NALANDA COLLEGE – COLOMBO

G.C.E. (Advanced Level)

Information & Communication Technology

Unit Test

Unit 08 – Database Management

Answer all questions.

Multiple Choice Questions

1. Which of the following statements is correct about database models?
   (1) Relational model has data integrity issues.
   (2) Hierarchical model can handle any type of relationship.
   (3) Network model provides data independence whereas hierarchical model does not.
   (4) Object relational model allows to inherit objects such as tables.
   (5) Flat file systems allow to retrieve data efficiently.

2. Which of the following statements is correct with respect to entity integrity constraints?
   (1) Entity integrity constraints specify that primary key values can be composite.
   (2) Entity integrity constraints are specified on individual relations.
   (3) Entity integrity constraints specify that primary key value can be null.
   (4) Entity integrity constraints are specified between weak entities.
   (5) When entity integrity rules are enforced, a tuple in one relation that refers to another relation must refer to an existing tuple.

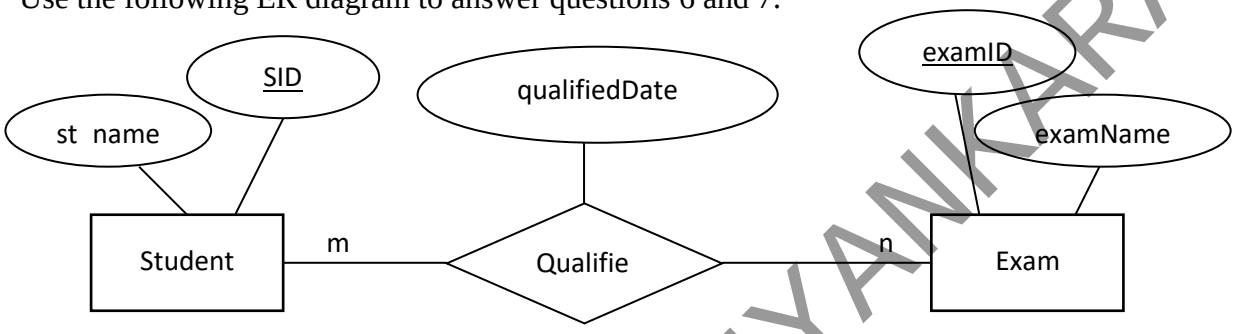
3. Which of the following correctly defines the cardinality and degree of a relation respectively?
   (1) number of rows and number of columns in a relation
   (2) number of records and number of entities in a relation
   (3) number of attributes and number of tuples in a relation
   (4) number of fields and number of rows in a relation
   (5) number of records and number of fields in a relation

4. Normalization of a database is essential to …… .
   A - avoid accidental deletion of required data when some data is deleted
   B - eliminate inconsistencies when a data item is modified in the database
   C - allow storage of data in a computer's disk
   D - use a database management system
   Which of the above statements are suitable to fill the blank?
   (1) A and C (2) A and B (3) B and C
   (4) B and D (5) A, C and D

5. Which of the following is the candidate key field which is not a primary key field in a database?

(1) Foreign key (2) Secondary key (3) Super key
(4) Key constraint (5) Alternate key

- Use the following ER diagram to answer questions 6 and 7.



6. What are the resulting schema out of the following, if the above ERD is mapped into a Relational model?

A – Student (SID, st_name)
B – Qualification (SID, examID, qualifiedDate)
C – Student (SID, examID, st_name)
D – Exam (examID, SID, examName)
E – Exam (examID, examName)

(1) A and C only (2) A, B and D only (3) A, B and E only
(4) A, D and E only (5) A, B, C and D only

7. Which of the following is the correct SQL statement that gives the student ID (SID), examID and qualifiedDate of the exam 'BSc in IT' (examName)?

(1) SELECT SID, examID, qualifiedDate FROM Student WHERE examID = (SELECT examID FROM Exam WHERE examName = 'BSc in IT');
(2) SELECT examID, qualifiedDate FROM Qualification WHERE examID IN (SELECT examID FROM Exam WHERE examName = 'BSc in IT');
(3) SELECT * FROM Qualification WHERE examID = (SELECT examID FROM Exam WHERE examName = 'BSc in IT');
(4) SELECT SID, examID, qualifiedDate FROM Student, Exam WHERE Exam.examID = Qualification.examID AND examName = 'BSc in IT' ;
(5) SELECT * FROM Qualification WHERE examID IN (SELECT examID FROM Exam WHERE examName = 'BSc in IT');

8. Which of the following SQL statements removes all the records in the table 'product'?

(1) delete all from product ; (2) remove * from product ;
(3) delete * from product ; (4) delete from product ;
(5) remove *.* from product ;

9. Consider the following statements about databases:

A - All the relations are at least in 1st normal form when an entity relationship diagram is mapped into a relational schema.

B - Foreign key of a relation cannot be null.

C - Relation instances are the values of attributes at a given instances.

D - Number of records in a table can be zero.

Which of the above are correct?

(1) B and D only (2) A and D only (3) A, C and D only

(4) A, B and C only (5) All A, B, C and D

10. With SQL, how do you select all the records from a table named "Person" where the values of the column "FirstName" include the letter "a"?

(1) SELECT * FROM Person WHERE FirstName='a %' ;

(2) SELECT * FROM Person WHERE FirstName = '%a%' ;

(3) SELECT * FROM Person WHERE FirstName LIKE '%a' ;

(4) SELECT * FROM Person WHERE FirstName LIKE '%a%' ;

(5) SELECT * FROM Person WHERE FirstName='a*' ;

Structured Essay Questions

1. Write two differences between hierarchical database model and network database model.

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2. State three disadvantages of flat file system.

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3. State three features of a relation in relational database.

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4. Explain entity integrity and referential integrity constraints.

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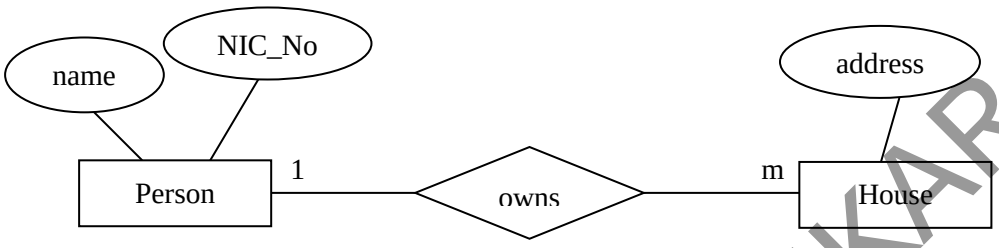
5. A person owns one or more houses. One house belongs to a single person. A person is uniquely identified by NIC number and has a name. Address identifies a house uniquely. Above information is represented by the following ER diagram.



(i) Convert the above ER diagram into 3rd normal form relations.

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(ii) Write SQL statements to implement the relations identified in part (a) above.

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(iii) Write queries in SQL to add the following data to the tables created in part (b) above.

Person name - Nilan Perera
NIC number - 945266750V
Address of house 1 - 75, Hokandara
Address of house 2 - 16A, Munagama, Horana

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Essay Questions

1. Explain the following terms with suitable examples.
    a. Composite attribute
    b. Multivalued attribute
    c. Derived attribute
    d. Weak entity
2. What is meant by "recursive relationship"? Give an example and represent it using a diagram.

3. Consider the following set of requirements for a university database that is used to keep information about result sheets of students.
    - The university keeps track of each student's name, student number, social security number, address, sex, birth-date and degree program. Some user applications need to refer to the city, state and zip of student's address. Both social security number and student number have unique value for each student.
    - Each student must follow only one course. Each course has a course name, description, course number, number of semester hours and level. The value of course number is unique for each course. A course can be followed by many students.
    - A course must be offered by one department. Each department can offer many courses. A name, department code, office number and office phone describe each department. Both name and code have unique values for each department.
    - The sections taught from each course are recorded. Each section has semester, year, course and section number. The section number distinguishes different sections of the same course. A particular section exists only as long as the existence of the course.

    (a) Draw an ER diagram for the above requirements. State if any assumptions you make clearly.
    (b) State candidate keys, primary keys and alternate keys (if any) for each entity type.
    (c) Write the table structures to convert the above ER diagram into relational model.
    (d) It is noted that following functional dependency exists in the given scenario.
        office_no → office_phone
        Give the 3NF relations of the above schema database. (Write only the relevant relation)

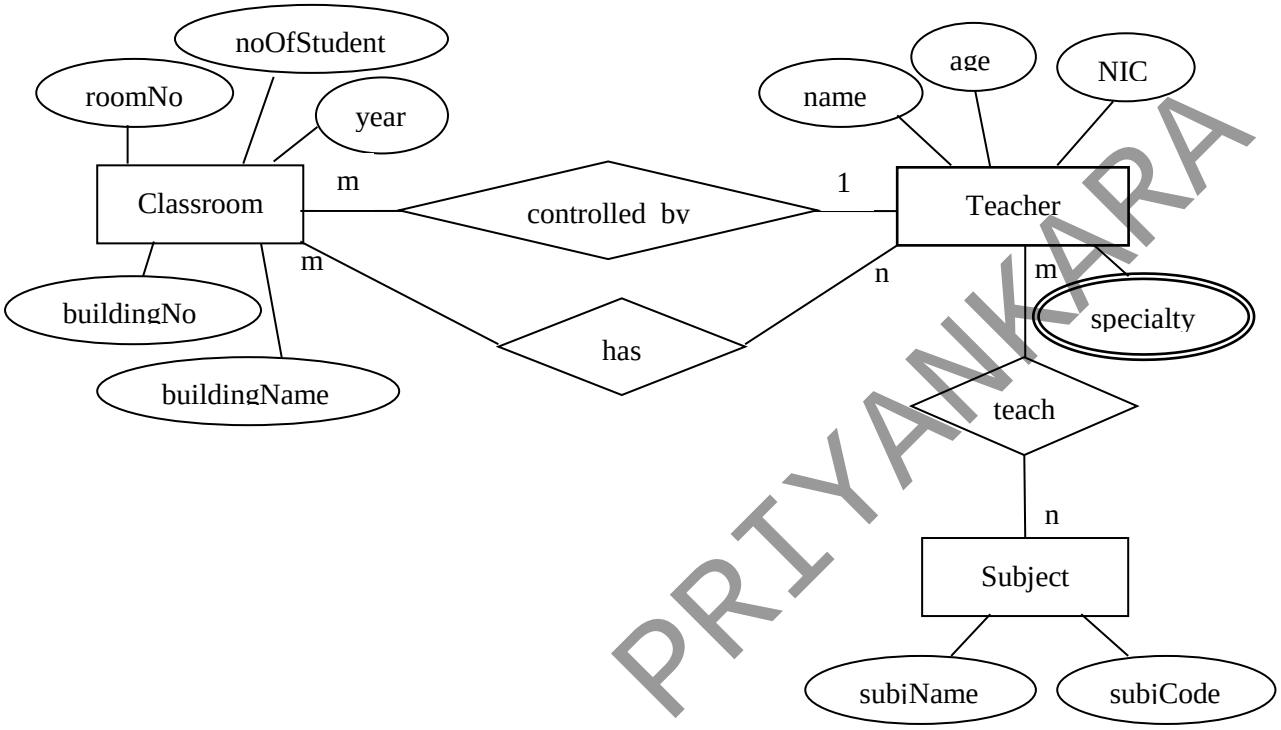
4. Consider the following table named 'Book'.

bookNo	title	publisher	version	author1	author2	author3
122	RDBMS	Prentice Hall	5	J.Kinly	N. Mcniel	H.J. Lee
134	Java Programming	Bartlett Learning	7	Kaal Sue	K.H. Kneel	
136	Oracle	Prentice Hall	6	Raj Khan	R. Prakash	J. Navathe

(a) Which normal form the above table is in?

(b) Write the relational schema for first, second and third normal forms separately. Indicate the primary keys and foreign keys in each relation.

5. Write relational schema to map the following ER diagram into relational model.



6. Consider the following Relational Schema.

Employee (empId, e_name, salary, deptId)

Department (deptId, d_name, manager_id, floor_number)

Write SQL statements for the following queries.

(a) Create the above relations.

(b) Display the name of all employees, who work on the 10th floor.

(c) Display the names of the employees who work in IT department.

(d) Insert the following record to the Department table.

HR005	Human Resources	H016	12

(e) Display all the details of employees sorted by empId in decreasing order.

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