transport c. network, session	Itiple Choice (40%, 5 points for each) An OS may put resource restrictions on processes to prevent; however, if an restrictions, may occur. a. starvation, deadlock b. deadlock, starvation c. segmentation, paging d. paging, segmentation Swapping in OS, multiprogramming with swapping is called; whereas multiprogramming is called a. partitioning, demand paging b. demand segmentation, framing c. demand paging, partitioning d. framing, demand segmentation In the key method, key is publicly known. a. asymmetric, decryption b. symmetric, decryption c. asymmetric, encryption In the TCP/IP protocol, layer is responsible for node-to-node delivery; wheresponsible for source-to-destination delivery. a. session, data link b. application, transport c. network, session	Itiple Choice (40%, 5 points for each) An OS may put resource restrictions on processes to prevent; however, if an OS puts to restrictions, may occur. a. starvation, deadlock b. deadlock, starvation c. segmentation, paging d. paging, segmentation Swapping in OS, multiprogramming with swapping is called; whereas multiprogramming swapping is called a. partitioning, demand paging b. demand segmentation, framing c. demand paging, partitioning d. framing, demand segmentation In the key method, key is publicly known. a. asymmetric, decryption b. symmetric, decryption c. asymmetric, encryption d. symmetric, encryption ln the TCP/IP protocol, layer is responsible for node-to-node delivery; whereas responsible for source-to-destination delivery. a. session, data link b. application, transport c. network, session

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5. Given the following expression tree, convert it to the Prefix and Postfix notations.



- a. Prefix: DFBHAGE; Postfix: EHDBFGA
- b. Prefix: FDBHAGE; Postfix: AGEFBDH
- c. Prefix: AGEFBDH; Postfix: FDBHAGE
- d. Prefix: EHDBFGA; Postfix: DFBHAGE
- 6. What is the maximum and minimum number of nodes in a balanced AVL tree of height 4?
 - a. Max = 31; Min = 11
 - b. Max= 30; Min= 12
 - c. Max= 31; Min= 12
 - d. Max= 30; Min= 11
- 7. The worst complexity of a selection sort is _____, and the worst complexity of a merge sort is _____.
 - a. $O(n^2)$; O(n*log n)
 - b. O(n*log n); O(n²)
 - c. $O(n^2)$; $O(\log n)$
 - d. $O(n^2*\log n)$; $O(\log n)$
- 8. Which of the following statement is NOT true?
 - a. SQL databases are vertically scalable; whereas NoSQL databases are horizontally scalable.
 - b. Table-based databases is the major type of SQL databases; whereas both document-based and key-value are the types of noSQL databases.
 - c. SQL databases is relational databases; whereas NoSQL is non-relational databases.
 - d. SQL databases are built to store data without a predefined schema; whereas NoSQL databases are best suited for complex queries.

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II. Answer the following questions (60%)

1. What is the output most likely to derive from the following code segment? (10%)

```
public class Main {
  public static void main(String[] args) {
    int result = sum(5, 15);
    System.out.println(result);
}

public static int sum(int input, int tmp) {
    if (tmp >= input) {
        return tmp + sum(input, tmp - 5);
    } else {
        System.out.println(tmp);
        return tmp;
    }
}
```

- 2. A relation R has three attributes abc. Given each of the following functional dependencies, what is the candidate key(s) for R? (15%)
 - (1). $a \rightarrow b$, $a \rightarrow c$
 - (2). $c \rightarrow a$
 - (3). $bca \rightarrow a, a \rightarrow b$

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3. Briefly explain the differences between supervised and unsupervised learning in machine learning. Based on the following metrics in the table, put a mark (V) on the cell if the model type is a form of supervised/unsupervised learning. (35%)

	Supervised Learning	Unsupervised Learning
Classification		
Clustering		
Dimensionality Reduction		
K-means		
KNN		
Regression		
SVM		

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