

NAPIER UNIVERSITY
SCHOOL OF COMPUTING

FIRST DIET SEM 1 UK – V2 SESSION 2001-2002

DATABASE SYSTEMS 2

MODULE NO: CO22001/CO72010

DATE: JAN 2002

EXAM TIME: 2 HOURS

START TIME: 1300 HOURS

FINISH TIME: 1500 HOURS

EXAMINERS:

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QUESTION PAPER DATA

Number of pages – SEVENTEEN

Number of questions – FORTY

INSTRUCTIONS TO EXAMS OFFICE

Do not allow exams to leave the exams hall.

Do not pass exams to the library.

INSTRUCTIONS TO CANDIDATES

Select ONE from (a) to (e)

1. Transactions are often referred to in terms of ACID. Which one of the following is not part of the term ACID.

- a. Atomic
- b. Complete
- c. Isolation
- d. Durable
- e. More than one of the above

(1)

2. Which of the following is a good example of what is meant by serialisability.

- a. All transactions happen one after another.
- b. All disk access happens one after another.
- c. The situation where the Lost Update problem exists.
- d. The result of the transactions is the same as if the transactions went one after another.
- e. The situation where a cascade abort occurs.

(1)

3. Deadlock occurs when

- a. a transaction cannot decide what to do next.
- b. the DBMS cannot decide what to do next.
- c. the state of a lock in the DBMS changes from live to dead.
- d. the user requests a cascade abort
- e. when transactions compete for the same resource.

(1)

4. Which of the following is TRUE for two-phase locking.

- a. locks can be acquired at any time.
- b. locks can only be acquired on primary keys.
- c. lock acquisition is the second phase.
- d. keys are acquired in the first phase.
- e. None of the above.

(1)

5. Which of the following is always TRUE about indexing.

- a. indexing always speeds up table access
- b. secondary indexing must also be based on unique secondary keys.
- c. Primary indexing can handle duplicate keys.
- d. Widely varying fields are good indexing candidates.
- e. You cannot query tables without building an index.

(1)

6. Which of the following is TRUE when considering hash tables.

- a. A good hash function is one which results in many hash collisions.
- b. The hash function only operates on the index field.
- c. Hash collisions cannot be handled.
- d. DBMS systems can only hash on numbers.
- e. Hash tables speed up sequential record scanning.

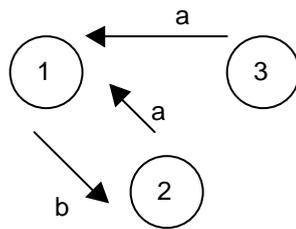
(1)

7. Consider the following schedule:

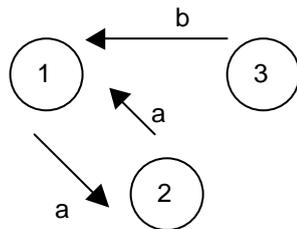
| Time | Transaction 1 | Transaction 2 | Transaction 3 |
|------|---------------|---------------|---------------|
| 1 | Read(a) | | |
| 2 | | | Write(b) |
| 3 | | | Write(c) |
| 4 | | Write(a) | |
| 5 | Write(b) | | |
| 6 | Read(a) | | |

Which of the following shows a precedence graph of this schedule:

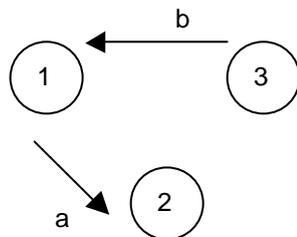
a.



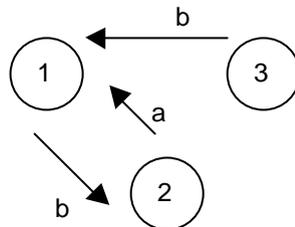
b.



c.



d.



e. none of the above

(1)

8. By which term is deferred update also known.

- a. NO-UNDO/NO-REDO
- b. UNDO/NO-REDO
- c. NO-UNDO/REDO
- d. UNDO/REDO
- e. Immediate update.

(1)

9. What is the main advantage of immediate update.

- a. Transactions that are short are given priority over long transactions.
- b. Transactions that are long are given priority over short transactions.
- c. All transaction data is held in memory making aborts faster.
- d. Changes can be stored on the disk before a commit.
- e. The locking strategy used can be timestamp based.

(1)

10. Embedded SQL allows which of the following.

- a. Programming languages to be embedded in SQL.
- b. SQL to be embedded in the DBMS
- c. SQL to be pushed into the DBMS.
- d. Variables to be embedded in SQL.
- e. None of the above.

(1)

11. Accessing data via embedded SQL requires which of the following.

- a. Cursors to move from one column to the next.
- b. The cardinality of tables to be one.
- c. The data dictionary to provide accurate library routines.
- d. The database to be fully normalised.
- e. Pre-compiler support for the programming language.

(1)

12. When implementing security in a DBMS, which of the following is NOT supported by the GRANT command.

- a. Changing passwords.
- b. Providing SELECT privileges.
- c. Supporting the devolution of access control to non-DBAs.
- d. Providing DELETE privileges.
- e. Removing privileges of other people.

13. The Data Dictionary provides which of the following features.

- a. Support for the SQL interface to the database.
- b. Support for backup procedures.
- c. Costings for future database changes.
- d. Transaction deadlock detection.
- e. None of the above.

(1)

14. The DOMAIN of an attribute is which of the following.

- a. Which tables the attribute is allowed to be in.
- b. The type of the attribute.
- c. The range of values that the attribute is allowed to take.
- d. More than one of the above.
- e. None of the above.

(1)

15. Which of the following is TRUE concerning TRANSFER TIME for hard drives.

- a. Transfer time is measured in Mbytes.
- b. Is the time to move data from the disk surface to the hard drive.
- c. Must be measured as a ratio of seek time.
- d. Depends on the number of files being transferred.
- e. Seek time is greater than transfer time.

(1)

16. In relational algebra, which of the options given is the relational algebra that is equivalent to the SQL shown below.

```
SELECT a
FROM x,y
WHERE x.a = y.b
```

- a. PROJECT a (x JOIN_{x.a=y.b} y)
- b. SELECT a (x JOIN_{x.a=y.b} y)
- c. PROJECT a (x SELECT_{x.a=y.b} y)
- d. SELECT a (x PROJECT_{x.a=y.b} y)
- e. None of the above

(1)

Table A

| Col1 | Col2 |
|------|------|
| A | 1 |
| B | 3 |
| C | 4 |

Table B

| Col3 | Col4 |
|------|------|
| A | 1 |
| C | 4 |
| D | 5 |
| E | 3 |

17. Consider the tables A and B shown above and select the result of
 A LEFT OUTER JOIN $_{col1 = col3}$ B

a.

| Col1 | Col2 | Col3 | Col4 |
|------|------|------|------|
| A | 1 | A | 1 |
| B | 3 | | |
| C | 4 | C | 4 |
| | | D | 5 |
| | | E | 3 |

b.

| Col1 | Col2 | Col3 | Col4 |
|------|------|------|------|
| A | 1 | A | 1 |
| C | 4 | C | 4 |

c.

| Col1 | Col2 | Col3 | Col4 |
|------|------|------|------|
| A | 1 | A | 1 |
| B | 3 | | |
| C | 4 | C | 4 |

d.

| Col1 | Col2 | Col3 | Col4 |
|------|------|------|------|
| A | 1 | A | 1 |
| C | 4 | C | 4 |
| | | D | 5 |
| | | E | 3 |

e. None of the above

18. Consider again the tables A and B shown above and select the result of

A JOIN_{col1 = col3} B

a.

| Col1 | Col2 | Col3 | Col4 |
|------|------|------|------|
| A | 1 | A | 1 |
| B | 3 | | |
| C | 4 | C | 4 |
| | | D | 5 |
| | | E | 3 |

b.

| Col1 | Col2 | Col3 | Col4 |
|------|------|------|------|
| A | 1 | A | 1 |
| C | 4 | C | 4 |

c.

| Col1 | Col2 | Col3 | Col4 |
|------|------|------|------|
| A | 1 | A | 1 |
| B | 3 | | |
| C | 4 | C | 4 |

d.

| Col1 | Col2 | Col3 | Col4 |
|------|------|------|------|
| A | 1 | A | 1 |
| C | 4 | C | 4 |
| | | D | 5 |
| | | E | 3 |

e. None of the above

(1)

19. When relational algebra is written in symbolic notation, what does the π symbol represent.

- a. select
- b. project
- c. product
- d. join
- e. rename

(1)

20. Given the following relation and dependences, state which normal form the relation is in.

$R(\underline{p,q},r,s,t)$

$p,q \rightarrow r,s,t$

$r,s \rightarrow p,q,t$

$t \rightarrow s$

- a. Unnormalised
- b. First normal form
- c. Second normal form
- d. Third normal form
- e. BCNF

(1)

21. Given the following relation and dependencies, select the option that is the result of fully normalising the relation to BCNF.

$R(\underline{a,b},c,d,e)$

$a \rightarrow c$

$d \rightarrow c,e$

- a. $R1(\underline{a},c)$
 $R2(\underline{d},e)$
 $R(\underline{a,b},d)$
- b. $R1(\underline{a},c)$
 $R2(\underline{d},c,e)$
 $R(\underline{a,b},d)$
- c. $R1(\underline{d},c,e)$
 $R(\underline{a,b},d)$
- d. $R(\underline{a,b},c,\underline{d},e)$
- e. None of the above

(1)

22. Given the following relation and dependencies, select the option that is the result of fully normalising the relation to BCNF.

$R(\underline{a,b},c,d,e)$

$c \rightarrow a$

$d,e \rightarrow a,b,c$

$c,d \rightarrow e,b$

- a. $R(\underline{b,c},d,e)$
 $R1(\underline{c},a)$
- b. $R(b,c,\underline{d,e})$
 $R1(\underline{c},a)$
- c. $R(b,\underline{c,d},e)$
 $R1(\underline{c},a)$
- d. all of the above

e. none of the above

(1)

23. Select the TRUE statement concerning normalisation.

- a. Performance is increased.
- b. Data consistency is improved.
- c. Redundancy is increased.
- d. The number of tables is reduced.
- e. Functional dependencies increase.

(1)

24. When mapping EER superclasses/subclasses, which of the following options is not a valid possibility.

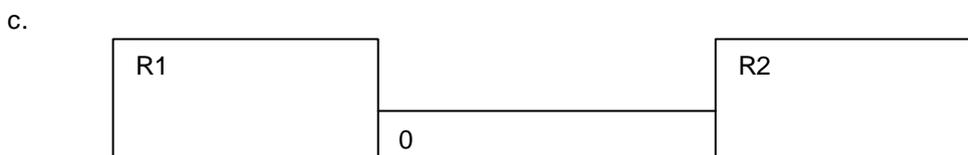
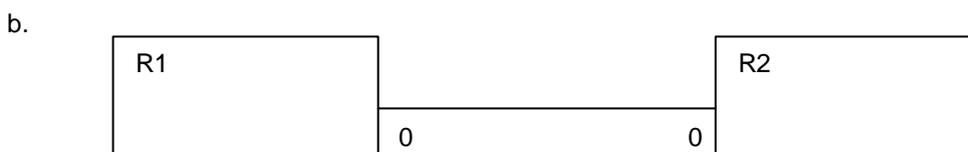
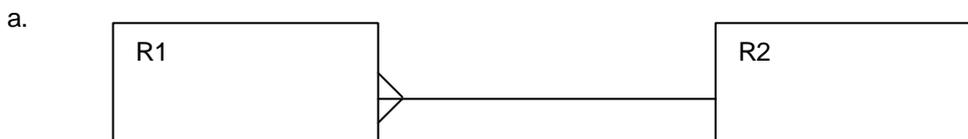
- a. Map each subclass onto separate relations
- b. Use one relation for the superclass
- c. Use a relation for the superclass and a separate relation for each of the subclasses.
- d. Map each subclass using class inheritance
- e. All of the above are valid options.

(1)

25. Given the following relation select which of the ER diagrams could describe the relation.

R1(a,b,c,d) d is a foreign key

R2(d,x,y)



- d. two of the above
- e. All three of a,b, and c.

(1)

26. Which of the following is part of the ANSI/SPARC three level architecture model.

- a. contextual
- b. contactable
- c. client
- d. conceptual
- e. coaxial

(1)

27. Which of the following can be found in a DSL.

- a. DML
- b. DLA
- c. DLD
- d. LDD
- e. PLA

(1)

28. Which of the following is not considered an Integrity Check.

- a. Redundancy check
- b. Type check
- c. Residential check
- d. Range check
- e. Comparison check

(1)

29. At the Physical design stage, select the TRUE statement.

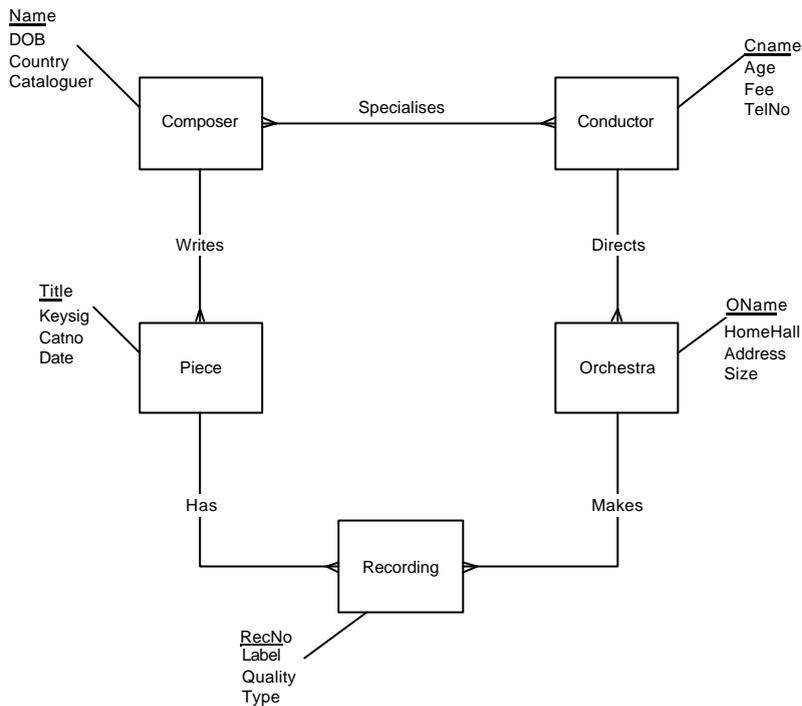
- a. ER diagrams are mapped into relations
- b. ER diagrams are mapped into relationships
- c. Relationships are mapped into tables
- d. Indices are identified and implemented for tables
- e. ER diagrams are mapped into tables.

(1)

30. When mapping from an ER diagram into relations, some relationships may have optionality. Select the TRUE statement.

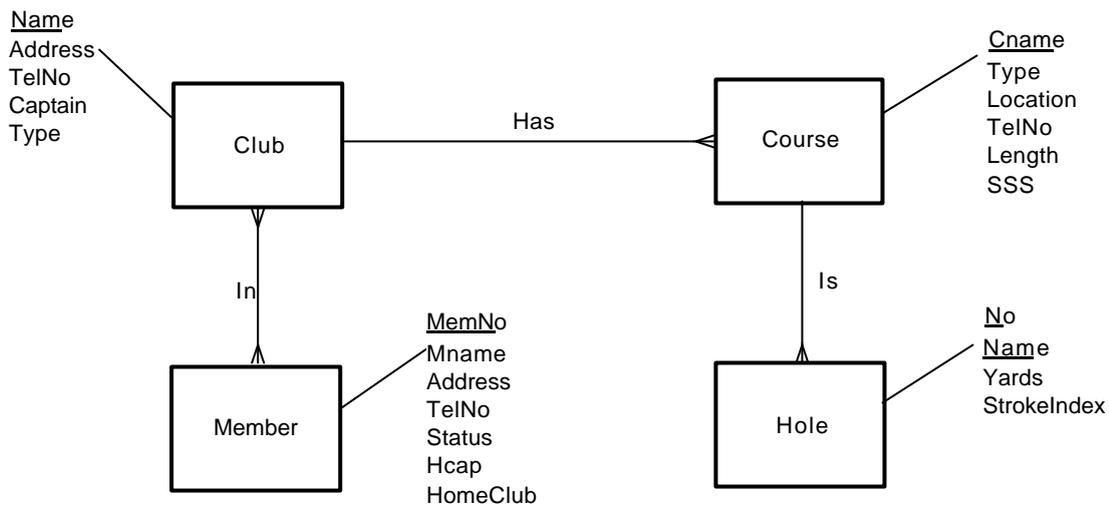
- a. If the relationship is 1:n with one end optional, you must put the foreign key in the many end.
- b. If the relationship is 1:1 with one end optional, you must subsume.
- c. If the relationship is 1:n with one end optional, you must put the foreign key in the optional end
- d. If the relationship is 1:n with one end optional, you must put the foreign key in the end which is not optional.
- e. If there is both optionality and a cardinality greater than one, then you must use a composite foreign key.

(1)



31. After mapping the above ERD to a relational schema which of the following set of relations would be obtained?

- a. Composer(Name, DOB, Country, Cataloguer)
 Conductor(Cname, Age, Fee, TelNo)
 Piece(Title, KeySig, CatNo, Date, Name, RecNo)
 Orchestra(OName, HomeHall, Adress, Size, Cname, RecNo)
 Recording(RecNo, Label, Quality, Type)
 Specialises(Name, Cname)
- b. Composer(Name, DOB, Country, Cataloguer, Cname)
 Conductor(Cname, Age, Fee, TelNo, Name)
 Piece(Title, KeySig, CatNo, Date, Name)
 Orchestra(OName, HomeHall, Adress, Size, Cname)
 Recording(RecNo, Label, Quality, Type, Title, OName)
- c. Composer(Name, DOB, Country, Cataloguer)
 Conductor(Cname, Age, Fee, TelNo, OName)
 Piece(Title, KeySig, CatNo, Date, Name)
 Orchestra(OName, HomeHall, Adress, Size)
 Recording(RecNo, Label, Quality, Type, Title, OName)
 Specialises(Name, Cname)
- d. Composer(Name, DOB, Country, Cataloguer)
 Conductor(Cname, Age, Fee, TelNo)
 Piece(Title, KeySig, CatNo, Date, Name)
 Orchestra(OName, HomeHall, Adress, Size, Cname)
 Recording(RecNo, Label, Quality, Type, Title, OName)
 Specialises(Name, Cname)
- e. None of the above.



32. After mapping the above ERD to a relational schema which of the following set of relations would be obtained?

- Club(Name, Address, TelNo, Captain, Type)
 Course(Cname, Type, Location, TelNo, Length, SSS, *Club*)
 Member(MemNo, Mname, Address, TelNo, Status, Hcap, HomeClub)
 Hole(No, Name, Yards, StrokeIndex, *Cname*)
 In(MemNo, Name)
- Club(Name, Address, TelNo, Captain, Type)
 Course(Cname, Type, Location, TelNo, Length, SSS, *Club*)
 Member(MemNo, Mname, Address, TelNo, Status, Hcap, HomeClub)
 Hole(No, Name, Yards, StrokeIndex, *Cname*)
- Club(Name, Address, TelNo, Captain, Type)
 Course(Cname, Type, Location, TelNo, Length, SSS, *Club*)
 Member(MemNo, Mname, Address, TelNo, Status, Hcap, HomeClub)
 Hole(No, Name, Yards, StrokeIndex)
 In(MemNo, Name)
- Club(Name, Address, TelNo, Captain, Type)
 Course(Cname, Type, Location, TelNo, Length, SSS)
 Member(MemNo, Mname, Address, TelNo, Status, Hcap, HomeClub)
 Hole(No, Name, Yards, StrokeIndex, *Cname*)
 In(MemNo, Name)
- None of the above.

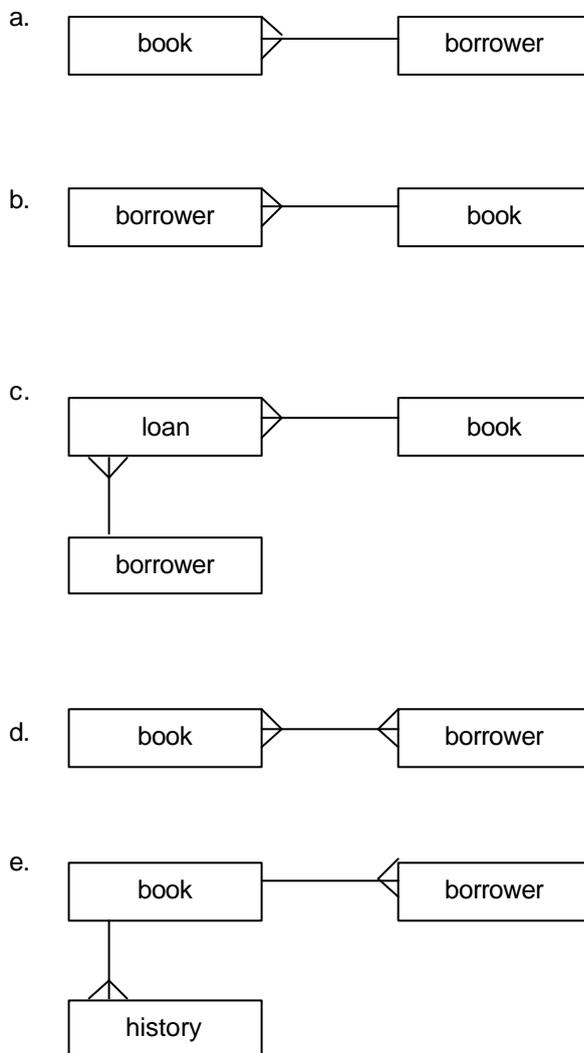
(1)

33. Which one of the following techniques is sometimes used to solve integrity problems in a concurrent transaction scenario?

- First-come first-served.
- First-fit.
- Greedy algorithms.
- Strassens's algorithm.
- Two-phase locking.

(1)

34. A library includes books and borrowers. At any one time a book may be borrowed by a single borrower. A record is kept of the current location of each book and its borrowing history. Select the ER diagram which best represents this scheme.



(1)

35. In ER Modelling, a "Fan Trap"

- a. may be fixed using the Navathe algorithm.
- b. may occur when 1:m relationships fan in from a single entity.
- c. may occur when 1:m relationships fan out from a single entity.
- d. may occur when m:n relationships fan in from a single entity.
- e. may occur when m:n relationships fan out from a single entity.

(1)

36. Which of the following is offered through the use of EER (Enhanced ER) Modelling?

- a. Canonisation
- b. Confirmation
- c. Many to many relation
- d. Partial participation
- e. Specialisation

(1)

37. Which of the following is TRUE about a foreign key?

- a. It can relate to multiple rows in another table.
- b. It can have a value which does not relate to a primary key.
- c. It maintains a relationship between tables.
- d. It can relate to columns which are not primary keys.
- e. It is only used in multi-language database implementations.

(1)

SQL Scenario 1

| Departments | |
|-------------|------------|
| DeptNo | Depname |
| 1 | Computing |
| 2 | Electrical |
| 3 | Geography |
| 4 | History |
| 5 | Business |

| Employees | |
|-----------|---------|
| empno | empname |
| 1 | Gordon |
| 2 | Ken |
| 3 | Brian |
| 4 | Colin |
| 5 | George |

| WorkFor | |
|---------|-------|
| empno | depno |
| 1 | 1 |
| 3 | 2 |
| 4 | 1 |
| 3 | 3 |
| 1 | 2 |
| 2 | 5 |

38. Using SQL Scenario 1, what is the CARDINALITY of the table "WorkFor"?

- a. 2
- b. 3
- c. 6
- d. 12
- e. none of the above.

(1)

39. Using SQL Scenario 1, which of the following SQL queries gives a list of departments and their employees?

- a.

```
SELECT depname,empname
FROM departments, employees
WHERE departments.depno = employees.empno
;
```
- b.

```
SELECT depname,empname
FROM departments, employees, workfor
WHERE departments.depno = workfor.depno
AND workfor.empno = employees.empno
;
```
- c.

```
SELECT depname,empname
FROM departments, workfor
WHERE departments.depno = workfor.depno
;
```
- d.

```
SELECT depno,empno
FROM workfor
;
```
- f. None of the above.

(1)

40. Using SQL Scenario 1, which of the following SQL queries gives the number of employees in each department?

- a.

```
SELECT depname,COUNT(depno)
FROM departments, employees, workfor
WHERE departments.depno = workfor.depno
AND workfor.empno = employees.empno
;
```
- b.

```
SELECT empno,COUNT(*)
FROM departments, workfor
WHERE departments.depno = workfor.depno
GROUP BY depno
;
```
- c.

```
SELECT depname,COUNT(empno)
FROM departments, workfor
WHERE departments.depno = workfor.depno
GROUP BY depname
;
```
- d.

```
SELECT depname,COUNT(empno)
FROM departments, employees, workfor
WHERE departments.depno = workfor.depno
AND workfor.empno = employees.depno
GROUP BY depno
```
- f. None of the above.

(1)

END OF PAPER