Department of Computer Science and Engineering
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Mid Term Examination II CSCE5350.002

Time Allowed: 1hour 15 minutes Answer All questions

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1. Physical storage system that we use for the database is a critical factor in determining the performance of the application.
    a. As the principal engineer in a database application development, you were asked to justify the usage of magnetic disk in a database application. The application needs to store **huge amount of data**. Explain pros and cons of using a magnetic disk in this application so that the customer can decide on which one to select. Use SSD disk in your explanation as a comparison. – 5 points

    b. How does the magnetic disk improve its performance to reduce the impact of slow access. Describe a technique the magnetic disk uses. – 5 points

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    c. Explain the concept behind the block level striping in RAID systems. What is the main purpose of this technique? – 5 points

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    d. Explain the concept of parity bit in RAID disk recovery. Explain why the parity bit technique cannot recover two disk failures. – 10 points

    e. Compare and contrast RAID level 0 and RAID level 1 – 5 points

2. Database indexing is a vital aspect in application development
    a. You have an ordered relation based on the key to the relation. You need to retrieve all the records with the key that is less than a given value. What is the most appropriate data retrieval mechanism for this scenario? Justify your answer with pros of the technique you suggest. -5 points

b. Explain how a B+ tree speedup the data retrieval from a given relation – 10 points

c. Insert the following set of integers to a B+ tree. The tree node has a fanout of 4 (which is n=4). Show each insertion in a separate tree. – 30 points

2, 6, 7, 11, 12, 14, 16, 22, 24, 28, 30, 33, 36, 39, 40, 42, 45

d. Delete the item 42 from the final B+ tree generated in the above question. Show each step clearly – 5 points

3. Transactions management is a key to improve the performance of a system that is constantly accessing a database.
   a. What is the main purpose of using a transaction manger in a database management system? -10 points

   b. Given the following schedule, determine whether the schedule is serializable by drawing the precedence graph for the schedule. – 10 points

T1	T2
Read(A)	
Write(A)	Read(B)
Read(B)	
	Write(B)
Write(B)	
	Read(C)