Part 1: Multiple Choice (96 points - 3 points per question)

(B) 1. Which can be used to delete a table in SQL? (A) delete table (B) drop table (C) kill table (D) erase table

(A) 2. Which SQL command can be used to indicate an attribute as a key? (A) unique (B) index (C) distinct (D) none of above

(D) 3. Which can be specified on referential integrity constraint in SQL? (A) reject (B) set rule (C) set value (D) None of the above

(C) 4. Which integrity constraints can trigger a sequence of operations? (A) restrict (B) set default (C) set null (D) cascade

(D) 5. In the like operator of SQL, which can represent any string? (A) * (B) ; (C) % (D) None of the above

(B) 6. Which is not a aggregation function in SQL? (A) round() (B) sum() (C) avg() (D) max()

(A) 7. When you log into your Facebook account, which SQL command will be used? (A) insert (B) update (C) select (D) delete

(B) 8. Which is not a meaning for null values? (A) Attribute does not apply to this tuple. (B) The value is beyond the domain range. (C) Attribute value is unknown. (D) Value exists but is not available.

(B) 9. Which is a selection condition in the following SQL commands? select name from employee, department where department_name = 'Research' and employee.department_no = department.department_no; (A) select name from employee, department (B) department_name = 'Research' (C) employee.department_no = department.department_no (D) None of the above

(D) 10. What result set will the following query return? select ticker from stock where price > 30; (A) The stocks of tickers whose price is more than 30. (B) The tickers of stocks whose ticker is more than 30. (C) The prices of stocks whose ticker is more than 30. (D) None of the above

(B) 11. Which can be used to eliminate duplicate rows in SQL? (A) distinct (B) check (C) specific (D) unique

(B) 12. In MySQL which is used to execute a SQL script? (A) use (B) \ (C) \c (D) none of the above

(B) 13. Which is used for string pattern matching in SQL? (A) as (B) like (C) between (D) none of above

(B) 14. When you log into your Facebook account, which SQL command will be used? (A) insert (B) update (C) delete (D) select

(D) 15. In MySQL which command can show the schema of a table? (A) show (B) display (C) present (D) describe

(D) 16. The UNION clause is used to: (A) join two tables together to form one table. (B) find all rows that do not match in two tables. (C) combine the output from multiple queries into a single result table. (D) none of above.

(A) 17. Which SQL aggregate function returns the number of rows? (A) count() (B) number() (C) sum() (D) none of above

(C) 18. Which can create a virtual table in a database? (A) correlated query (B) derived table (C) view (D) none of above.

(A) 19. Which is in the DBMS-dependent design process? (A) requirement analysis (B) conceptual design (C) transaction implementation (D) none of above

(A) 20. Which type of schema is described in ER models? (A) Conceptual Schema (B) External schema (C) Internal Schema (D) None of the above

(D) 21. An entity whose existence depends on another entity is called: (A) dependent entity (B) variant entity (C) strong entity (D) weak entity

(C) 22. Which is an entity in a hotel? (A) open hours (B) address (C) room (D) none of above

(B) 23. Which type of relationships between a customer and the order? (A) one-to-one (B) one-to-many (C) many-to-one (D) many-to-many

(D) 24. Which is usually to represent a relationship in an ER diagram? (A) adjective (B) conjunction (C) noun (D) verb

(D) 25. Referring to the following figure, which following statement is true?

(A) Child is a strong entity. (B) An employee can have only one child. (C) Employee_ID in Employee is a foreign key. (D) none of the above

(D) 26. Which is an attribute is composed of the other attribute? (A) associative (B) derived (C) required (D) none of above
27. Which are specific objects or things in the mini-world that are represented in the database?
   (A) entities (B) attributes (C) relationships (D) descriptions

28. A relationship that links strong entities to weak entities is called:
   (A) a key relationship (B) a corresponding relationship (C) an associative entity (D) none of above

29. One entity related to another of the same entity type is called a(n):
   (A) binary relationship (B) ternary relationship (C) unary relationship (D) none of the above

30. Which attribute can uniquely identify weak entities? (A) partial key (B) weak key (C) identifying key (D) none of above

31. Which is not a type of attributes? (A) simple (B) composite (C) multi-valued (D) parametric

32. Which is a relationship type of degree 3? (A) ternary (B) primary (C) tertiary (D) binary

Part 2: Questions and Answers (108 points)

1. (28 points) Briefly explain these terminologies. If they are acronyms, also write what they stand for.
   (a) joined table (b) trigger (c) assertion (d) ER model (e) cardinality ratio (f) key attribute (g) identifying relationship
   (a) A joined table is a table resulting from a join operation.
   (b) A trigger is a statement that is automatically executed in response to certain events on a particular table or view in a database.
   (c) An assertion is any condition that the database must always satisfy.
   (d) Entity-Relationship (ER) model is a high-level conceptual data model in which an entity represents an object in the real world and a relationship associates these entities.
   (e) The cardinality ratio for a binary relationship specifies the maximum number of relationship instances that an entity can participate in.
   (f) A key attribute is an attribute whose value can be used identify each entity uniquely.
   (g) An identifying relationship is a relationship that links a strong entity to a weak entity.

2. (a) (4 points) What does SQL stand for? Explain it.
   (b) (6 points) Based on the functions how can SQL be classified into three categories?
   (a) Structured Query Language (SQL) is a standard language used to retrieve, update and delete data from relational database management systems (DBMS).
   (b) Data Definition Language (DDL) is used to define databases.
   Data Manipulation Language (DML) is used to manipulate databases.
   Data Control Language (DCL) is used to control databases.

3. (40 points) Use SQL to answer the following questions based on the following database.

<table>
<thead>
<tr>
<th>Artist table</th>
<th>Release table</th>
<th>Album table</th>
</tr>
</thead>
<tbody>
<tr>
<td>artist_id</td>
<td>album_id</td>
<td>album_id</td>
</tr>
<tr>
<td>first_name</td>
<td>released_year</td>
<td>title</td>
</tr>
<tr>
<td>last_name</td>
<td>quantity</td>
<td></td>
</tr>
<tr>
<td>A1001 Lady</td>
<td>B1001 2010</td>
<td>B1001 Born This Way</td>
</tr>
<tr>
<td>A3003 Taylor</td>
<td>B3003 2010</td>
<td>B3003 Speak Now</td>
</tr>
</tbody>
</table>

where primary keys are underlined. artist_id and album_id in the release table are foreign keys referencing to the artist and album table respectively.

(a) (3 points) Create the Artist table and set artist_id as the primary key.
(b) (3 points) Add an attribute genre into the Album table.
(c) (3 points) Specify a constraint release_year > 1900 in the Release table.
(d) (3 points) Specify the foreign key (artist_id) in the Release table references to the Artist table.
(e) (3 points) Remove the Album table.
(f) (3 points) Insert ('A6006', 'Sarah', 'McLachlan') into the Artist table.
(g) (3 points) Update the Artist table and change the value of name from "Lady Gaga" to "Stefani Germanotta".
(h) (3 points) Count total number of the albums released in 2011.
(i) (3 points) List the titles of albums released more than 1000000 copies.
(j) (3 points) List the titles of all album released by Lady Gaga.
(k) (3 points) Delete all albums released in 2011.
(l) (4 points) List the name and count the number of all albums released by each artist.
(m) (3 points) Write the result of the query "select title, quantity from Album as A, Release as R where A.album_id = R.album_id"
(a) create table Artist  
    artist_id char(5) primary key not null,  
    firstname varchar(30),  
    lastname varchar(10));  
(b) alter table Album add genre varchar(20);  
(c) alter table Release add constraint year  
    constraint check (year > 1900)  
(d) alter table Release add foreign key (artist  
    id) references Artist (artist  
    id);  
(e) drop table album  
(f) insert into Artist values ('A6006', 'Sarah', 'McLachlan')  
(g) update Artist set firstname = 'Stefani', lastname = 'Germanotta' where firstname = 'Lady' and lastname = 'Gaga';  
(h) select sum (quantity) from Release where released_year = 2011  
(i) select title from Album, Release  
    where Album.album_id = Release.album_id and quantity > 1000000  
(j) select title from Album, Release, Artist  
    where Album.album_id = Release.album_id and Artist.artist_id = Release.artist_id and firstname = 'Lady' and  
    lastname = 'Gaga'  
(k) delete from album where album_id in (select album_id from Release where released_year = 2011);  
(l) select title from Album, Release, Album where Artist.artist_id = Release.artist_id and  
    Release.album_id = Album.album_id group by firstname,  
    lastname  
(m) | title       | quantity |
    |-------------|----------|
    | Born This Way | 2200000 |
    | Teenage Dream  | 3200000 |
    | Speak Now     | 1800000 |

4.  (a) (4 points) Explain the differences among a entity instance and an entity type.  
(b) (3 points) What is the degree of relationships?  
(c) (3 points) What is the cardinality of relationships?  
(a) A entity instance is a single occurrence of an entity type. An entity type is a collection of entities that share common  
properties or characteristics.  
(b) The degree is the number of entity types that participate in a relationship.  
(c) The Cardinality specifies the number of instances of one entity that can be associated with each instance of another  
entity.

5. (16 points) Consider the following relations for a store.  
customer (customer_no, customer_name)  
order (order_no, customer_no, date)  
detail (order_no, item, product_no, amount)  
product (product_no, product_name, unit, price)  
(a) (8 points) Draw the relational schema diagram and indicate the primary keys and the referential constraints.  
(b) (8 points) Based on the above schema diagram draw the ER diagram.

(a)  

(b)