Part 1: Multiple Choice (84 points - 3 points per question)

(D) 1. Which is a SQL DDL command? (A) delete (B) grant (C) update (D) none of the above

(B) 2. Which SQL command is used to remove a table? (A) delete table (B) drop table (C) truncate table (D) none of the above

(D) 3. Which SQL keyword is used to identify an attribute is a key in a table? (A) distinct (B) check (C) specific (D) unique

(B) 4. Which is used to indicate categorization of results in SQL? (A) order by (B) group by (C) sort by (D) having

(C) 5. Which can speed up access to database tables? (A) data dictionary (B) data view (C) index (D) none of the above

(A) 6. Which SQL aggregate function returns the number of rows? (A) count() (B) number() (C) sum() (D) none of the above

(A) 7. Which is not a aggregation function in SQL? (A) round() (B) sum() (C) avg() (D) max()

(A) 8. What is a virtual table in SQL? (A) view (B) vision (C) screen (D) none of the above

(C) 9. To eliminate duplicate rows in a query, which can be used? (A) unique (B) index (C) distinct (D) none of the above

(A) 10. What does the following SQL statement do? select name from student where city = 'Hsinchu'; ?
   (A) Retrieves the name of all students who live in Hsinchu. (B) Retrieves all students whose name is Hsinchu.
   (C) Retrieves all cities whose name is Hsinchu. (D) None of the above

(B) 12. Which SQL operator is used to search for a specified pattern in a column?
   (A) as (B) like (C) match (D) none of the above

(D) 13. In MySQL which command can show the schema of a table? (A) show (B) display (C) present (D) describe

(C) 14. In MySQL which is used to execute a SQL script? (A) use (B) e (C) . (D) none of the above

(D) 15. When you log into your Line, which SQL command will be used? (A) insert (B) update (C) delete (D) select

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

(D) 18. Which is an entity in a hotel? (A) open hours (B) address (C) room (D) none of above

(D) 19. Which is the number of participating entity instances for a relationship?
   (A) participation (B) degree (C) identification (D) cardinality

(B) 20. 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

(B) 21. Which is usually to represent a relationship in an ER diagram? (A) adjective (B) verb (C) noun (D) conjunction

(D) 22. In ER digram what does a double ellipse represent?
   (A) simple attribute (B) associative attribute (C) derived attribute (D) none of the above

(D) 23. 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) 24. Which is an attribute is composed of the other attribute? (A) associative (B) derived (C) required (D) none of above

(A) 25. Which are specific objects or things in the mini-world that are represented in the database?
   (A) entities (B) attributes (C) relationships (D) descriptions

(B) 26. Which is the process of defining a set of subtypes of a supertype?
   (A) generalization (B) specialization (C) aggregation (D) identification

(B) 27. Which integrity constraints can trigger a sequence of operations? (A) restrict (B) set null (C) cascade (D) set default

(B) 28. Which provides a standard software API for using DBMS? (A) CASE (B) ODBC (C) OLAP (D) none of the above

Part 2: Questions and Answers (87 points)

1. (20 points) Briefly explain these terminologies. If they are acronyms, also write what they stand for.
   (a) trigger (b) ER model (c) cardinality ratio (d) identifying relationship (e) ontology

   (a) A trigger is a statement that is automatically executed in response to certain events on a particular table or view in a database.
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.

The cardinality ratio for a binary relationship specifies the maximum number of relationship instances that an entity can participate in.

An identifying relationship is the relationship between a weak entity type and its owner.

Ontology means using conceptual modeling and other tools to develop a specification of a conceptualization.

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. (12 points) Briefly explain the four constraints on specialization and generalization.
   - The disjointness constraint specifies that the subclasses of the specialization must be disjoint.
   - The overlapping specialization specifies that the subclasses of the specialization can be overlapping.
   - The total specialization specifies that every entity in the superclass must be a member of some subclass.
   - The partial specialization specifies that an entity in the superclass is allowed not to belong to any of the subclasses.

4. (33 points) A video shop has the following tables:

<table>
<thead>
<tr>
<th>video_no</th>
<th>title</th>
<th>released_year</th>
<th>price</th>
<th>stock</th>
<th>rental_period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001</td>
<td>King Kong</td>
<td>2005</td>
<td>29</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>2002</td>
<td>Blood Diamond</td>
<td>2006</td>
<td>39</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>3003</td>
<td>Letters from Iwo Jima</td>
<td>2006</td>
<td>39</td>
<td>5</td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>member_no</th>
<th>name</th>
<th>phone_no</th>
<th>deposit</th>
</tr>
</thead>
<tbody>
<tr>
<td>10678</td>
<td>Ariana Grande</td>
<td>03-51223456</td>
<td>1200</td>
</tr>
<tr>
<td>23468</td>
<td>Avril Lavigne</td>
<td>0912-123456</td>
<td>800</td>
</tr>
<tr>
<td>45823</td>
<td>Taylor Swift</td>
<td>0928-342512</td>
<td>200</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>video_no</th>
<th>checkout_date</th>
<th>member_no</th>
<th>discount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001</td>
<td>2007-05-30</td>
<td>10678</td>
<td>0.2</td>
</tr>
<tr>
<td>2002</td>
<td>2007-06-01</td>
<td>23468</td>
<td>0</td>
</tr>
<tr>
<td>3003</td>
<td>2007-05-28</td>
<td>45823</td>
<td>0.3</td>
</tr>
</tbody>
</table>

   where primary keys are underlined. video_no and member_no in the rental table are foreign keys referencing to the video and member table respectively.

   (a) If the following operations are taken, check if domain constraints, key constraints, entity integrity, or referential integrity is violated. If there is any violation, explain it.
      i. Insert (‘10678’, ‘Mariah Carey’, ‘03-5122345’, 1000) into the member table.
      iii. Delete the tuple with the member name ‘Avril Lavigne’ from the member table. ‘Avril Lavigne’ to ‘Natalie Imbruglia’.
      iv. Update the member table and change the value of member_no from 45823 to 36872.
   (b) Use SQL to answer the following questions.
      i. (4 points) Create the video table and indicate the primary key and necessary constraints.
      ii. (2 points) Insert (‘12345’, ‘Mariah Carey’, ‘03-5122345’, 1000) into the member table.
      iii. (2 points) Change 0.4 to 0.3 in the rental table.
      iv. (3 points) delete all videos borrowed by Taylor Swift.
      v. (3 points) Retrieve the title and released year of all videos rented by Avril Lavigne or Ariana Grande.
      vi. (3 points) Add a constraint of $0 \leq \text{discount} \leq 0.4$ in the rental table.
      vii. (3 points) Count the number of video rented by Taylor Swift.
      viii. (3 points) Rank the videos by the number of rentals from high to low.

   (a) i. It violates the key constraint because the member_no ’10687’ already existed.
      ii. It violates the domain constraint because ’29’ is a string and not a number value.
      iii. It violates the referential integrity because the foreign key, member_no of the value 23468 in the rental table will have no primay key to reference to.
      iv. It violates the referential integrity because the foreign key member_no of the value 45823 in the rental table will have no primay key to reference to.
(b)  

i. create table video (  
    video_no char(10) not null primary key,  
    title varchar(50) not null,  
    released_year int,  
    price int,  
    stock int,  
    rental_period int  
);  
ii. insert into member values ('12345', 'Mariah Carey', '03-5122345', 1000);  
iii. update member set discount = 0.3 where discount = 0.4;  
iv. delete from video where video_no in (  
    select video_no from rental, member  
    where rental.member_no = member.member_no and name = 'Taylor Swift'  
);  
v. select title, released_year  
    from video, member, rental  
    where name = 'Avril Lavigne' or name = 'Ariana Grande'  
    and video.video_no = rental.video_no  
    and member.member_no = rental.member_no;  
vi. alter rental add constraint discount constraint check (discount >= 0 and discount <= 0.4)  
vii. select name, count(video_no) as video_count from member, rental  
    where member.member_no = rental.member_no and name = 'Taylor Swift';  
viii. select title, count(video_no) as video_count from video, rental  
    where video.video_no = rental.video_no  
    group by title  
    order by video_count desc

5. (14 points) Consider the world cup baseball game. There are players, teams, and matches. Each player has player number, name, and birthday. Each player will join a country team with a confreradation. Each match has date, time, and location. There are two types of players: professional and amateur. Each professional player has the professional year information. Each amateur player has the club name information.

(a) (7 points) Add the necessary relationships to draw a EER diagram to represent the relationships among teams, players, and matches.

(b) (7 points) Draw the relation schema.

(a)  

(b)  

player: player_no, country, name, birthday, category, club, year  
team: country, confreradation  
match: country, date, match_country, time, location