IMPORTANT QUESTIONS

Set of Important Questions (Model Test Paper)

1. List four significant differences between a file-processing system and a DBMS.
2. Explain the difference between physical and logical data independence.
3. What are five main functions of a database administrator?
4. Explain the distinctions among the terms primary key, candidate key, and superkey.
5. Construct an E-R diagram for a car-insurance company whose customers own one or more cars each.Each car has associated with it zero to any number of recorded accidents.
6. Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted.
7. Explain the difference between a weak and a strong entity set.
8. We can convert any weak entity set to a strong entity set by simply adding appropriate attributes. Why, then, do we have weak entity sets?
9. Define the concept of aggregation. Give two examples of where this concept is useful.
10. A weak entity set can always be made into a strong entity set by adding to its attributes the primary key attributes of its identifying entity set. Outline what sort of redundancy will result if we do so.
11. Design a generalization–specialization hierarchy for a motor-vehicle sales company. The company sells motorcycles, passenger cars, vans, and buses. Justify your placement of attributes at each level of the hierarchy. Explain why they should not be placed at a higher or lower level.
12. Explain the distinction between total and partial participation constraints.
13. Describe the differences in meaning between the terms *relation* and *relation schema*.
14. Consider the insurance database given below, where the primary keys are underlined. Construct the following relational algebra queries for this relational database.

person (*driver-id#, name, address*)
car (*license, model, year*)
accident (*report-number, date, location*)
owns (*driver-id#, license*)
participated (*driver-id, car, report-number, damage-amount*)

   a) Find the total number of people who owned cars that were involved in accidents in 1989.
   b) Find the number of accidents in which the cars belonging to “John Smith” were involved.
   c) Add a new accident to the database; assume any values for required attributes.
   d) Delete the Mazda belonging to “John Smith”.
   e) Update the damage amount for the car with license number “AABB2000” in the accident with report number “AR2197” to $3000.

15. Give an expression in the relational algebra to express each of the following queries:

employee (*person-name, street, city*)
works (*person-name, company-name, salary*)
company (*company-name, city*)
manages (*person-name, manager-name*)

   a) Find the names of all employees who work for First Bank Corporation.
   b) Find the names and cities of residence of all employees who work for First

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c) Bank Corporation.
d) Find the names, street address, and cities of residence of all employees who
e) work for First Bank Corporation and earn more than $10,000 per annum.
f) Find the names of all employees in this database who live in the same city
g) as the company for which they work.
h) Find the names of all employees who live in the same city and on the same
i) street as do their managers.
j) Find the names of all employees in this database who do not work for First
k) Bank Corporation.
l) Find the names of all employees who earn more than every employee of
m) Small Bank Corporation.
n) Assume the companies may be located in several cities. Find all companies located in every city in which Small Bank Corporation is located.

16. Consider the relational database given above. Give an expression in the relational algebra for each
request:

a) Modify the database so that Jones now lives in Newtown.
b) Give all employees of First Bank Corporation a 10 percent salary raise.
c) Give all managers in this database a 10 percent salary raise.
d) Give allmanagers in this database a 10 percent salary raise, unless the salary would be greater than $100,000. In such cases, give only a 3 percent raise.
e) Delete all tuples in the *works* relation for employees of Small Bank Corporation.

17. Let $R = (A, B, C)$, and let $r1$ and $r2$ both be relations on schema R. Give an expression in the domain relational calculus that is equivalent to each of the following:

a) $\Pi A(r1)$
b) $\sigma B = 17\ (r1)$
c) $r1 \cup r2$
d) $r1 \cap r2$
e) $r1 - r2$
f) $\Pi A,B(r1) \square \Pi B,C(r2)$

18. List two reasons why null values might be introduced into the database.
19. Consider the insurance database given below, where the primary keys are underlined. Construct the
following SQL queries for this relational database.

person (*driver-id#, name, address*)
car (*license, model, year*)
accident (*report-number, date, location*)
owns (*driver-id#, license*)
participated (*driver-id, car, report-number, damage-amount*)

a) Find the total number of people who owned cars that were involved in accidents in 1989.
b) Find the number of accidents in which the cars belonging to "John Smith" were involved.
c) Add a new accident to the database; assume any values for required attributes.
d) Delete the Mazda belonging to "John Smith".
e) Update the damage amount for the car with license number "AABB2000" in the accident with report number "AR2197" to $3000.

20. Consider the employee database , where the primary keys are underlined. Give an expression in QBE

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for each of the following:
employee (*employee-name*, *street*, *city*)
works (*employee-name*, *company-name*, *salary*)
company (*company-name*, *city*)
manages (*employee-name*, *manager-name*)

a) Find the names of all employees who work for First Bank Corporation. Find the names and cities of residence of all employees who work for First Bank Corporation.
b) Find the names, street addresses, and cities of residence of all employees who work for First Bank Corporation and earn more than $10,000.
c) Find all employees in the database who live in the same cities as the companies for which they work.
d) Find all employees in the database who live in the same cities and on the same streets as do their managers.
e) Find all employees in the database who do not work for First Bank Corporation.
f) Find all employees in the database who earn more than each employee of Small Bank
g) Corporation.
h) Assume that the companies may be located in several cities. Find all companies located in every city in which Small Bank Corporation is located.
i) Find all employees who earn more than the average salary of all employees of their company.
j) Find the company that has the most employees.
k) Find the company that has the smallest payroll.
l) Find those companies whose employees earn a higher salary, on average, than the average salary at First Bank Corporation.

21. Consider the relational database of employee given above. Give an expression in QBE for each of the following:

a) Modify the database so that Jones now lives in Newtown.
b) Give all employees of First Bank Corporation a 10 percent raise.
c) Give all managers of First Bank Corporation a 10 percent raise.
d) Give all managers of First Bank Corporation a 10 percent raise unless the salary becomes greater than $100,000; in such cases, give only a 3 percent raise.
e) Delete all tuples in the *works* relation for employees of Small Bank Corporation.

22. Give an expression in QBE for each of the following:
person (*driver-id#*, *name*, *address*)
car (*license*, *model*, *year*)
accident (*report-number*, *date*, *location*)
owns (*driver-id#*, *license*)
participated (*driver-id*, *car*, *report-number*, *damage-amount*)

a) Find the total number of people who owned cars that were involved in accidents in 1989.
b) Find the number of accidents in which the cars belonging to “John Smith” were involved.
c) Add a new accident to the database; assume any values for required attributes.
d) Delete the Mazda belonging to “John Smith”.
e) Update the damage amount for the car with license number “AABB2000” in the accident with report number “AR2197” to $3000.

23. Consider the employee database , where the primary keys are underlined. Give an expression in SQL
for each of the following queries.

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employee (*employee-name*, *street*, *city*)
works (*employee-name*, *company-name*, *salary*)
company (*company-name*, *city*)
manages (*employee-name*, *manager-name*)

a) Find the names of all employees who work for First Bank Corporation. Find the names and cities of residence of all employees who work for First Bank Corporation.
b) Find the names, street addresses, and cities of residence of all employees who work for First Bank Corporation and earn more than $10,000.
c) Find all employees in the database who live in the same cities as the companies for which they work.
d) Find all employees in the database who live in the same cities and on the same streets as do their managers.
e) Find all employees in the database who do not work for First Bank Corporation.
f) Find all employees in the database who earn more than each employee of Small BankCorporation.
g) Assume that the companies may be located in several cities. Find all companies located in every city in which Small Bank Corporation is located.
h) Find all employees who earn more than the average salary of all employees of their company.
i) Find the company that has the most employees.
j) Find the company that has the smallest payroll.
k) Find those companies whose employees earn a higher salary, on average, than the average salary at First Bank Corporation.

24. Consider the relational database of employee given above. Give an expression in SQL for each of the following queries.

a) Modify the database so that Jones now lives in Newtown.
b) Give all employees of First Bank Corporation a 10 percent raise.
c) Give all managers of First Bank Corporation a 10 percent raise.
d) Give all managers of First Bank Corporation a 10 percent raise unless the salary becomes greater than $100,000; in such cases, give only a 3 percent raise.
e) Delete all tuples in the *works* relation for employees of Small Bank Corporation.

25. Suppose that we decompose the schema $R = (A, B, C, D, E)$ into
(A, B, C)
(A, D, E)
Show that this decomposition is a lossless-join decomposition if the following set F of functional
dependencies holds:
$A \rightarrow BC$
$CD \rightarrow E$
$B \rightarrow D$
$E \rightarrow A$

26. Compute the closure of the following set F of functional dependencies for relation schema R = (A, B,
C, D, E).
$A \rightarrow BC$
$CD \rightarrow E$
$B \rightarrow D$
$E \rightarrow A$
List the candidate keys for R.

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27. The schema $R = (A, B, C, D, E)$ is given. Give a lossless-join decomposition into BCNF of schema *R.*
A → BC
CD → E
B → D
E → A
28. List the ACID properties of transaction. Explain the usefulness of each.
29. Explain the distinction between the terms *serial schedule* and *serializable schedule*.
30. What is a recoverable schedule? Why is recoverability of schedules desirable? Are there any circumstances under which it would be desirable to allow nonrecoverable schedules? Explain your answer.
31. What is a cascadeless schedule? Why is cascadelessness of schedules desirable?
32. Show that the two-phase locking protocol ensures conflict serializability, and that transactions can be serialized according to their lock points.
33. What benefit does strict two-phase locking provide? What disadvantages result?
34. Compare the deferred- and immediate-modification versions of the log-based recovery scheme.
35. Explain shadow paging.
36. Describe the three levels of data abstraction.
37. Define the "integrity rules".
38. What is a view? How it is related to data independence?
39. Explain following terms:
    a) Relation
    b) Attribute
    c) Entity
    d) Entity Set
e. Weak and Strong Entity set
40. Define instance and schema.
41. Define the terms 1) physical schema 2) logical schema.
42. Explain DBMS Architecture.
43. What are the components of storage manager?
44. Define single valued and multivalued attributes.
45. Define the terms
    a) DDL
    b) DML
46. Write short notes on tuple relational calculus.
47. Write short notes on domain relational calculus.
48. What are aggregate functions? And list the aggregate functions supported by SQL?
49. What is the use of group by clause?
50. Define canonical cover. List the properties of canonical cover.
51. What are the states of transaction?
52. What are the two types of serializability?
53. Define lock. What are the different modes of lock?
54. Define deadlock.
55. Explain the different normal forms in detail
    a) 1 normal form
    b) 2 nd normal form
    c) 3 rd normal form
    d) BCNF

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56. Explain multivalued dependency.
57. What is lossy and lossless decomposition?
58. Explain hierarchical modelling in detail.
59. Explain network modelling in detail.
60. Explain relational modelling in detail.
61. What is MVD?
62. Draw an ERD corresponding to publishing House Company.
63. What is data model? What are the various types of data model?
64. Draw an ERD corresponding to Registrar's office.
65. How many types of relationship exist in database designing?
66. Explain the use of like operator.
67. Explain Insert, Update and Delete query.
68. Define the use of 'IN' clause in SQL.
69. Define the use of 'ORDER By' clause in SQL.
70. What's the difference between "UNION" and "UNION ALL" ?
71. What is the difference between "HAVING" and "WHERE" clause?
72. Explain aggregate functions present in database.
73. Explain the use and importance of query evaluation engine.
74. Differentiate between relational algebra, relational calculus and SQL.
75. Define Functional Dependency.

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