



UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (*EXTERNAL*)

Academic Year 2010/2011 – 1st Year Examination – Semester 2

IT2304 – Database Systems I

Multiple Choice Question Paper

31st July, 2011
(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 **12** 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) Which of the following statement(s) is/are correct?

- (a) The legacy 'file based systems' can handle data duplication efficiently.
 - (b) 'Data independence' refers to altering the data without changing the application software.
 - (c) Increased data redundancy is an advantage of the database approach.
 - (d) The query processor and data dictionary are some of the features of a DBMS.
 - (e) When designing DBMS applications it is necessary to identify business rules first.

- 2) Which field type is commonly used to store pictures in a database?

(a) Memo	(b) Text	(c) BLOB
(d) Hyperlink	(e) XML	

- 3) When SQL is embedded in an application, why does it require a pre-processor?

- (a) Procedural languages always require a pre-processor operation.
 - (b) SQL is a two-tier language.
 - (c) SQL deals with one data set at a time.
 - (d) The procedural host language compiler does not understand SQL.
 - (e) A pre-processor is not essential when SQL is embedded in an application.

- 4) Which normal form guarantees no modification anomalies?

(a) Domain/Key Normal Form	(b) Boyce-Codd Normal Form	(c) First Normal Form
(d) Third Normal Form	(e) Fifth Normal Form	

- 5) Which of the following statement(s) is/are correct?

- (a) An attribute represents a real world object or a concept.
 - (b) Conceptual data models provide concepts that are close to the way many users perceive data.
 - (c) The database schema is a description of the database.
 - (d) The three schema architecture includes internal schema, external schema and middle schema.
 - (e) The three schema architecture describes various user views and also describes physical storage structures and access paths.

- 6) A database administrator

- (a) allocates storage locations and data structures.
 - (b) communicates with the database users.
 - (c) sets up standards and procedures for database systems.
 - (d) is involved in planning, designing and implementing of database systems.
 - (e) views a database system from the perspective of the functions it should perform.

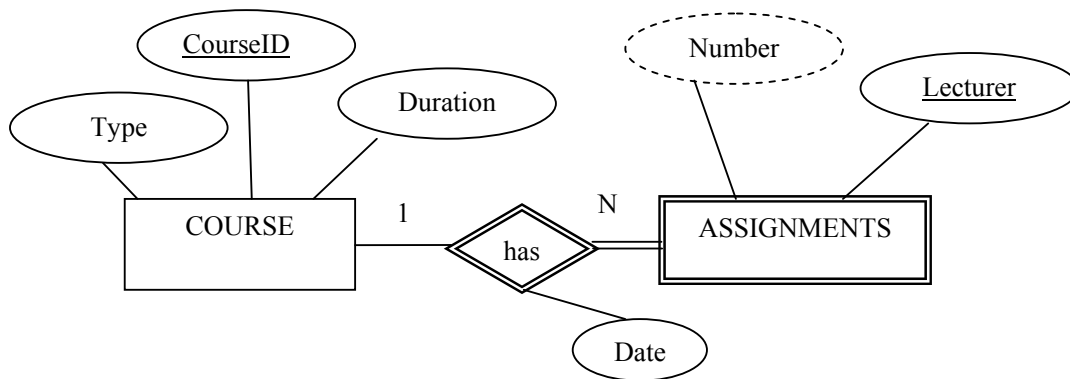
- 7) Which of the following statement(s) is/are correct about the ANSI/SPARC architecture?

- (a) Any given database has exactly one conceptual schema and one physical schema, but it may have several external schemas.
 - (b) A data definition language is used to define the external schema.
 - (c) The conceptual level is a level of indication between the internal level and the external level.
 - (d) The internal schema in a database system can only be relational.
 - (e) The external level is concerned with individual user perceptions, while the conceptual level is concerned with a community user perception.

- 8) Which of the following statement(s) is/are correct about the external schema?

(a) View tables exist in physical storage.	(b) It cannot derive new attributes.
(c) Users can see data through external views.	(d) It is made up of View tables.
(e) Security levels cannot be defined.	

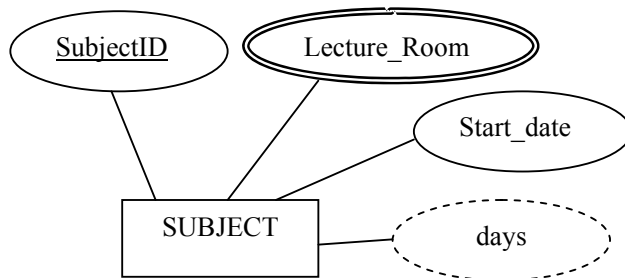
- 9) Consider the following Entity Relationship Diagram (ERD).



Which of the following is/are the most suited relation(s) if the above diagram is mapped into a relational model?

- (a) COURSE(CourseID, Duration, Type)
- (b) ASSIGNMENTS(Lecturer, Number)
- (c) COURSE_ASSIGNMENTS(CourseID, Lecturer, Date, Number)
- (d) COURSE(CourseID, Duration, Type, Date)
- (e) ASSIGNMENTS(Lecturer, CourseID, Date)

- 10) Consider the following Entity.



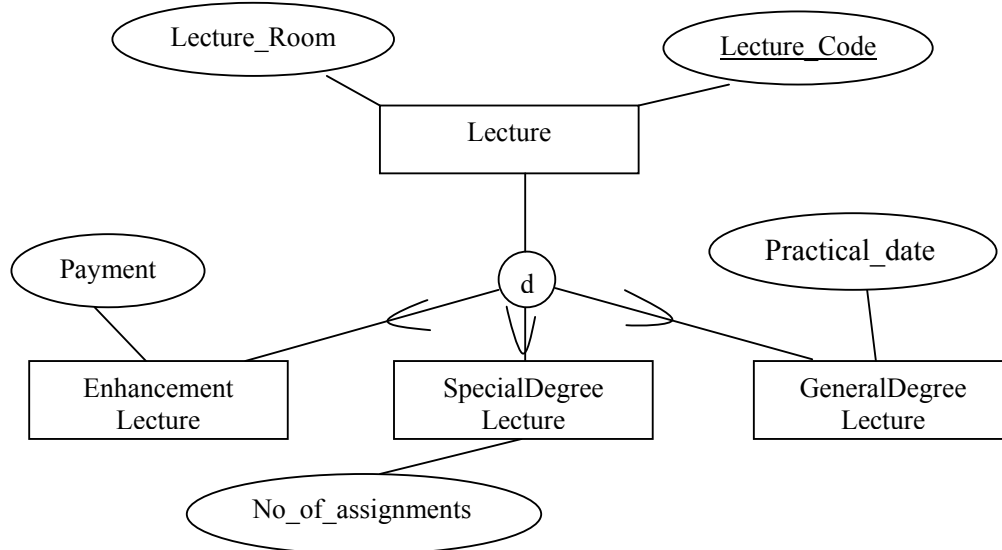
Select the characteristics which are represented by the above diagram.

- (a) 'SubjectID' is a foreign key in this entity.
- (b) 'days' is a derived attribute.
- (c) This entity has a composite attribute.
- (d) This entity will map to only one relation in the relational model.
- (e) 'days' is a multi-valued attribute.

- 11) During the 'physical database design' stage, which of the following should be considered when choosing a data type?

- (a) Minimize storage cost
- (b) Represent all possible values
- (c) Improve data integrity
- (d) Support all data manipulations
- (e) Field name

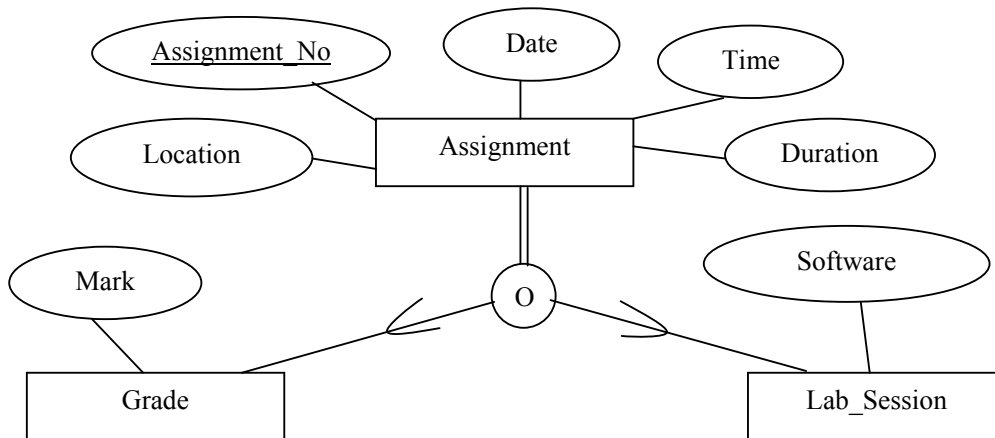
- 12) Consider the following Entity Relationship Diagram (ERD).



Which of the following possible relations hold(s) if the above ERD is mapped into a relational model?

- (a) Lecture(Lecture_Code, Lecture_Room)
- (b) Enhancement_Lecture(Payment)
- (c) SpecialDegree_Lecture(No_of_assignments)
- (d) GeneralDegree_Lecture(Practical_date)
- (e) Lecture(Lecture_Code, Lecture_Room, Payment, Practical_date)

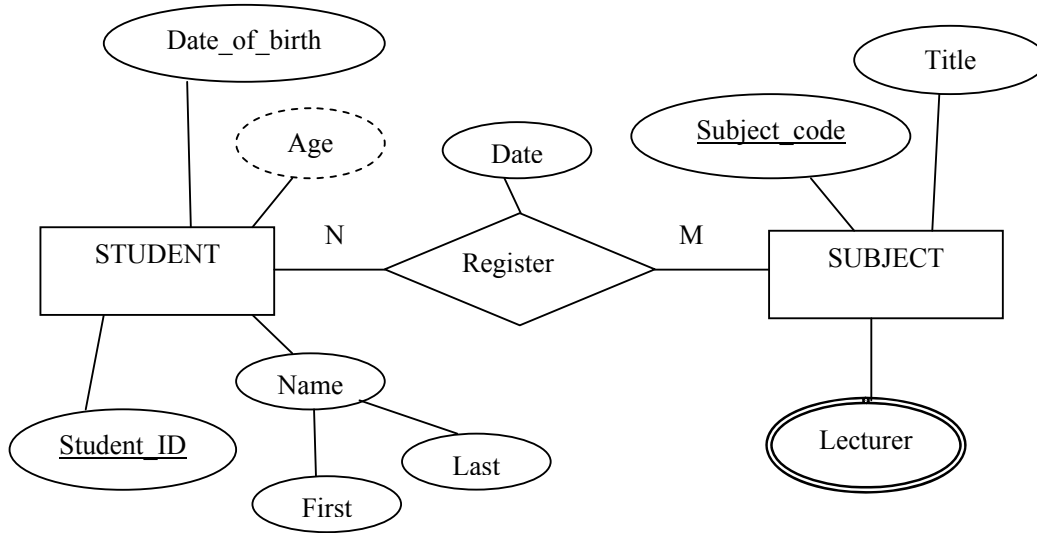
- 13) Consider the following Entity Relationship Diagram (ERD).



Which of the following possible relations hold(s) if the above ERD is mapped into a relational model?

- (a) Assignment(Assignment_No, Location, Date, Time, Duration)
- (b) Grade(Assignment_No, Mark)
- (c) Grade(Assignment_No)
- (d) Lab_Session(Assignment_No, Software)
- (e) Lab_Session(Assignment_No)

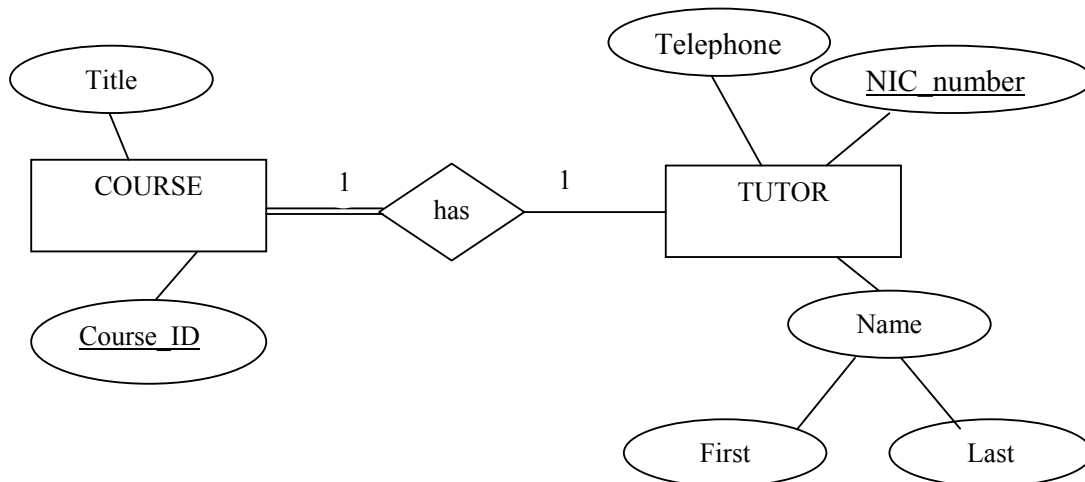
- 14) Consider the following Entity Relationship Diagram (ERD).



Which of the following possible relations hold(s) if the above ERD is mapped into a relational model?

- (a) STUDENT(Student_ID, Name, Age, Date_of_birth)
- (b) REGISTER(Student_ID, Subject_code, Date)
- (c) SUBJECT(Subject_code, Title)
- (d) STUDENT(Student_ID, First, Last, Date_of_birth)
- (e) SUBJECT(Subject_code, Title, Lecturer)

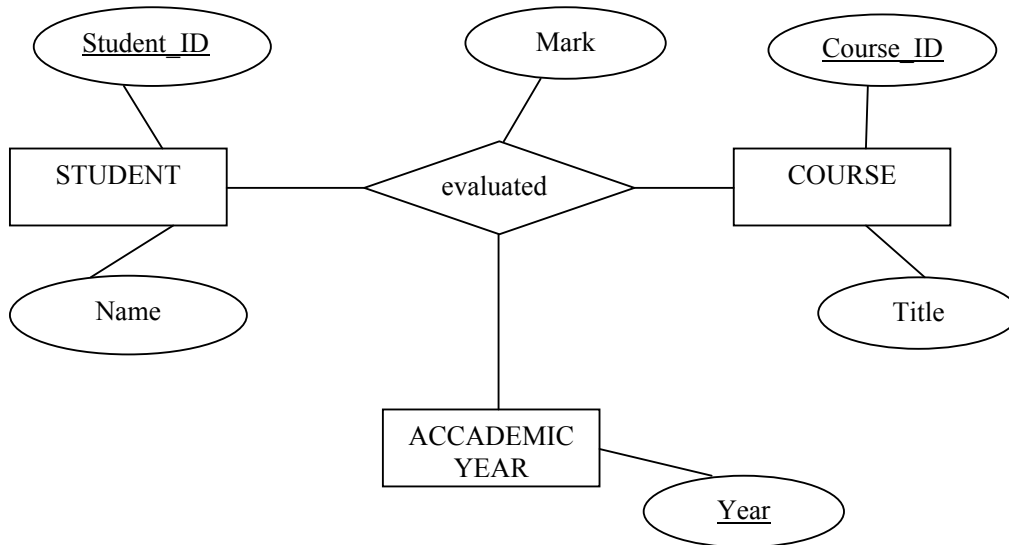
- 15) Consider the following Entity Relationship Diagram (ERD).



Which of the following possible relations hold(s) if the above ERD is mapped into a relational model?

- (a) COURSE(Course_ID, Title, NIC_number)
- (b) TUTOR(NIC_number, Telephone, First, Last, Course_ID)
- (c) COURSE(Course_ID, Title)
- (d) TUTOR(NIC_number, Telephone, Name)
- (e) TUTOR(NIC_number, Telephone, First, Last)

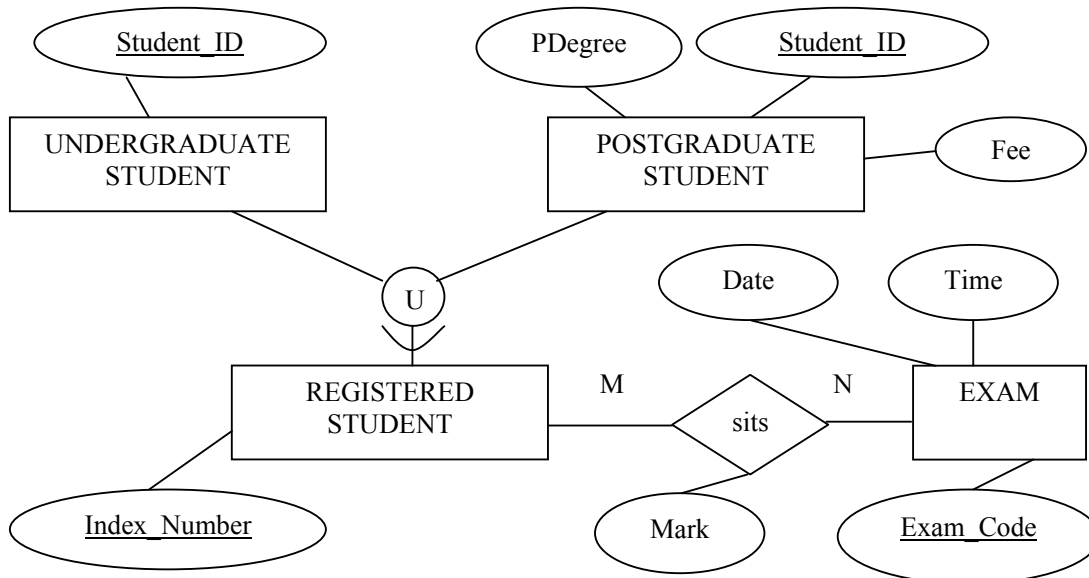
- 16) Consider the following Entity Relationship Diagram (ERD).



Which of the following possible relations hold(s) if the above ERD is mapped into a relational model?

- (a) STUDENT(Student_ID, Name)
- (b) COURSE(Course_ID, Title)
- (c) EVALUATED(Student_ID, Course_ID, Year)
- (d) ACCADEMIC_YEAR(Year)
- (e) This type of Entity-Relationships cannot be mapped to the relational model.

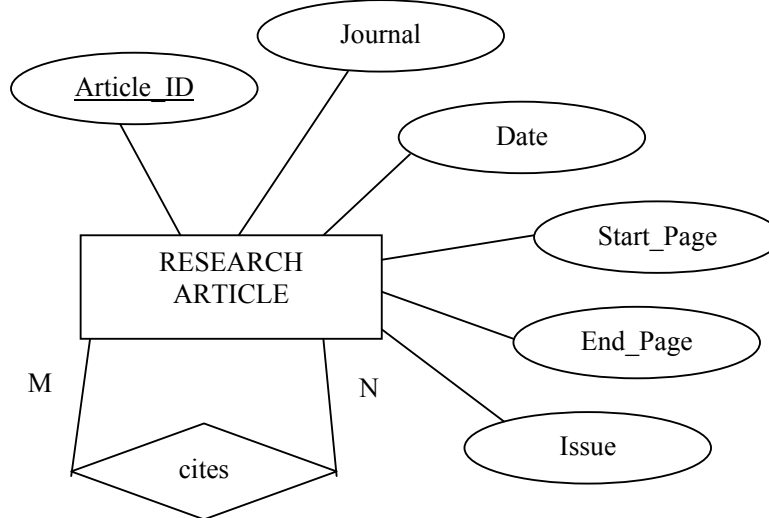
- 17) Consider the following Entity Relationship Diagram (ERD).



Which of the following possible relations hold(s) if the above ERD is mapped into a relational model?

- (a) UNDERGRADUATE_STUDENT(Student_ID)
- (b) POSTGRADUATE_STUDENT(Student_ID, PDegree)
- (c) REGISTERED_STUDENT(Student_ID, Index_Number)
- (d) EXAM(Exam_Code, Time, Date, Index_Number)
- (e) STUDENT_EXAM(Index_Number, Exam_Code, Mark, Time, Date)

- 18) Consider the following Entity Relationship Diagram (ERD).



Which of the following possible relations hold(s) if the above ERD is mapped into a relational model?

- (a) ARTICLE(Article_ID, Journal, Date, Start_Page, End_Page, Issue)
 - (b) CITE(Soure Article, Cited Article)
 - (c) ARTICLE1(Article_ID, Journal, Date, Start_Page, End_Page, Issue, Cites)
 - (d) ARTICLE2(Article_ID, Journal, Date, Start_Page, End_Page, Issue, Cites)
 - (e) This type of Entity-Relationships cannot be mapped to the relational model.
- Note: In (c) and (d) Cites is a foreign key

- 19) A SELECT function can be used to perform the following functions.

- (i) Choose columns from a table.
- (ii) Choose rows from a table.
- (iii) Bring together data that is stored in different tables by creating a relationship with them.

What are these operations called?

- (a) Selection, Projection, Join
- (b) Selection, Intersection, Join
- (c) Projection, Selection, Join
- (d) Intersection, Difference, Join
- (e) Difference, Projection, Join

- 20) Consider the following two relations.

Supplier(Sup_no, Sup_name, Address)

Supply(S_no, Item_no, Quantity)

Which of the following statements give(s) a list of supplier names supplying the item with Item_no '102'?

- (a) SELECT Sup_name FROM Supplier WHERE Sup_name EXISTS (SELECT Sup_name FROM Supply WHERE Item_no='102');
- (b) SELECT Sup_name FROM Supplier, Supply WHERE Supplier.Sup_no=Supply.S_no AND Item_no='102';
- (c) SELECT Sup_name FROM Supplier WHERE Sup_no IN (SELECT S_no FROM Supply WHERE Item_no='102');
- (d) SELECT Sup_name FROM Supplier WHERE Item_no='102';
- (e) SELECT Sup_name FROM Supplier WHERE Sup_no EXISTS (SELECT Sup_no FROM Supply WHERE Item_no='102');

- 21) A relational database system consists of the following tables.

Customer(cno, cname, city)

Item(ino, iname, colour)

Qty (cno, ino, qty)

Which of the following SQL statement(s) will get Customer names for Customers who had purchased at least one Blue item?

- (a) SELECT cname FROM Customer C, Item I, Qty Q
WHERE C.cno = Q.cno and I.ino = Q.ino and colour = 'Blue';
- (b) SELECT cname FROM Customer
WHERE ino IN (SELECT ino FROM Qty WHERE cno IN (SELECT cno FROM Item
WHERE colour = 'Blue'));
- (c) SELECT cname FROM Customer
WHERE cno IN (SELECT Q.cno FROM Qty Q WHERE Q.ino IN (FIND Q.ino FROM
Item I WHERE colour = 'Blue'));
- (d) SELECT cname FROM Customer WHERE cno
IN (SELECT Q.cno FROM Qty Q, Item I WHERE Q.ino = I.ino and colour = 'Blue');
- (e) SELECT cname FROM Customer C, Item I, Qty Q
WHERE C.cno = Q.cno and I.ino = Q.ino
GROUP BY colour HAVING colour = 'Blue';

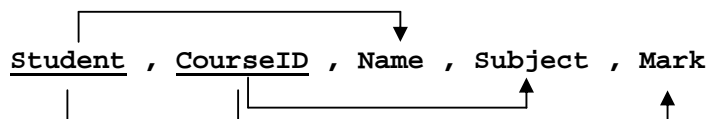
- 22) Which SQL command(s) can be used to remove an object from the database?

- | | | |
|--------------|--------------|----------|
| (a) DELETE | (b) EDIT | (c) DROP |
| (d) TRUNCATE | (e) ROLLBACK | |

- 23) If a relation has 2 candidate keys, then

- | |
|--|
| (a) one of the key attributes should be dropped from the database. |
| (b) one becomes a primary key. |
| (c) one key becomes the alternate key. |
| (d) one becomes the primary key and other the index key. |
| (e) both become composite keys. |

Consider the following functional dependency diagram on student marks for courses to answer Questions 24 and 25.



- 24) If all the above data is put into a single relation which of the following best describes its normal form?

- | | |
|-----------------------------|----------------------------|
| (a) The relation is in 0NF | (b) The relation is in 1NF |
| (c) The relation is in 2NF | (d) The relation is in 3NF |
| (e) The relation is in BCNF | |

- 25) What would be the set of relation(s) after removing all the functional dependencies?

- | | |
|--|---|
| (a) Students(<u>Student</u> , Name) | (b) Marks(<u>Student</u> , <u>CourseID</u> , Mark) |
| (c) Students(<u>Student</u> , <u>Course</u>) | (d) Subjects(<u>CourseID</u> , Subject) |
| (e) Marks(<u>Student</u> , Mark) | |

Consider the following relations to answer Questions 26-32. Note that the fieldnames which are underlined are the primary keys and the fieldnames which are in *italic* are foreign keys.

Lecturer (Emp_No, Name, Gender, Salary, Category, *DNo*)
 Department(DNo, *DName*, *Head*)
 Deliver(EmpNo, CNo, hours)
 Course(CNo, CName, Credits, *DNo*)
 Research_Fund(RFName, *EmpNo*, Budget)

- 26) Which SQL statement(s) will return information related to lecturers attached to department number '005'?

- (a) SELECT * FROM Lecturer L, Department D
WHERE L.DNo=D.DNo;
- (b) SELECT DISTINCT * FROM Lecturer L, Department D
WHERE L.DNo=D.DNo;
- (c) SELECT * FROM Lecturer;
- (d) SELECT Emp_No, Name, Salary, DName FROM Lecturer, Department
WHERE Lecturer.DNo=Department.DNo AND Department.DNo='005';
- (e) SELECT Emp_No, Name, Salary, DName FROM Lecturer, Deliver
WHERE Lecturer.DNo=Deliver.CNo AND Deliver.CNo='005';

- 27) Following are details of a new course to be offered by the Computer Science department whose department number is '101'.

Course Number = '555'
 Name = 'Database Systems'
 Number of credits = 4

Which SQL statement(s) will add a new course having the following details?

- (a) UPDATE Course
SET CNo='555', CName='Database Systems', Credits=4, DNo='101';
- (b) INSERT INTO Course(CNo, CName, Credits, DNo)
VALUES ('555', 'Database Systems', 4, '101');
- (c) UPDATE Course(CNo, CName, Credits, DNo)
SET CNo='555', CName='Database Systems', Credits=4, DNo='101';
- (d) INSERT INTO Course
VALUES ('555', 'Database Systems', 4, '101');
- (e) INSERT INTO Course VALUES (555, Database Systems, 4, 101);

- 28) Which SQL statement(s) will retrieve all lecturers whose last name (surname) is 'Silva'?

- (a) SELECT * FROM Lecturer WHERE Name LIKE '%Silva';
- (b) SELECT * FROM Department WHERE DName LIKE '%Silva';
- (c) SELECT * FROM Lecturer WHERE Name = *Silva;
- (d) SELECT DISTINCT Name FROM Lecturer WHERE Name = *Silva;
- (e) SELECT * FROM Lecturer WHERE Name LIKE '_Silva_';

- 29) Which SQL statement(s) will retrieve all courses offered by department number '101', and sort them in ascending order based on the number of credits?

- (a) SELECT * FROM Course;
- (b) SELECT * FROM Course WHERE DNo='101' GROUP BY Credits ASC;
- (c) SELECT * FROM Course WHERE DNo='101' ORDER BY Credits ASC;
- (d) SELECT * FROM Course WHERE DNo='101' HAVING Credits ASC;
- (e) SELECT * FROM Course WHERE DNo='101';

- 30) Which of the following mechanisms can be used within SQL to remove duplicate tuples?
- | | |
|---|--------------------------|
| (a) The keyword 'DISTINCT' | (b) The keyword 'SELECT' |
| (c) The keyword 'COUNT' | (d) The keyword 'UNION' |
| (e) This is handled using client scripts not via SQL. | |
- 31) Which SQL statement(s) will increase the salaries of all lectures in the category of 'Senior Lecturer' by 25%?
- | |
|--|
| (a) INSERT Lecturer SET Salary=Salary*(25/100); |
| (b) UPDATE Lecturer SET Salary=Salary*(125/100); |
| (c) INSERT Lecturer SET Salary=Salary*(125/100); |
| (d) UPDATE Lecturer SET Salary=Salary*(25/100); |
| (e) Can only be done via client scripts and not via SQL. |
- 32) Which SQL statement(s) will locate all lecturers who are attached to a department that delivers more than 5 courses?
- | |
|--|
| (a) SELECT DNo FROM Course GROUP BY DNo HAVING COUNT(*) > 5; |
| (b) SELECT Name FROM Lecturer WHERE DNo IN
(SELECT DNo FROM Course GROUP BY DNo HAVING COUNT(*) > 5); |
| (c) SELECT Name FROM Lecturer WHERE DNo EXISTS
(SELECT DNo FROM Course GROUP BY DNo HAVING COUNT(*) > 5); |
| (d) SELECT L.Name FROM Lecturer L, Course C WHERE L.DNo = C.DNo
HAVING COUNT(*) > 5; |
| (e) SELECT Name FROM Lecturer GROUP BY DNo HAVING COUNT(DNO) > 5; |
- 33) Consider the following SQL statement.
- GRANT SELECT, INSERT, UPDATE(Salary) ON Employee TO Sarath;
- Which of the following statement(s) is/are correct?
- | |
|---|
| (a) Sarath has permission to update Salary in the Employee table. |
| (b) Sarath has permission to insert tuples into the Employee table. |
| (c) Sarath is given the right to grant select and update privileges to the other users. |
| (d) Sarath is given permission to change the Payments table. |
| (e) Sarath has rights to retrieve the data from the Employee table. |
- 34) After the statement in Question 33, the following SQL statement is executed.
- REVOKE INSERT, SELECT ON Employee FROM Sarath;
- Which of the following statement(s) is/are correct?
- | |
|---|
| (a) Sarath has permission to update Salary in the Employee table. |
| (b) Sarath has permission to insert tuples into the Employee table. |
| (c) Sarath is given the right to grant select and update privileges to the other users. |
| (d) Sarath is given permission to change the Payments table. |
| (e) Sarath has rights to retrieve the data from the Employee table. |

Questions 35 and 36 are based on the relations *Student* and *Instructor* as given below. Please note that Fname and Lname also denote the First Name and Last Name respectively.

Student

First Name	Last Name
Ajith	Gamage
Basil	Peiris
Geetha	Alwis
Jeeva	Costa
Kumari	Fernando
Nimal	Silva
Prasad	Zoysa

Instructor

Fname	Lname
Ajith	Gamage
Basil	Peiris
Nimal	Alwis

- 35) Which of the following statements is/are correct with respect to the two relations given above?

- (a) The two relations are not union-compatible since their attribute names differ.
- (b) The two relations are union-compatible since they have the same type of tuples.
- (c) To find out those students who are also instructors, it is necessary to perform the operation $\text{Student} \cup \text{Instructor}$.
- (d) To find out those students who work as instructors, it is necessary to perform the operation $\text{Student} \cap \text{Instructor}$.
- (e) To find out the students who are not instructors, it is necessary to perform the operation $\text{Student} \div \text{Instructor}$.

- 36) Consider the following table obtained using Student and Instructor relations.

First Name	Last Name
Geetha	Alwis
Jeeva	Costa
Kumari	Fernando
Nimal	Silva
Prasad	Zoysa

Which relational algebra operation could have been applied on the pair of relations Student and Instructor to obtain the above data?

- (a) $\text{Student} \cap \text{Instructor}$
- (b) $\text{Instructor} \div \text{Student}$
- (c) $\text{Student} - \text{Instructor}$
- (d) $\text{Student} \cup \text{Instructor}$
- (e) $\text{Instructor} - \text{Student}$

- 37) Consider the following statements regarding relational algebra and relational calculus.

- (i) In relational calculus, one has to write one declarative expression to specify a retrieval request, whereas in relational algebra, one has to write a sequence of operations.
- (ii) In relational calculus, there is no specification on how to evaluate a query. Therefore the relational calculus is considered to be a declarative or non-procedural language.
- (iii) The expressive power of both relational algebra and relational calculus are equivalent so that any retrieval that can be specified in the relational algebra can also be specified in the relational calculus.

Which of the following is true?

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

38) Which of the following statement(s) is/are true with respect to user views?

- (a) User views are virtual tables that are not visible to users.
- (b) User views occupy data storage space and contain query output data.
- (c) Most of the SQL commands that can be performed on tables can be performed on views too.
- (d) User views are a way of protecting data from unauthorized access.
- (e) DROP VIEW command will remove the view table and its corresponding data.

39) Consider the following CREATE VIEW statement and the three statements (i), (ii) and (iii) which follows.

```
CREATE VIEW Employee_payments AS
SELECT Emp_no, Dept_name, Emp_name, Basic_Salary, Allowances
FROM Emp_personal, Department
WHERE Dept_no=Dept_number;
```

- (i) Emp_personal needs to be a view table.
- (ii) Employee_payments is a virtual table.
- (iii) Department need not be a base table.

Which of the following is true?

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

40) Which of the following statements is/are correct with respect to INSERT command?

- (a) In order to add a single tuple to a relation, one has to specify the relation name and a list of values for the tuple in the correct order.
- (b) When the values are listed in the INSERT command, there is no order to specify the values.
- (c) When entering values for a selected list of attributes in a relation, the ALTER command is used.
- (d) When entering a new tuple for the entire list of attributes in a relation, the INSERT command can be used.
- (e) When entering values for a selected list of attributes in a relation, attributes that do not allow NULL values should be always present.
