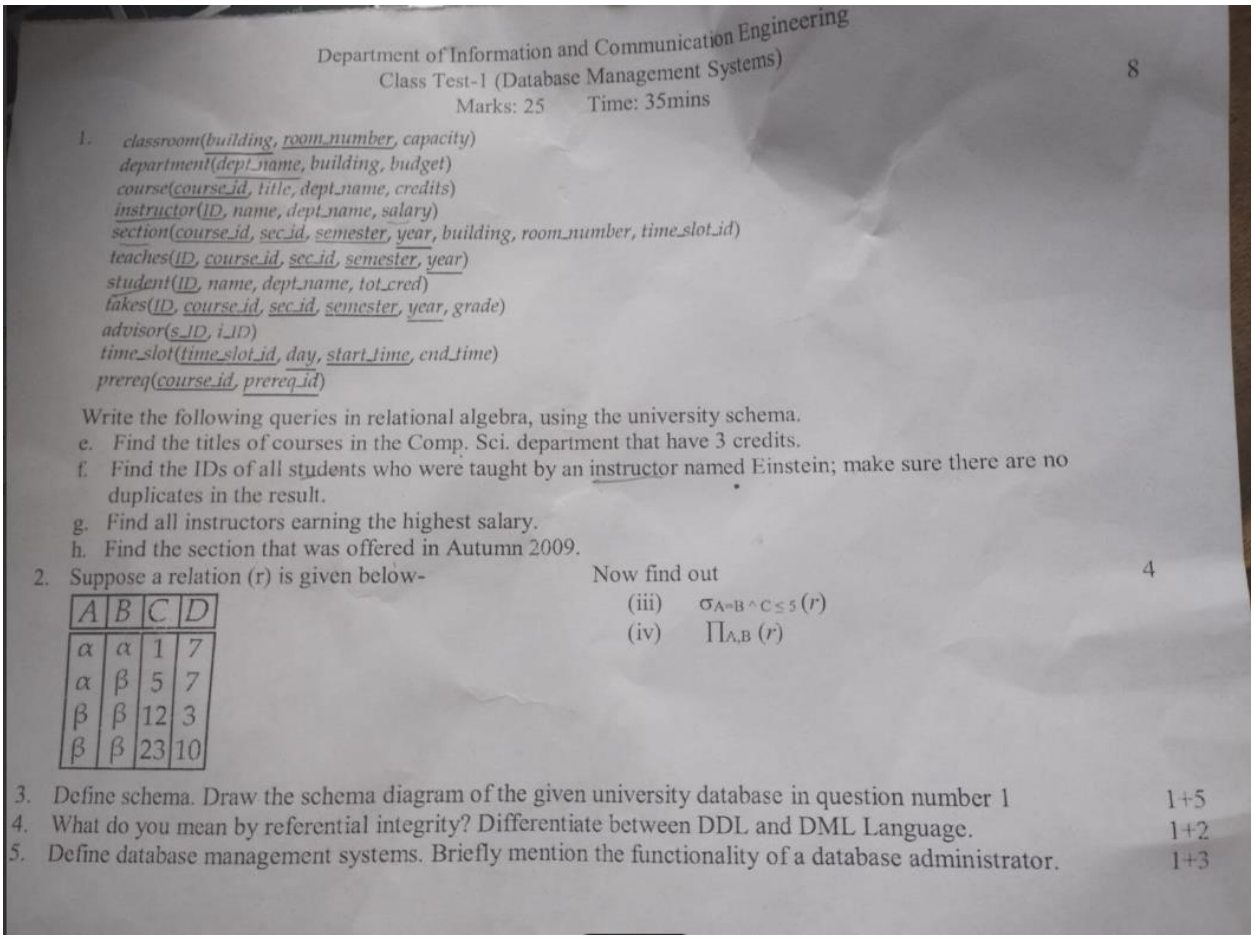
9th batch:

Ct:



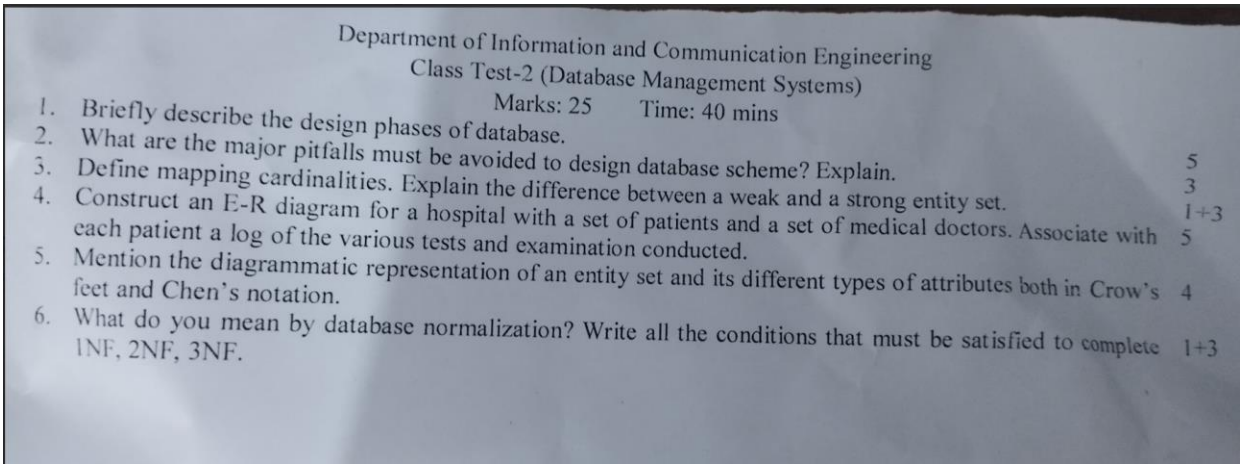
Department of Information and Communication Engineering
Class Test-1 (Database Management Systems) 8
Marks: 25 Time: 35mins

1. *classroom*(*building*, *room_number*, *capacity*)
   department(*dept_name*, *building*, *budget*)
   course(*course_id*, *title*, *dept_name*, *credits*)
   instructor(*ID*, *name*, *dept_name*, *salary*)
   section(*course_id*, *sec_id*, *semester*, *year*, *building*, *room_number*, *time_slot_id*)
   teaches(*ID*, *course_id*, *sec_id*, *semester*, *year*)
   student(*ID*, *name*, *dept_name*, *tot_cred*)
   takes(*ID*, *course_id*, *sec_id*, *semester*, *year*, *grade*)
   advisor(*s_ID*, *i_ID*)
   time_slot(*time_slot_id*, *day*, *start_time*, *end_time*)
   prereq(*course_id*, *prereq_id*)

   Write the following queries in relational algebra, using the university schema.
   e. Find the titles of courses in the Comp. Sci. department that have 3 credits.
   f. Find the IDs of all students who were taught by an instructor named Einstein; make sure there are no duplicates in the result.
   g. Find all instructors earning the highest salary.
   h. Find the section that was offered in Autumn 2009.
2. Suppose a relation (r) is given below- Now find out 4

A	B	C	D
α	α	1	7
α	β	5	7
β	β	12	3
β	β	23	10

   (iii) $\sigma_{A=B \wedge C \leq 5}(r)$
   (iv) $\Pi_{A,B}(r)$
3. Define schema. Draw the schema diagram of the given university database in question number 1 1+5
4. What do you mean by referential integrity? Differentiate between DDL and DML Language. 1+2
5. Define database management systems. Briefly mention the functionality of a database administrator. 1+3



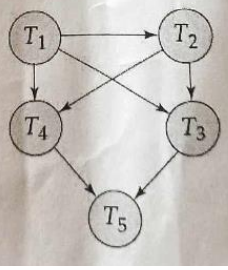
Department of Information and Communication Engineering
Class Test-2 (Database Management Systems)
Marks: 25 Time: 40 mins

1. Briefly describe the design phases of database. 5
2. What are the major pitfalls must be avoided to design database scheme? Explain. 3
3. Define mapping cardinalities. Explain the difference between a weak and a strong entity set. 1+3
4. Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examination conducted. 5
5. Mention the diagrammatic representation of an entity set and its different types of attributes both in Crow's feet and Chen's notation. 4
6. What do you mean by database normalization? Write all the conditions that must be satisfied to complete 1NF, 2NF, 3NF. 1+3

Department of Information and Communication Engineering
Class Test-3 (Database Management Systems)
Marks: 25 Time: 35 mins

1. Consider the relation **R(ABCD)** and the functional dependency **FD{ C → D, C → A, B → C }**. Now 3+8+2
   (a) Find the prime and non-prime key attributes of the relation
   (b) Decompose **R** up to BCNF
   (c) Explain is that your decomposition is lossless or not?
2. Define Normalization and closure. Write Armstrong's axioms to find closure. 2+2
3. What do you mean by consistency of a database? Explain with an example. 3
4. What is schedule and what are the conflicts arise in schedule. Explain with example. 1+4

1. Define log. Explain the dead lock prevention approaches, their disadvantages and steps to improve those disadvantages. 9
2. What do you mean by Cascading rollback? How can you avoid it? Briefly explain with example. 6
3. Illustrate the Timestamp-Ordering protocol. 5
4. Consider the precedence graph of the given figure. Is the corresponding schedule conflict serializable? Explain your answer. 5



8th batch:

Ct:

Information and Communication Engineering

Class Test-1

Marks: 25 Time: 35mins

1. Define Database. Briefly explain what are the drawbacks of using a file system over database system? 1+6
2. Suppose you want to design a database for your department. Now write down and elaborate on the process to design the general structure of your database. 8
3. How a query is processed? Explain with an appropriate diagram. 4
4. Differentiate between the Primary key and the Candidate key. 2
5. Suppose a relation (r) is given below- 4

A	B	C	D
α	α	1	7
α	β	5	7
β	β	12	3
β	β	23	10

Now find out

(i) $\sigma_{A=B \wedge C \leq 5}(r)$

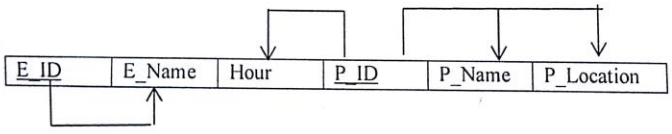
(ii) $\prod_{A,B}(r)$

Information and Communication Engineering

Database Management System (Class Test-2)

Marks: 25 Time: 35mins

1. Define E-R model. Briefly describe the basic concepts of ER data model with example. 1+3
2. What is mapping cardinality? Explain different types of mapping cardinalities with diagram. 1+4
3. The main entities of the NSTU Library Management System for the (E-R) entity-relationship model are Student (name, s_id, address, mobile_no, date_of_birth, age), Book (book_id, book_name, author, book_price) each entity must have one primary key, the attribute name is complex, the attribute address is composite, the attribute mobile_no is multi-valued, the attribute date_of_birth is stored and the attribute age is derived etc. From the above description construct the E-R diagram. 6
4. How can you convert a non-binary relationship to binary relationship? Elaborate with an example. 4
5. Make use of the normalization process for the following relation up to BCNF 6



Noakhali Science and Technology University
Department of Information and Communication Engineering
Term Final Examination -2022

Course Code: ICE-2207 *Course Title: Database Management System*
Session: 2019-2020 *Semester: 2nd Year 2nd Semester*

Total Marks: 70 *Time: 04 Hours*
Answer any seven of the following questions.

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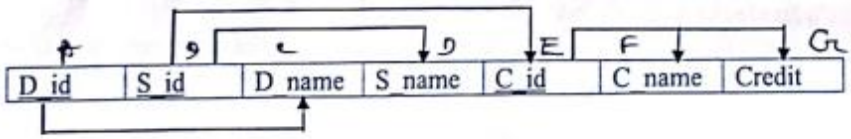
1. a) What is database management system? Discuss the significant application of database management systems. 1+2
   b) Explain the advantages of database system over file processing system. 3
   c) What is the concept of physical data independence and its importance in database systems? 2
   d) Discuss the level of database abstraction. 2

2. a) Explain the following with example: 4
      i) Primary key
      ii) Candidate key
      iii) Super key and
      iv) Foreign key.
   b) Distinguish between having and where clause in SQL 2
   c) Using normalization process to decompose the relation up to BCNF. Also elaborate all the outputs. 4



3. a) Define E-R model. Describe the basic concepts of ER model with appropriate example. 1+3
   b) Explain all the types of mapping cardinality that are useful in describing binary relationship sets. 4
   c) Compare between the complex attribute and derived attribute. 2

4. a) Briefly describe the database design issues with example. Also explain how you can minimize those issues. 6
   b) The main entities of the ICE Library Management system for the Entity-Relationship Model is Student (name, s_id, address, mobile_no, date_of_birth, age), Book (book_id, book_name, author, book_price) each entity must have one primary key, the attribute name is complex, the attribute address is composite, the attribute mobile_no is multi-valued, the attribute date_of_birth is stored and the attribute age is derived etc. From the above description construct the E-R diagram using Chen notation. 4

5. a) Define UML. Briefly explain different types of UML diagram. 1+2
   b) Using Chen and Crows feet notation, draw all the alternative ER notations. 3

c) Consider a relation scheme R=(A,B,C,D,E,H) on which the following functional dependency hold: {A→B, BC→D, E→C, D→A}. Identify the candidate keys of R. 4

6. a) Explain the following: 2
   i) 2-phase locking
   ii) Time-stamp ordering

b) Apply the serializability technique(s) to prove whether the following schedule is serializable or not. 3

T_1	T_2
read(A)	
write(A)	
	read(B)
read(A)	
	write(A)
	read(B)

c) Explain various types of failure that may occur in a system and also write the basic recovery concept. 2

d) List the ACID properties. Explain the usefulness of each. 3

7. a) Differentiate between Instances and Schemas with example. 3

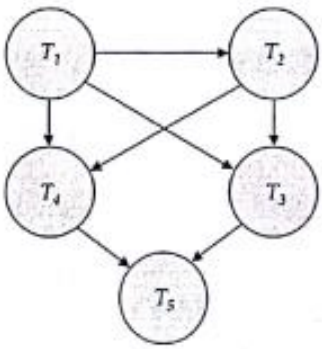
b) Who are the Sophisticated Users? 1

c) Explain the users of a database system who can access or retrieve data on demand using the applications and interfaces provided by the DBMS. 6

8. a) Why do we need snapshot isolation in concurrent transactions? 2

b) Explain the terms **phantom phenomenon and predicate locking** for transactions as SQL statements. 4

c) Consider the following graph of figure. Is the corresponding schedule conflict serializable? Explain your answer. 4



9. a) What is a cascadeless schedule? Why is cascadelessness of schedules desirable? 3

b) Are there any circumstances under which it would be desirable to allow noncascadeless schedules? Explain your answer. 2

c) Consider the following two transactions: 5

$T1$: read(A);
read(B);
if $A = 0$ **then** $B := B + 1$;
write(B).
$T2$: read(B);
read(A);
if $B = 0$ **then** $A := A + 1$;
write(A).

Add lock and unlock instructions to transactions $T1$ and $T2$, so that they observe the two-phase locking protocol. Can the execution of these transactions result in a deadlock?

7th batch:

Department of Information and Communication Engineering
Noakhali Science and Technology University
Term Final Examination, 2020
Year: 2, Term: II, Session: 2018-2019

Course Code: ICE-2207 Course Title: Database Management Systems
Time: 4 Hours Marks: 70

Answer any seven of the following nine questions.

			Marks
1.	(a)	Define instance and schema. Describe the drawbacks of using file systems to store data.	4
	(b)	Why do we need transaction management in DMBS?	2
	(c)	Explain the concept of physical data independence, and its importance in database systems.	2
	(d)	What are the five main functions of a database administrator?	2
2.	(a)	Consider a university database for the scheduling of classrooms for final exams. This database could be modeled as the single entity set exam, with attributes course-name, section-number, room-number, and time. Alternatively, one or more additional entity sets could be defined, along with relationship sets to replace some of the attributes of the examentity set, as i) course with attributes name, department, and c-number ii) section with attributes s-number and enrollment, and dependent as a weak entity seton course iii) room with attributes r-number, capacity, and building Design an E-R diagram illustrating the use of all three additional entity sets listed.	5
	(b)	What is foreign key? Compare the cartesian product and natural join operation with an example.	5
3.	(a)	What are the different types of languages that are available in the DBMS?	2
	(b)	Define weak Entity set. Give an example and explain why it is weak entity set.	3
	(c)	What are the different levels of abstraction in the DBMS? Explain any two among these.	2+3
4.	(a)	List two reasons why null values might be introduced into the database.	2
	(b)	What do you mean by integrity constraints?	2
	(c)	Consider the given relational movie database. The data in this database is from the IMDB website. The database consists of following five tables.	6

ACTOR (id, fname, lname, gender)
MOVIE (id, name, year, rank)
DIRECTOR (id, fname, lname)
CAST (pid, mid, role)
MOVIE_DIRECTOR (did, mid)

id column in ACTOR, MOVIE & DIRECTOR tables is a key for the respective table. CAST.pid refers to ACTOR.id, CAST.mid refers to MOVIE.id
MOVIE_DIRECTOR.did refers to DIRECTOR.id and MOVIE_DIRECTOR.mid refers to MOVIE.id

Now, write down the SQL query for the following questions.

i. Delete all movies after 1980 and before 1991.
ii. Find all actors who acted only in films before 1970.
iii. Find the films with more women actors than men.
iv. List all the movies that have the same year as the movie *'The Clay Bird*

(2002)', but a better rank. (Note: bigger value of rank implies a better rank)

v. List first name and last name of all the actors who played in the movie '*Jalal's Story* (2015)'

vi. List all directors in descending order of the number of films they directed

5. (a) What is data model? Which data model is best in your opinion and why? 1+3

(b) What do you mean by Meta data? 2

(c) Consider the following tables EMPLOYEE: 4

Emp_id	Emp_name	Salary
1001	Rahim	12000
1002	Mamun	10000
1003	Rasel	15000
1004	Sobus	13000

i). Write a SQL Query to find highest salary.

ii). Write a SQL Query to find second highest salary.

6. (a) Differentiate row level and statement level trigger. 2

(b) Differentiate between generalization and specialization. 2

(c) Make the distinction between disjoint and overlapping constraints. 2

(d) Probably you know Cloud databases and Object-oriented databases. Can you compare these two along with their advantages, disadvantages and techniques? Discuss your answer. 1+3

7. (a) What are the two major pitfalls in designing a database schema and how these can be avoided? 3

(b) Differentiate between the partial and total participation constraints with examples. 3

(c) Discuss different types of the mapping cardinality for a binary relationship set R between entity sets A and B with example. 4

8. (a) Distinguish between 3NF and BCNF with appropriate examples. 2

(b) Consider a relational schema R = {A, B, C, D, X, Y} and the decomposed table R1 = {B, X} and R2 = {A, C, Y, D, X} and FD = {A → B, C → {D, X}, {A, C} → Y}. Decide whether the given decomposition of R, R1 and R2 is lossless or lossy decomposition? 4

(c) Consider a relational schema R = (A, B, C, D) and functional dependencies: F = {C→D, C→A, B→C}. 4

a) Construct the best normal form that R satisfies.

b) Decompose R into a set of BCNF relations.

9. (a) Explain variable-length records using slotted page structure. 2

(b) How can we calculate the Access time, Data-transfer rate and Mean time to failure (MTTF) for measuring the disk performance? Implement with example. 3

(c) Define RAID and describe its level 0, 1 and 5. 5

6th batch:

Ct:

Department of Information and Communication Engineering
Noakhali Science and Technology University
Class Test-01, 2019

A

Course Code: ICE-2207 **Course Title: Database Management Systems**
Time: 30 Minute **Marks: 25**

a.		Define instance and schema. Describe about the drawbacks of using file systems to store data.	5
b.		Define query processing. Why do we need transaction management in DMBS?	5
c.		What is primary key? Explain about the natural join with example.	5
d.	i.	Retrieve all employees in department ICE whose salary is between Tk. 20000 and 40000.	3
	ii.	Find the names and average salaries of all departments whose average salary is greater than Tk. 30000	3
	iii.	Find the total number of (distinct) students who have taken course sections taught by the instructor with *ID 180*120M.	4

Department of Information and Communication Engineering
Noakhali Science and Technology University
Term Final Examination, 2019
Year: 2, Term: II, Session: 2017-2018

Course Code: ICE-2207 **Course Title: Database Management Systems**

Time: 4 Hours **Marks: 70**

Answer any seven of the following nine questions.

			Marks
1.	(a)	In which perspective do you think that the DBMS is important?	2
	(b)	You may know file processing system. If so, define it.	2
	(c)	Do you find any disadvantages of file processing system? Discuss against your answer.	3
	(d)	Define database schema and database instance.	3
2.	(a)	How can you classify the database user? Show your debate for distinct categories of database user.	2+3
	(b)	Suppose you are given the following requirements for a simple database for the NSTU Premiere League (NPL): • The NPL has many teams • Each team has a team name, a department name, a coach, a captain, and a set of players • Each player belongs to only one team • each player has a player name, a position (such as cover, square leg or wicket keeper), a skill level (bowler, batsman, allrounder etc.), and a set of injury records • A team captain is also a player • A game is played between two teams (referred to as team_A and team_B) and has a date (such as July 11th, 2016) and a score. **Now, Construct a clean and concise ER diagram for the NPL database.**	5
3.	(a)	Describe about various Data types in SQL.	2
	(b)	What do you mean by integrity constraints?	2
	(c)	Consider the following tables: Employee (Emp_no, Name, Emp_city) Company (Emp_no, Company_name, Salary) i. Write a SQL query to display Employee name and company name. ii. Write a SQL query to display employee name, employee city ,company name and salary of all the employees whose salary >10000 iii. Write a query to display all the employees working in 'XYZ' company.	6
4.	(a)	What is transaction? Explain the ACID properties of a transaction.	1+2
	(b)	**What is CLAUSE?** What is the difference between a HAVING CLAUSE and a	1+2

WHERE CLAUSE?

(c) How you can drop an attribute from an existing relation? Explain with example. 4

5. (a) Define Data Models and list the types of Data Model 2

(b) Explain the difference between a weak and strong entity set with example 2

(c) How can we represent entity sets with composite attributes? Explain with an example 4

(d) Explain generalization and specialization with example. 2

6. (a) What do you mean by redundancy? How this can be avoided? 5

(b) Draw an E – R Diagram for Banking System. 3

(c) Explain the partial and total participation constraints with example. 3

7. (a) Explain the converting procedure of Non-Binary Relationships to Binary Form. 2

(b) Explain Closure of Set of Functional dependency and Closure of Attribute sets 3

(c) Consider the universal relation R = {A,B,C,D,E}. F = {A→BC, CD →E, B →D, E→A}. Is the above decomposition a lossless join or not? 2

(d) What is transitive dependency?

8. (a) What is the need of the normalization? Explain the first three steps involed in the normalization. 4

(b) Consider the universal relation R = (A, B, C, D) and the set of functional Dependencies F = {AB→C, AB→D, C→A, D→B}.

i) Is R in 3NF, why? If it is not, decompose it into 3NF.

ii) Is R in BCNF, why? If it is not, decompose it into BCNF

(c) What is lossy and lossless decomposition? Explain with example 4

9. (a) Between SAN and NAS, explain which one is comparatively better. 2

(b) Is there any algorithm to optimize Disk-Block Access? If yes, explain the algorithm. 3

(c) Define RAID and describe its all level from 0 to 6. 5