United International University (UIU)

Dept. of Computer Science & Engineering (CSE)

Final Exam, Trimester: Fall 2022
Course Code: CSE-3521 Course Title: Database Management Systems
Total Marks: 40 Duration: 2 hours

Any examinee found adopting unfair means will be expelled from the trimester / program as per UIU disciplinary rules.

<table>
<tr>
<td>1.</td>
<td>a) Consider the following relation,

<table>
<tr><th>DID</th><th>Dname</th><th>EID</th><th>Ename</th><th>PID</th><th>Pname</th><th>Btime</th></tr>
<tr><td>10</td><td>Finance</td><td>1</td><td>Huey</td><td>27</td><td>Alpha</td><td>4.5</td></tr>
<tr><td>10</td><td>Finance</td><td>5</td><td>Dewey</td><td>25</td><td>Beta</td><td>3</td></tr>
<tr><td>10</td><td>Finance</td><td>11</td><td>Louie</td><td>22</td><td>Gamma</td><td>7</td></tr>
<tr><td>14</td><td>R&D</td><td>2</td><td>Jack</td><td>26</td><td>Pail</td><td>8</td></tr>
<tr><td>14</td><td>R&D</td><td>4</td><td>Jill</td><td>21</td><td>Hill</td><td>9</td></tr>
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Here, D – Department, E – Employee, P – Project, Btime – Budgeted time. An employee and his allocated project information are kept in this relation. Assume that an employee may work in different projects for this scenario.

i) Find out the functional dependencies of the given relation.
i) Find out in which normal form the relation is. Justify your answer with proper explanation.
ii) If R = (A, B, C, D, E) and FD = {A→C, B→D, AC→D, CD→E, E→A} then find all the candidate keys for this relation.

b) Consider the following relation and functional dependencies of this relation,
R (A, B, C, D, E, G, I, J)
A → BE
AB → DE
AC → G
i) Normalize this relation to the highest normal possible form.</td>
<td>3+1+2

5</td>
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<td>2.</td>
<td>a) Mention how indexing helps in the searching process for managing memory? Consider the hash function below and create a hash table inserting the following data using chaining or listing to avoid collision.

Hash_Function = key%7
Data: 5, 11, 12, 19, 26, 28, 18, 33, 34, 32

Now, comment and justify how good this hash function is and why?

b) Consider a B+ tree of order 5. Assume that there are two initial values present in the tree which are 8 and 5. Now update this B+ tree inserting the</td>
<td>1+2

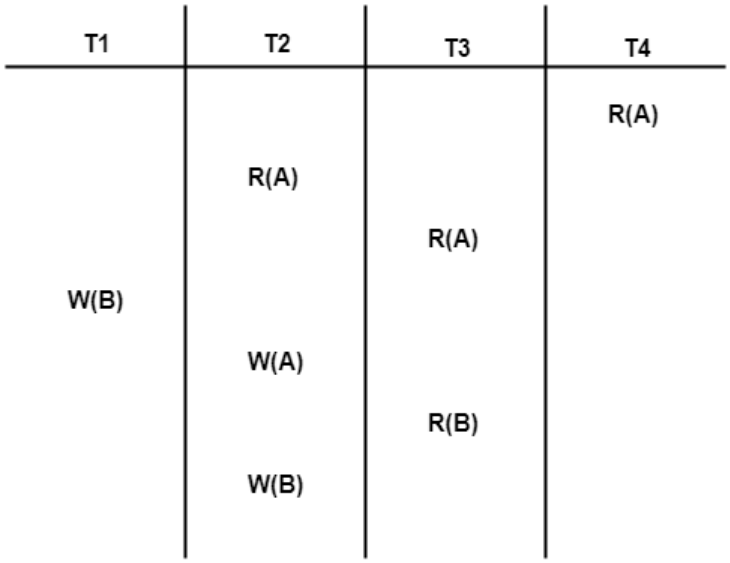
7</td>
</tr>
</table>

following values coming one after another and show all the steps of insertion.

10, 50, 26, 13, 17, 24, 31, 3, 29, 42, 9, 62

3. a) Explain what you understand by serializability of a schedule? — 1

b) Find out all possible conflict equivalent serial schedules from the given schedule below and show the probability of getting a valid serial sequence when the total possible serial schedule here is the factorial of total number of transactions. — 6+2



4. Consider an extendible hashing scheme for the given values below. Assume that the bucket capacity is 3 and the initial local and global depth are 1. Considering that MSB (Most-significant bit) is checked to find any data record, insert the following records in the hash table **showing all the states for each insertion**. — 10

Data records	Search_Key	Hash(Search_Key)
Data 1	AFR	16
Data 2	HDE	48
Data 3	IYC	32
Data 4	EFG	4
Data 5	ADF	52
Data 6	EFG	17
Data 7	KHY	13
Data 8	OKU	25
Data 8	HMK	33
Data 10	YGL	21
