UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY
Academic Year 2009/2010 – 1st Year Examination – Semester 2

IT2304 – Database Systems I

08th August 2010
(TWO HOURS)

Important Instructions :

- The duration of the paper is **2 (two) hours**.
- The medium of instruction and questions is English.
- The paper has **40** questions and **16** pages.
- All questions are of the MCQ (Multiple Choice Questions) type.
- All questions should be answered.
- Each question will have 5 (five) choices with **one or more** correct answers.
- All questions will carry equal marks.
- There will be a penalty for incorrect responses to discourage guessing.
- The mark given for a question will vary from 0 to +1 (*All the correct choices are marked & no incorrect choices are marked*).
- Answers should be marked on the special answer sheet provided.
- Note that questions appear on both sides of the paper.
- If a page is not printed, please inform the supervisor immediately.
- Mark the correct choices on the question paper first and then transfer them to the given answer sheet which will be machine marked. **Please completely read and follow the instructions given on the other side of the answer sheet before you shade your correct choices.**

1) What are the advantages of the database approach versus the file processing approach?

(a) Changes to the data structure may not require changing all programs that use the relevant data.
(b) Reports can be generated according to the various user requests by accessing the stored data.
(c) Multiple users are allowed to access the database at the same time while enforcing necessary constraints.
(d) Users are allowed to manipulate the data using database definitions.
(e) Data redundancy is eliminated entirely.

2) Components of the DB Manager in Column X have to be matched with the relevant descriptions given in Column Y.

	Column X		**Column Y**
1	Scheduler	A	Includes indexes that are used to access data quickly
2	Authorization Control	B	Checks whether the database is transformed in to the correct state satisfying all constraints whenever users have changed the data
3	System Catalog	C	Ensures concurrent operations on the database to proceed without conflicting with one another
4	Integrity Checker	D	Checks whether users have necessary access rights to carry out the required operation

Which of the following is the most suitable match?

(a) 1 & B , 2 & A , 3 & C , 4 & D
(b) 1 & C , 2 & B , 3 & D , 4 & A
(c) 1 & C , 2 & D , 3 & A , 4 & B
(d) 1 & B , 2 & A , 3 & D , 4 & C
(e) 1 & D , 2 & B , 3 & A , 4 & C

3) The statements given below are associated with the ANSI/SPARC three level architecture.

(i) If the location of physical data is changed, then the database need not be recompiled.
(ii) Three schemas are only descriptions of data and the data actually exists at the physical level.
(iii) Physical data independence is the capacity to change conceptual schema without having to change the internal schema.
(iv) Mapping between two levels create an overhead during execution of query or program.

Which of the above is/are true?

(a) (i) only (b) (ii) only (c) (i) and (iii) only
(d) (i) and (iv) only (e) (ii) and (iv) only

4) Which of the following is/are true with respect to the database design process?

(a) Conceptual design is data model dependent.
(b) Logical design is data model dependent.
(c) Physical design deals with index structures.
(d) The conceptual schema includes entity types.
(e) Conceptual design is dependent on the storage requirements.

5) The statements given below are associated with DBMS languages.

(i) Non-procedural DML must be embedded in a general purpose programming language.
(ii) Procedural DML typically retrieves individual records or objects from the database.
(iii) Mapping between the conceptual schema and internal schema can be done either using the Data Definition Language or the Storage Definition Language.

Which of the above is/are true?

(a)	(i) only	(b)	(ii) only	(c)	(i) and (iii) only
(d)	(ii) and (iii) only	(e)	All		

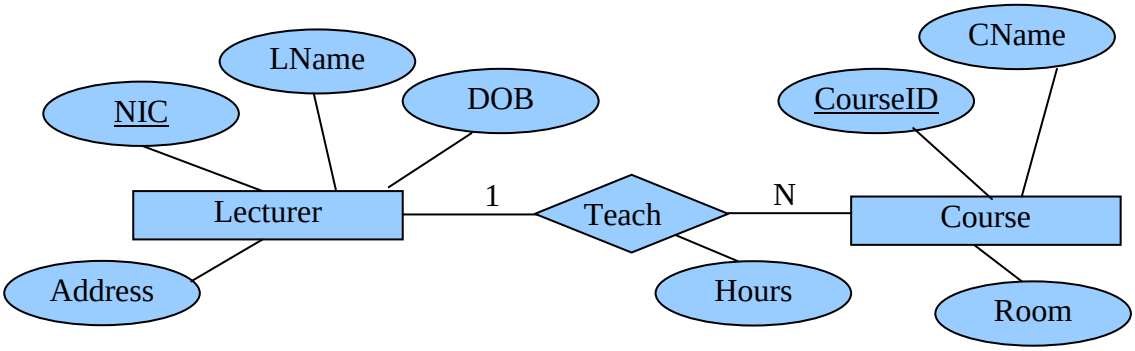
6) Which of the following are the characteristics of the relational data model?

(a) In a relation, an instance is recorded as a tuple.
(b) Queries can not be performed using an individual relation.
(c) A row in a database can also be called a domain.
(d) The order of tuples is significant since it may affect the access performance.
(e) Each attribute in a relation has a distinct name but there may be two attributes in different relations having the same name.

7) Which of the following statements is/are true with respect to Data Views?

(a) User view provides flexible and powerful data access capabilities by occupying a particular amount of storage space for its data.
(b) Query modification in view implementation creates a temporary view of the table when it is queried first.
(c) An update on the base relation is reflected through a view.
(d) User view provides only querying facilities and it is impossible to update the data in a User view.
(e) It is possible to define and use views without any consideration of the base relations.

8) Consider the following ER diagram.



What would be the relations when the above ER diagram is mapped in to a relational model?

(a) Lecturer(NIC, LName, DOB, Address)
(b) Lecturer(NIC, LName, DOB, Address, CourseID)
(c) Teach(NIC, CourseID, Hours)
(d) Course(CourseID, CName, Room)
(e) Course(CourseID, CName, Room, Hours, NIC)

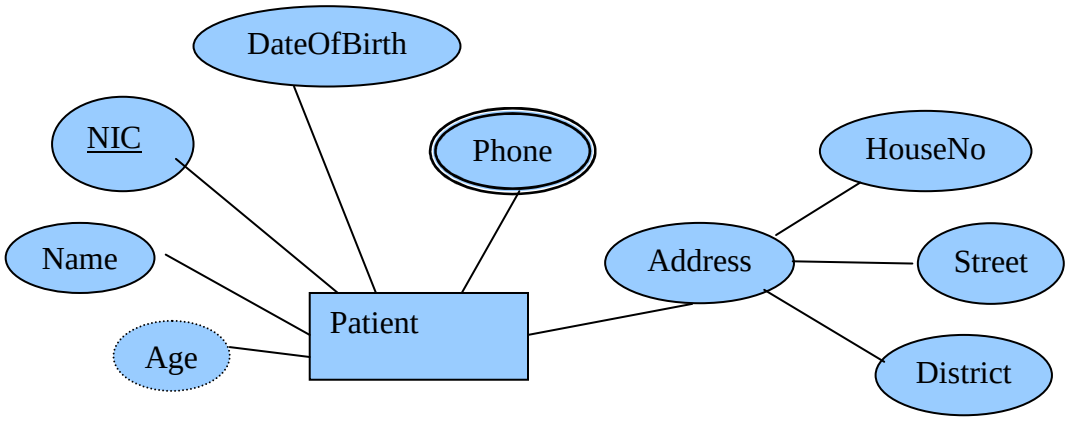
9) Consider the following statements about mapping weak entities in an Entity Relationship Diagram (ERD) to Relations.

(i) Create a relation that includes all simple attributes of the weak entity.
(ii) The primary key is partially or fully derived from the owner.
(iii) The relational model does not support mapping weak entities in an ERD to Relations.

Which of the above statements is/are correct?

(a) (i) only	(b) (ii) only	(c) (iii) only
(d) (i) and (ii) only	(e) All	

10) Consider the following diagram.



Which of the following is/are correct?

(a) Phone is a multivalued attribute
(b) Patient is a weak entity
(c) DateOfBirth is a derived attribute
(d) Address is a composite attribute
(e) NIC is the key attribute

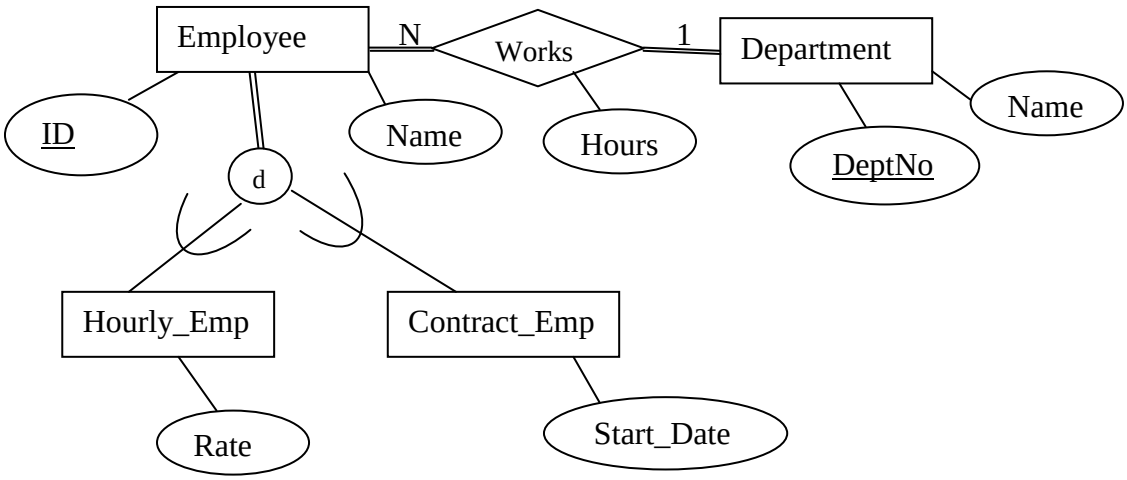
11) Which of the following statements is/are true with respect to data types?

(a) VARCHAR data type often reduces disk storage wastage when compared to CHAR data type.
(b) BLOB data type can be used to store a photograph or a sound clip.
(c) BYTE data type cannot store any type of binary data.
(d) Both INTEGER and FLOAT are Numeric data types.
(e) INTEGER data type can only store positive integers.

12) Which of the following statements is/are correct?

(a) Weak entity types do not have their own primary key attributes.
(b) A weak entity type normally has a partial key and it is a set of attributes which can uniquely identify weak entities related to the same owner entity.
(c) Regular entity types which do have a key attribute are sometimes called strong entity types.
(d) A weak entity must have total participation in the identifying relationship.
(e) Identifying entity types are a special case of weak entity types.

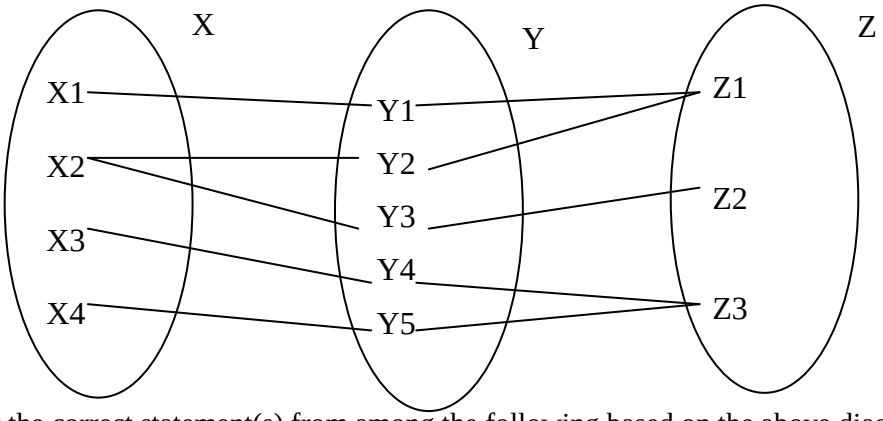
13) Consider the following ERD.



Which of the following relations are possible if the above ERD is mapped into a relational model?

(a) Hourly_Emp(ID, Name, Rate, Hours, DeptNo)
(b) Contract_Emp(ID, Name, Start_Date, Hours, DeptNo)
(c) Employee(ID, Name, Rate, Start_Date)
(d) Department(DeptNo, Name)
(e) Works(ID, DeptNo, Hours)

14) Consider the following diagram depicting a kind of a relationship type where X and Z are entities and Y is a relationship type.



Select the correct statement(s) from among the following based on the above diagram.

(a) The relationship type Y is of cardinality ratio 1 : N.
(b) The relationship type Y is of cardinality ratio 1 : 1.
(c) The diagram depicts existence dependencies.
(d) The participation of X in the Y relationship type is total.
(e) The participation of Z in the Y relationship type is partial.

15) Consider the two relations R(A, B) and S(A, B) and the following equalities.

(i) $R \cap S = R - (R - S)$
(ii) $R \cap S = S - (S - R)$
(iii) $R \cap S$ = R NATURAL-JOIN S
(iv) $R \cap S = (R \cup S) - ((R-S) \cup (S-R))$

Which of the above equalities hold in relational algebra?

(a) (i) only (b) (i) and (ii) only (c) (i) and (iii) only
(d) (i), (ii) and (iv) only (e) All

Use the schema given below to answer the questions from (16) – (18).

Student(<u>Sid</u>, Sname, Year, GPA)

Course (<u>Cid</u>, Cname, Credits)

Enroll(<u>Sid</u>, <u>Cid</u>, Mark, Grade)

16) Which of the following sequence of operations would find the ids of the students (Sid) who are in year three (03) and have obtained more than 80 marks for some subjects?

(a) $\pi_{Sid}(\sigma_{Year=3}(Student) * \sigma_{Mark>80}(Enroll))$
(b) $\pi_{Sid}(\sigma_{Year=3}(Student)) \cap \pi_{Sid}(\sigma_{Mark>80}(Enroll))$
(c) $\pi_{Sid}(\sigma_{Year=3}(Student)) \cup \pi_{Sid}(\sigma_{Mark>80}(Enroll))$
(d) $\pi_{Sid}(\sigma_{Year=3 \text{ and } Mark>80}(Student * Enroll))$
(e) $\pi_{Sid}(\sigma_{Year=3 \text{ and } Mark>80}(Student \cap Enroll))$

17) Consider the sequence of operations performed on the relations.

$R1 \leftarrow \pi_{Cid}(\sigma_{Credits=3}(Course))$
$R2 \leftarrow \pi_{Cid,Sid}(\sigma_{Grade = 'A'}(Enroll))$
$R3 \leftarrow R2 \div R1$

What will the above sequence of operations produce?

(a) The Cid and Sid of the students if they have obtained an 'A' grade for any course with 03 credits.
(b) The Sid of the students if they have obtained an 'A' grade for any course with 03 credits.
(c) The Cid and Sid of the students if they have followed all the courses with 03 credits and have obtained 'A' grades for some of those courses.
(d) The Sid of the students if they have obtained an 'A' grade for all the courses other than the ones with 03 credits.
(e) The Sid of the students if they have followed all the subjects with 03 credits and have obtained 'A' grades for all of those courses.

18) Consider the SQL query given below.

```
SELECT Sid
FROM Student S
WHERE GPA = 3.5 AND NOT EXISTS  ( SELECT *
                                  FROM Enroll E
                                  WHERE E.Mark < 50 AND
                                  S.Sid = E.Sid )
```

What would be the corresponding sequence of relational algebra operations for the above query?

(a) $\pi_{Sid}(\sigma_{GPA=3.5}(Student) - \sigma_{Mark<50}(Enroll))$
(b) $\pi_{Sid}(\sigma_{GPA=3.5}(Student)) \cap \pi_{Sid}(\sigma_{Mark<50}(Enroll))$
(c) $\pi_{Sid}(\sigma_{GPA=3.5}(Student)) - \pi_{Sid}(\sigma_{Mark<50}(Enroll))$
(d) $\pi_{Sid,GPA}(\sigma_{GPA=3.5}(Student)) \div \pi_{Cid\ (Mark<50}(Enroll))$
(e) $\pi_{Sid}(\sigma_{GPA=3.5 \text{ and } Mark<50}(Student - Enroll))$

Consider the following Lecturer relation with the given attributes and data types to answer questions **(19) and (20)**. Assume that the attributes are stated in the order that they were specified in the create table statement.

Lecturer(EmpNo CHAR(03), Name VARCHAR(50), Salary REAL, Category VARCHAR(25), DateJoined DATE, DNo CHAR(02))

Consider the following details of a Lecturer. Note SYSDATE returns the current system date.

EmpNo – 175, Name – Dulip Silva, Salary - 12,000, Category – Instructor, DateJoined - SYSDATE , DNo – 05

19) Which of the following SQL statements will insert the above data into Lecturer relation?

```
(a) INSERT INTO Lecturer
    VALUES ('175','Dulip Silva', 12000, 'Instructor', SYSDATE, '05');

(b) INSERT INTO Lecturer (EmpNo, Name, Salary, Category,
    DateJoined, DNo)VALUES ('175', 'Dulip Silva', 12000,
    'Instructor', SYSDATE, '05');

(c) INSERT INTO Lecturer (EmpNo, Name, Salary, Category ,
    DateJoined, DNo)
    VALUES (175, 'Dulip Silva', 12,000, 'Instructor', SYSDATE, '05');

(d) INSERT INTO Lecturer
    VALUES (175, 'Dulip Silva', 12000,'Instructor',SYSDATE, '05');

(e) INSERT (EmpNo, Name, Salary, Category , DateJoined, DNo) VALUES
    ('175', 'Dulip Silva', 12000, 'Instructor', SYSDATE, '05')
    INTO Lecturer;
```

20) Which of the following SQL statements will increase the Salary by Rs: 3000/= for all department '02'employees who's salary is below 10,000/=?

```
(a) UPDATE Lecturer SET Salary=Salary+3000
    WHERE Salary<10000;

(b) INSERT INTO Lecturer SET Salary=Salary*3000
    WHERE Salary<10000 AND DNo='02';

(c) DELETE FROM Lecturer
    WHERE Salary <10000 AND DNo='02';

(d) UPDATE Lecturer SET Salary=Salary+3000
    WHERE Salary<10000 AND DNo='02';

(e) INSERT INTO Lecturer SET Salary=Salary+3000
    WHERE Salary<10000 AND DNo=='02';
```

Consider the following university schema to answer the questions from (21) to (23).

Primary Keys are underlined and Foreign Keys are in italics. Lecturers can teach courses offered by other departments as well.

Lecturer (EmpNo, Name, Gender, Salary, Category, *DNo*).

Department (DNo, Dname, *HeadEmpNo*)

Course(CNo, Cname, Credits, *DNo*)

Deliver(EmpNo, CNo, Hours)

Research_Fund(RFName, *EmpNo*, Budget)

21) It is necessary to create a view called Head_Funds to display the EmpNo, Name and the Total research funds 'TBudget' of the department heads. Which of the following statements would achieve it?

(a)
```
CREATE VIEW Head_Funds AS
SELECT D.HeadEmpNo, L.Name, SUM(Budget) AS TBudget
FROM Research_Fund R, Lecturer L, Department D
WHERE  D.HeadEmpNo = R.EmpNo AND D.HeadEmpNo = L.EmpNo
GROUP BY HeadEmpNo, Name;
```

(b)
```
CREATE VIEW Head_Funds AS
SELECT D.HeadEmpNo, L.Name, SUM(Budget) AS TBudget
FROM Lecturer L, Department D
WHERE R.EmpNo = D.HeadEmpNo AND D.HeadEmpNo = L.EmpNo
GROUP BY HeadEmpNo, Name;
```

(c)
```
CREATE VIEW Head_Funds AS
SELECT D.HeadEmpNo, L.Name, SUM(Budget) AS TBudget
FROM Research_Fund R, Lecturer L, Department D
WHERE D.HeadEmpNo = L.EmpNo
GROUP BY HeadEmpNo,Name;
```

(d)
```
CREATE VIEW Head_Funds AS
SELECT D.HeadEmpNo, L.Name, SUM(Budget)  AS TBudget
FROM Research_Fund R, Lecturer L, Department D
WHERE D.HeadEmpNo= R.EmpNo AND D.HeadEmpNo = L.EmpNo
GROUP BY HeadEmpNo, Name
HAVING SUM(Budget) >0;
```

(e)
```
CREATE VIEW Head_Funds AS
SELECT D.HeadEmpNo, L.Name, SUM(Budget) AS TBudget
FROM Research_Fund R, Lecturer L, Department D
WHERE R.EmpNo = D.HeadEmpNo AND D.HeadEmpNo = L.EmpNo;
```

22) One tries to execute the following SQL statements on the Head_Funds view created in **question (21)** above.

```
 (i)  UPDATE Head_Funds SET TBudget=TBudget*1.10;
(ii)  INSERT INTO Head_Funds VALUES (1,'Perera',250000);
(iii) CREATE VIEW Head_Fund1 AS
      SELECT EmpNo, Name, Budget
      FROM Head_Funds WHERE Budget >50000;
```

Which of the above statements is/are true?

(a) Only (i) can be executed on Head_Funds view.
(b) Only (ii) can be executed on Head_Funds view.
(c) Only (iii) can be executed on Head_Funds view.
(d) Only (ii) & (iii) can be executed on Head_Funds view.
(e) None of the above statements can be executed on Head_Funds view.

23) Which SQL statement would display the EmpNo and Names of all lecturers along with the total sum of the research funds (TotalFund) if a lecturer controls some research fund (otherwise TotalFund would be NULL)?

(a)
```
SELECT L.EmpNo, L.Name, SUM(F.Budget) AS TotalFund
FROM Lecturer AS L RIGHT OUTER JOIN Research_Fund
AS F ON L.EmpNo = F.EmpNo GROUP BY L.EmpNo, L.Name;
```

(b)
```
SELECT L.EmpNo, L.Name, SUM(F.Budget) AS TotalFund
FROM Lecturer AS L LEFT OUTER JOIN Research_Fund AS F
ON L.EmpNo = F.EmpNo GROUP BY L.EmpNo, L.Name;
```

(c)
```
SELECT L.EmpNo, L.Name, F.TotalFund
FROM Lecturer AS L LEFT OUTER JOIN
(SELECT EmpNo, SUM(Budget) AS TotalFund FROM Research_Fund
GROUP BY EmpNo) AS F ON L.EmpNo = F.EmpNo;
```

(d)
```
SELECT L.EmpNo, L.Name, SUM(F.Budget) AS TotalFund
FROM Lecturer AS L, Research_Fund AS F WHERE L.EmpNo = F.EmpNo
GROUP BY L.EmpNo, L.Name;
```

(e)
```
SELECT L.EmpNo, L.Name, F.TotalFund
FROM Lecturer AS L RIGHT OUTER JOIN (SELECT EmpNo,SUM(Budget)
AS TotalFund FROM Research_Fund) AS F ON L.EmpNo = F.EmpNo
GROUP BY L.EmpNo;
```

24) Consider the Employee relation with 2 records declared as follows:

```
CREATE TABLE Employee (Name VARCHAR(50) PRIMARY KEY,
                Salary INT CHECK(Salary <= 40000) );
```

Initially, the relation has two records:

Employee

Name	***Salary***
Perera	10000
Silva	30000

The following statements are to be executed in the given sequence. Some of them may be rejected due to the constraints in the relation.

```
 (i)  INSERT INTO Employee VALUES ('Silva', 5000);
 (ii) UPDATE Employee SET Salary = Salary*1.10 WHERE Name = 'Silva';
(iii) INSERT INTO Employee VALUES ('Dias', 13000);
 (iv) DELETE FROM Employee WHERE Name = 'Costa';
```

At the end of these statements, the sum of the Salaries over all the tuples in Employee relation is.

(a) 46000	(b) 56000	(c) 61000
(d) 76000	(e) 60000	

25) Which of the following statements are correct?

(a) SQL is divided into two main categories: Data Definition Language (DDL) and Data Manipulation Language (DML).
(b) Data Definition Language (DDL) is used to insert, select, update and delete records in the database.
(c) CREATE TABLE is an example of Data Manipulation Language (DML).
(d) SELECT is an example of Data Definition Language (DDL).
(e) UPDATE is an example of Data Manipulation Language (DML).

26) Which of the following are correct with respect to Relational Model Constraints?

(a) Key constrained are enforced by application based constraints.
(b) The constraint "there can be no multi valued attributes in a relation" is an inherent constraint.
(c) Insert operation can violate a domain constraint.
(d) Delete operation can violate an entity integrity constraint.
(e) Updating either a primary key or a foreign key can violate either constraint.

27) The statements given below are associated with Referential Integrity Constraints.

(i) A foreign key attribute can never contain a null value.
(ii) A foreign key attribute is a record that always refers to another record which does not contain null.
(iii) Referential integrity constraint is specified between two relations and is used to maintain the consistency.

Which of the above is/are true?

(a) (i) only	(b) (ii) only	(c) (iii) only
(d) (i) and (iii)only	(e) (ii) and (iii)only	

28) Consider the following two relations.

Job

JobId	*Designation*	*Salary*
01	Developer	40000
02	DBA	50000
03	Tech Writer	35000
04	System Admin	55000

Job_Skill

Job	*Skill*
01	SQL
01	C++
02	Unix
04	Unix
02	SQL

A complete list of all jobs is required together with the corresponding job skills, if any. Which of the following statements would achieve it?

```
(a) SELECT JobId FROM Job;
(b) SELECT JobId, Skill FROM Job, Job_Skill WHERE JobId = Job;
(c) SELECT JobId, Skill FROM Job, Job_Skill;
(d) SELECT JobId, Skill FROM Job LEFT OUTER JOIN Job_Skill ON
    JobId = Job;
(e) SELECT JobId, Skill FROM Job RIGHT OUTER JOIN Job_Skill ON
    JobId = Job;
```

29) KAPILA, AMAL and SITHUM are three database users and they have been assigned access privileges as given below.

```
GRANT CREATE TABLE TO KAPILA;
GRANT SELECT ON Student, Courses TO AMAL WITH GRANT OPTION;
GRANT SELECT ON Student TO SITHUM;
```

Consider the following statements with respect to the above given privileges.

(i) KAPILA is the only authorized person to create Student and Course relations.
(ii) SITHUM can set privileges to retrieve Student information from some other user.
(iii) AMAL can update Course information.

Which of the above statements is/are true?

(a) (i) only	(b) (ii) only	(c) (iii) only
(d) (i) & (ii) only	(e) (ii) & (iii) only	

30) **For question 30 and 31,** consider the following two relations that contain weather measurements for a number of weather stations located in different regions in the country. Area in WeatherStation is a foreign key which refers the AreaId in Area.

Area (AreaId, AreaName)

WeatherStation (StationId, RainFall, Humidity, Area)

Select the SQL statement which results in a list of average rainfall and humidity for each area.

(a)
```
SELECT AreaName, AVG(RainFall), AVG(Humidity)
    FROM Area, WeatherStation
    WHERE Area.AreaId = WeatherStation.Area
    GROUP BY StationId;
```

(b)
```
SELECT AreaName, AVG(RainFall), AVG(Humidity)
    FROM Area, WeatherStation
    WHERE Area.AreaId = WeatherStation.Area;
```

(c)
```
SELECT AreaName, AVG(RainFall), AVG(Humidity)
    FROM Area, WeatherStation
    WHERE Area.AreaId = WeatherStation.Area
    GROUP BY AreaName;
```

(d)
```
SELECT AVG(RainFall), AVG(Humidity)
    FROM WeatherStation
    GROUP BY AreaId;
```

(e)
```
SELECT AreaName, AVG(RainFall), AVG(Humidity)
    FROM Area, WeatherStation
    WHERE Area.AreaId = WeatherStation.Area
    GROUP BY RainFall, Humidity;
```

31) Consider the following two queries for retrieving the list of all Area Names that the Rainfall is below 20cm or Humdity is above 1.

(i)
```
(SELECT DISTINCT AreaName
    FROM Area, WeatherStation
    WHERE Area.AreaId = WeatherStation.Area AND Rainfall < 20)UNION
    (SELECT DISTINCT AreaName
    FROM Area, WeatherStation
    WHERE Area.AreaId = WeatherStation.Area AND Humidity > 1)
```

(ii)
```
SELECT DISTINCT AreaName
    FROM Area
    WHERE AreaID IN (SELECT AreaId
         FROM Area, WeatherStation
         WHERE AreaId = Area AND Rainfall < 20)OR
    AreaID IN (SELECT AreaId
         FROM Area, WeatherStation
         WHERE AreaId = Area AND Humidity > 1);
```

Which of the following statements is/are true with respect to the above two queries?

(a) Only query (i) will give the correct result.
(b) Only query (ii) will give the correct result.
(c) Both query (i) and (ii) will give the correct result.
(d) Neither query (i) nor query (ii) will give the correct result.
(e) Query (ii) will give a syntax error.

Consider the relation R1(P,Q,R,S,T) with the following functional dependencies to answer questions (32) and (33).

FD1 : PQ → RT
FD2 : T → PQ
FD3 : R → S

32) What is/are the prime key attribute(s) of the relation R1?

(a) T	(b) R	(c) P
(d) S	(e) Q	

33) Which of the following statements is/are true with respect to the relation R1?

(a) The highest normal form of R1 is 1NF.
(b) The functional dependency FD2 violates 2NF.
(c) The highest normal form of R1 is 2NF.
(d) The functional dependency FD3 violates 3NF.
(e) The highest normal form of R1 is 3NF.

Consider the relation PATIENT_VISIT(Patient,Hospital,Doctor) to answer questions from (34) to (36).

Assume that there are following semantic rules for the above relation.

(i) Each patient may be a patient in several hospitals.
(ii) For each hospital, a patient may have only one doctor.
(iii) Each hospital has several doctors.
(iv) Each doctor uses only one hospital.
(v) Each doctor treats several patients in one hospital.

34) Based on the rules given in (i)-(v), which of the following functional dependencies exist in PATIENT_VISIT?

(a) Patient → Hospital
(b) Patient , Hospital → Doctor
(c) Hospital → Doctor
(d) Doctor → Hospital
(e) Doctor, Hospital → Patient

35) What is the candidate key of PATIENT_VISIT?

(a) Doctor, Hospital	(b) Doctor	(c) Hospital
(d) Patient	(e) Patient, Hospital	

36) Which of the following statements is/are true with respect to the relation PATIENT_VISIT?

(a) The highest normal form of PATIENT_VISIT is 1NF.
(b) The highest normal form of PATIENT_VISIT is 2NF.
(c) The highest normal form of PATIENT_VISIT is 3NF.
(d) The functional dependency Hospital → Doctor violates 3NF.
(e) The functional dependency Hospital → Doctor violates 2NF.

Consider the following scenario and relational schema to answer the questions **from (37) to (40).**

An offer consists of several products and a product may appear in several offers. **UserOffer** table has the information about the offers bought by customers. A customer can cancel a previous user offer and buy a new uses offer only once. When customer cancel his/her offer and buy new one we keep a link between the previous user offer and new user offer. Previous user offer will be represented using parent_id column in the **UserOffer** table.

Offer(offer_id, name)

Product(prd_id,price)

OfferProduct(offer_id, prd_id);

UserOffer(uoffer_id, parent_id, price, offer_id)

Offer

offer_id	name
4	ABC
6	DEF
8	XYZ

OfferProduct

offer_id	prd_id
4	8
4	45
6	85
6	45
6	56
8	15

o

Product

prd_id	price
8	15
15	25
45	20
56	12
85	18

UserOffer

uoffer_id	parent_id	price	offer_id
10	NULL	50	6
50	NULL	50	6
12	10	25	8

37) Select the correct SQL statement(s) to retrieve the price of parent user offer from user offer 12.

```
(a) SELECT price FROM UserOffer WHERE uoffer_id=12;
(b) SELECT price FROM UserOffer WHERE uoffer_id=(SELECT parent_id
    FROM UserOffer WHERE uoffer_id=12);
(c) SELECT parent_id FROM UserOffer WHERE uoffer_id=12;
(d) SELECT u2.price FROM UserOffer u1, UserOffer u2 WHERE
    u1.parent_id=u2.uoffer_id AND u1.uoffer_id=12;
(e) SELECT uoffer_id FROM UserOffer, Offer WHERE
    Offer. offer_id = UserOffer.uoffer_id AND uoffer_id=12;
```

38) Which of the following is the most suitable query to get the product and its price included in user offer 10?

(a)
```
SELECT p.prd_id,p.price
FROM Product p, OfferProduct op, Offer o, UserOffer uo
WHERE uo.uoffer_id=10 AND uo.offer_id=o.offer_id AND
o.offer_id=op.offer_id AND op.prd_id=p.prd_id;
```

(b)
```
SELECT p.prd_id,p.price
 FROM Product p, OfferProduct op, Offer o
 WHERE o.offer_id=10 and o.offer_id=op.offer_id and
 op.prd_id=p.prd_id;
```

(c)
```
SELECT p.prd_id,p.price
 FROM Product p, OfferProduct op, Offer o, UserOffer uo
 WHERE uo.offer_id=o.offer_id AND o.offer_id=op.offer_id AND
 op.prd_id=p.prd_id;
```

(d)
```
SELECT p.prd_id p.price FROM Product p, OfferProduct op
 WHERE p.prd_id=op.prd_id;
```

(e)
```
SELECT p.prd_id,p.price
 FROM Product p, OfferProduct op,
 WHERE p.prd_id=op.prd_id AND offer_id=10;
```

39) Consider the following SQL statements in order create the UserOffer table.

(i)
```
CREATE TABLE UserOffer
(uoffer_id INTEGER NOT NULL,
parent_id  INTEGER,
price      DEC(7,2),
offer_id   INTEGER NOT NULL,
PRIMARY KEY     (uoffer_id),
FOREIGN KEY     (parent_id) REFERENCES UserOffer (uoffer_id),
FOREIGN KEY     (offer_id) REFERENCES Offer(offer_id));
```

(ii)
```
CREATE TABLE UserOffer
(uoffer_id INTEGER PRIMARY KEY,
parent_id  INTEGER NULL,
price      DEC(7,2),
offer_id        INTEGER NOT NULL,
FOREIGN KEY     (parent_id) REFERENCES UserOffer (uoffer_id),
FOREIGN KEY     (offer_id) REFERENCES Offer(offer_id));
```

(iii)
```
CREATE TABLE UserOffer
(uoffer_id, parent_id, price, offer_id,
PRIMARY KEY     (uoffer_id),
FOREIGN KEY     (parent_id) REFERENCES UserOffer (uoffer_id),
FOREIGN KEY     (offer_id) REFERENCES Offer);
```

Which of the above statements is/are correct?

(a) (i) only	(b) (ii) only	(c) (iii) only
(d) (i) and (ii) only	(e) (i) and (iii) only	

40) Consider the following SQL output.

uoffer_id	price	offer_id
12	25	8
10	50	6
50	50	6

Which of the following SQL statements is/are true in order to retrieve the above SQL output?

```
(a)  SELECT * FROM UserOffer ORDER BY price;
(b)  SELECT * FROM UserOffer ORDER BY price DESC;
(c)  SELECT uoffer_id, price, offer_id FROM UserOffer;
(d)  SELECT uoffer_id, price, offer_id FROM UserOffer
     ORDER BY price, offer_id DESC;
(e)  SELECT uoffer_id, price, offer_id FROM UserOffer
     ORDER BY price, uoffer_id;
```

*****