I. 單選題(45%，每題3%)

1. All of the following are benefits of object-oriented modeling EXCEPT:
   A) the ability to tackle more challenging problem domains.
   B) increased consistency among analysis, design, and programming activities.
   C) decreased communication among the users, analysts, designers, and programmers.
   D) reusability of analysis, design, and programming results.

2. Which of the following is true about stored procedures?
   A) Stored procedures cannot be passed parameters like a regular application function.
   B) Stored procedures are stored in the database.
   C) Stored procedures are stored as an embedded function in the application program.
   D) Stored procedures are invoked automatically by the DBMS when specific events occur.
   E) All of the above are true about stored procedures.

3. Given the generic relation: **GENERIC (PKey1, PKey2, Attribute1, Attribute2, Attribute3)**, and the functional dependencies: **(PKey1, PKey2) → Attribute1** and **PKey2 → (Attribute2, Attribute3)**, which of the following is true?
   A) GENERIC is not fully normalized.
   B) PKey1 is a determinant.
   C) PKey2 is a candidate key.
   D) GENERIC is in DK/NF.
   E) All of the above

4. In which of the following situations would one have to use an outer join in order to obtain the desired results?
   A) A report is desired that lists all customers who placed an order.
   B) A report is desired that lists all customers and the total of their orders.
   C) A report is desired that lists all customers, the total of their orders during the most recent month, and includes customers who did not place an order during the month (their total will be zero).
   D) There is never a situation that requires only an outer join.

5. Which of the following is true about representing a weak entity with the relational model?
   A) If the weak entity is existence-dependent, the key of the parent must be part of the key of the weak entity.
   B) If the weak entity is ID-dependent, the key of the parent entity must be part of the key of the weak entity.
   C) If the weak entity is ID-dependent, the key of the weak entity must be part of the key of the parent entity.
   D) If the strong entity has a minimum cardinality of 1, the key of the weak entity must be part of the strong entity.
   E) If the parent entity is existence-dependent, then the minimum cardinality of the weak entity is zero.

6. Which of the following is NOT true of packaged data models?
   A) Relationships are connected to the highest-level entity type in an order that makes sense.
   B) All subtype/supertype relationships follow the total specialization and disjoint rules.
   C) No entities on the many side of a relationship can be weak.
   D) Both B and C.

7. Which of the following is the correct technique for representing a M:N relationship using the relational model?

   A) An intersection relation is created and the key of either entity is placed as a key in both the intersection relation and in the other relation.

   B) An intersection relation is created with a surrogate key, which is placed in each of the parent entities.

   C) An intersection relation is created and the keys of both parent entities are placed as a composite key in the intersection relation.

   D) The key from either relation is placed as a foreign key in the other relation.

   E) None of the above

8. Which of the following is NOT true of database recovery through reprocessing?

   A) Reprocessing requires a record of all transactions since the last time the database was saved.

   B) Reprocessing takes the same amount of time as did processing in the first place.

   C) Reprocessing will always return the database to its exact previous state.

   D) Reprocessing makes use of a database save.

   E) All of the above are true of reprocessing.

9. In the normalization process, if you find a candidate key that is not a determinant then you should:

   A) place the columns of the functional dependency in a new relation.

   B) make the determinant of the functional dependency the primary key of the new relation.

   C) leave a copy of the determinant as a foreign key in the original relation.

   D) All of the above

   E) None of the above

10. All of the following are advantages of vertical partitioning EXCEPT:

    A) easier to set up than horizontal partitioning.

    B) security.

    C) ease of querying.

    D) efficiency.

11. The normal form which removes any remaining functional dependencies because there was more than one primary key for the same nonkeys is called:

    A) Fifth normal form.

    B) Fourth normal form.

    C) Boyce-Codd normal form.

    D) Sixth normal form.

12. User-defined transactions can improve system performance because:

    A) transactions are processed as sets, reducing system overhead.

    B) transactions are mapped to SQL statements.

    C) speed is improved due to query optimization.

    D) all of the above.

13. All of the following are limitations of the independent data mart EXCEPT:

    A) separate extraction, transformation, and loading processes are developed for each data mart.

    B) it is often more expedient to build a data mart than a data warehouse.

    C) there is no capability to drill down into greater detail in other data marts.

    D) data marts may not be consistent with one another.

14. All of the following are tasks of data cleansing EXCEPT:

   A) decoding data to make them understandable for data warehousing applications.

   B) adding time stamps to distinguish values for the same attribute over time.

   C) generating primary keys for each row of a table.

   D) creating foreign keys.

15. Which of the following functional dependency diagrams accurately represents the following situation:

   ● A campus has many buildings.
   ● Each building has a unique name.
   ● Each building has many rooms.
   ● All rooms in any given building are numbered sequentially starting at "101."
   ● Each room has a certain capacity although many rooms in the same building or different buildings may have the same capacity.
   ● Each room is assigned to a single department.
   ● A department may have many rooms in one or more buildings, each with the same or different capacities.

   A) BuildingName → (RoomNumber, Capacity, Department)

   B) RoomNumber → (BuildingName, Department, Capacity)

   C) (Department, Capacity) → (BuildingName, RoomNumber)

   D) (BuildingName, Capacity) → (Department, RoomNumber)

   E) (BuildingName, RoomNumber) → (Capacity, Department)

II.　問答題(55%)

1. What is OLAP and what types of OLAP tools are available? (10%)

2. What is an anomaly and what are the three types of anomalies? (8%)

3. Discuss how data integrity can be controlled. (7%)

4. Define and briefly describe the function of ODBC. (10%)

5. What are the advantages and disadvantages of a distributed database? (10%)

6. Discuss three possible opportunities for denormalization. (10%)