1. From the following list of characteristics of the relational database model,

(a) Only one relation is allowed.
(b) A relation is a table of tuples that describe the type of data in the table.
(c) Relations may have many tuples.
(d) A key identifies a particular attribute.
(e) Each attribute is composed of only one domain.

Which of the preceding are true?

(a) a, b, c
(b) c, e
(c) c, d, e
(d) a, c
(e) none of the above

2. From the following list of characteristics related to relational algebra.

(a) Relational algebra operations include select, project, and join.
(b) Relational algebra functions operate on tables.
(c) The result table of a select operation may have fewer tuples than the source table.
(d) The result table of a project operation will have more tuples than the source table.
(e) There are several different kinds of join operations.

Which of the preceding are true?

(a) a, b, c, e
(b) a, b, c
(c) a, c, e
(d) b, c, d, e
(e) b

3. From the following list of characteristics related to SQL.

(a) The SQL is a programming language.
(b) The SQL select implements relational joins, selects, and projects.
(c) There are several database systems that implement SQL.
(d) SQL is both a DDL and DML.
(e) SQL implements relational algebra.

Which of the preceding are true?

(a) a, c, d
(b) b, c
(c) a, c, d, e
(d) b, c, e
(e) a, b, c
(f) all of the above
4. From the following list of characteristics related to database normal forms.

(a) Any properly formed relation is in first normal form.
(b) The goal of normal form structures is to eliminate insert, delete, and update anomalies.
(c) As a database is configured from first, to second, and to third normal form the amount of redundant data is reduced by reducing the number of relations.
(d) A database is in second normal form if it is in first normal form and has no transitive dependencies.
(e) A database is in third normal form if it is in second normal form and has no reverse dependencies.

Which of the preceding are true?

(a) a, b, d
(b) a, b, d, e
(c) b, d, e
(d) b, c, e
(e) all of the above

5. From the following list of characteristics related to database management systems (DBMS).

(a) DBMSs provide data and implementation independence.
(b) DBMSs reduce the instance of inconsistent data by sharing non-redundant data.
(c) DBMSs may be implemented as shared server systems or as non-shared systems.
(d) It is not possible to provide data security with networked DBMSs.
(e) DBMSs from various companies mostly are not compatible because they each use their own programming language.

Which of the preceding are true?

(a) a, b, c
(b) a, b, c, e
(c) b, d, e
(d) b, c
(e) all of the above

6. From the following list of characteristics related to PHP.

(a) PHP is a programming language.
(b) HTML and PHP execution are not compatible and must be accessed from separate files.
(c) PHP is executed by web browsers.
(d) PHP provides a link between an SQL server and the user interface.
(e) Associative arrays allow convenient access to tuple elements.

Which of the preceding are true?

(a) a, b, c, d
(b) a, c, d, e
(c) a, d, e
(d) d, e
(e) all of the above
7. From the following list of characteristics related to the entity-relationship (E-R) model.

(a) The E-R model is a data and implementation independent method of describing data requirements.

(b) Some of the components of the E-R model are entities, relationships, attributes, and tuples.

(c) The E-R model is not specific enough to serve as a documentation tool.

(d) Both E-R entities and relationships may be translated into SQL tables.

(e) An E-R model can be used to evaluate database performance issues.

Which of the preceding are true?

(a) a, d, e
(b) a, c, d, e
(c) a, b, c
(d) d, e
(e) all of the above

8. For this E-R model,

Which one of the following relational databases is equivalent to the E-R model.

(a) \( E_1(A_{E_{11}}, A_{E_{12}}) \ E_2(A_{E_{21}}, A_{E_{22}}) \ R(A_{E_{11}}, A_{E_{21}}, A_R) \)

(b) \( E_1(A_{E_{11}}, A_{E_{12}}, A_{E_{21}}, A_R) \ E_2(A_{E_{21}}, A_{E_{22}}) \)

(c) \( E_1(A_{E_{11}}, A_{E_{12}}, A_{E_{21}}, A_{E_{22}}, A_{E_{11}}, A_R) \)

(d) \( E_1(A_{E_{11}}, A_{E_{12}}) \ E_2(A_{E_{21}}, A_{E_{22}}) \ R(A_R) \)

(e) \( E_1(A_{E_{11}}, A_{E_{12}}) \ E_2(A_{E_{21}}, A_{E_{22}}, A_{E_{11}}, A_R) \)
9. Which of the following output the following relation from the student database?

<table>
<thead>
<tr>
<th>cnum</th>
<th></th>
<th>cnum</th>
<th></th>
<th></th>
<th>periodnum</th>
</tr>
</thead>
<tbody>
<tr>
<td>csn 360</td>
<td>Database Systems</td>
<td>1</td>
<td>shc 108</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>csn 310</td>
<td>Computer Architecture</td>
<td>1</td>
<td>shc 108</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>csn 320</td>
<td>Programming Languages</td>
<td>3</td>
<td>shc 108</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>csn 301</td>
<td>Theory of Computing</td>
<td>2</td>
<td>shc 108</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

(a) studentdb=# select *
studentdb=# from enrollment, courses;

(b) studentdb=# select *
studentdb=# from courses;

(c) studentdb=# select cnum, cname, fname
studentdb=# from courses, faculty;

(d) studentdb=# select courses
studentdb=# from relation='courses'
studentdb=# where *;

(e) studentdb=# select *
studentdb=# from courses, enrollment
studentdb=# where cname = 'Database Systems';

10. Which of the following lists the course names that Professor Debure teaches.

(a) studentdb=# select *
studentdb=# from courses
studentdb=# where last_name = 'Debure' and
studentdb=# courses.fnum = faculty.fnum;

(b) studentdb=# select cname
studentdb=# from courses, faculty
studentdb=# where last_name = 'Debure';

(c) studentdb=# select cname
studentdb=# from courses, faculty
studentdb=# where last_name = 'Debure' and
studentdb=# f.num = c.num;

(d) studentdb=# select cname
studentdb=# from courses, faculty
studentdb=# where last_name = 'Debure' and
studentdb=# courses.fnum = faculty.fnum;

(e) studentdb=# select courses
studentdb=# from courses, faculty
studentdb=# where last_name = 'Debure' and
studentdb=# courses.fnum = faculty.fnum;
The following student database sql is related to questions 9 and 10.

```
CREATE TABLE students (  
  first_name CHAR(20),  
  last_name CHAR(20),  
  snum INTEGER PRIMARY KEY,  
  addr1 CHAR(30),  
  addr2 CHAR(30),  
  city CHAR(20),  
  state CHAR(2),  
  zip CHAR(5),  
  UNIQUE (first_name, last_name)  
);

CREATE TABLE faculty (  
  first_name CHAR(20),  
  last_name CHAR(20),  
  fnum INTEGER PRIMARY KEY,  
  officenum CHAR(10),  
  telnum CHAR(7),  
  jobtitle CHAR(20),  
  UNIQUE (first_name, last_name)  
);

CREATE TABLE courses (  
  cnum CHAR(7) PRIMARY KEY,  
  cname CHAR(30),  
  fnum INTEGER  
  REFERENCES faculty(fnum),  
  roomnum CHAR(8),  
  periodnum INTEGER  
);

CREATE TABLE enrollment (  
  cnum CHAR(7)  
  REFERENCES courses(cnum),  
  snum INTEGER  
  REFERENCES students(snum),  
  UNIQUE (cnum, snum)  
);  
```