International Islamic University Chittagong

Department of Computer Science and Engineering

B. Sc. in CSE, Final Examination, Spring 2024

Course Code: CSE 2423 Course Title: Database Management System

Total marks: 50 *Time: 2 hours 30 minutes*

[The figures in the right hand margin indicate full marks. Course Outcomes and Bloom's Taxonomy Levels are mentioned in additional columns. **The questions must be answered in order.**]

Group A

			CO	DL
1.a)	Consider the following relational database: ***Patient*** (pid, pname, Address, mobile, DOB, gender) ***visit*** (pid, did, visit_date) ***Doctor*** (did, dname, speciality) **drug** (drid, d_name, d_type, manuf_year, unit_price) **prescribe** (pid, did, drid, pdate, quantity) Give an SQL DDL definition of this database. Identify referential-integrity constraints that should hold, and include them in the DDL definition. **Ensure the following constraints:** Pname, dname, and d_name (not null), Mobile (unique), gender ('M', or 'F'), quantity and unit_price (not negative). **OR** Normalize the following table if it is not normalized.	6	2	3

sid	sname	address	Course_id	cname	Department_id	dname	D_location
S01	Forhad	ctg	C01, C02	C, C++	D01	CSE	GEC
S02	Anika	dhaka	C01, C03	C, JAVA	D01	CSE	GEC
S03	Mazed	ctg	B01	Statistics	D02	BBA	Agrabad

1.b)	How the trigger does ensure integrity of the database? Give example. **OR** Write an assertion for the patient database to ensure that the patient has not visiting the two doctors at a time. (May consider the schema of Q1 (a)).	4	2	2

2.a)	Let the relation schema, **R(ABCDEFGH)** have the following F set of functional dependencies: A->B CH->A B->E BD->C EG->H DE->F i. Can "CHDG" and "DEHC" be candidate keys for the above functional dependencies? Compute the closure and justify your answer. ii. The above schema is not in BCNF but in 2NF. Decompose the relation into BCNF and explain your answer.	2 + 3	2	4
2.b)	Why data normalization is important? Explain lossless decomposition and lossy decomposition with an example.	5	1	2

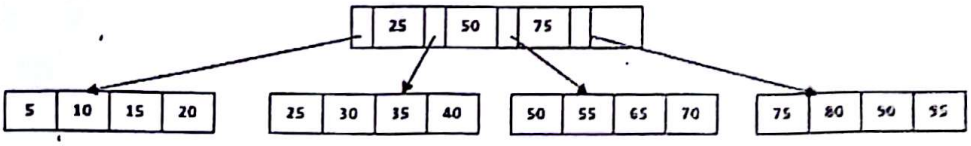
Group B

3.a) How to choose indexing or hashing technique? Justify. 4 2 2

OR

How can Indexes help performance? Consider employees relation, if we want to retrieve all employees, whose salary is in a given range, will it be best alternative to sort the employee records by employee id. Justify your answer.

3.b) Given the following B+ tree. 6 2 3



Requirements:

1. Insert (step by step): 13,12,17, 60, 45
2. Delete: 35, 60, 75, 95

4. i. For the following transaction T_i, transfers \$50 from account A to account B is shown below: 3 + 1 + 2 + 2 + 3 = 4

T_i: read(A);
A:=A-50;
write(A);
read(B);
B:=B+50;
write(B);

Considering the above example, explain each of the ACID properties.

ii. Explain the distinction between the terms "**serial schedule**" and "**serializable schedule**".

iii. *"A given schedule can be tested for conflict serializability by constructing a precedence graph for the schedule and by searching for the absence of cycles in the graph."* – State whether the statement is true or not using an example.

iv. What is a cascadeless schedule? Why is cascadelessness of schedules desirable? Are there any circumstances under which it would be desirable to allow non-cascadeless schedules? Explain your answer.

5.a) Why **distributed database** is important? *"Replication and fragmentation are the two ways of storing data in the distributed database"*. Distinguish between these two systems explaining the advantage of one over the other. 3 1 2

5.b) Explain the purpose of **checkpoint** mechanism. How often should checkpoints be performed give an example. 3 2 3

OR

Draw the **state diagram of a transaction** and elaborately discuss its state.

5.c) How can you resolve problem of system failure? Explain at least two techniques 4 2 2