Final Exam 2019

Part 1: True or False

1. A database system is a collection of related data stored in a computer
   a. False, that is a database, not a database system
2. A DBMS is the software that directly supports various database applications
   a. True
3. With a centralized DBMS, a user can directly access the database through an app on his PC or cellphone
   a. True
4. High initial cost is the main inhibitor of using a DBMS
   a. True
5. The database schema changes frequently in the database system
   a. False, should be database instance
6. End users use the conceptual schema to access the database
   a. False
7. The conceptual schema of a database is based on a conceptual model
   a. True
8. In a client/server architecture, client and server can be on different machines
   a. True
9. The network model is a low-level data model that describes the details of how data is stored on the computer
   a. False
10. The relational model is a high-level data model that can represent the semantics of the application
    a. False
11. Domains in the relational model can contain any kind of values
    a. False, only atomic values
12. Object model is more expressive than ER model
    a.
13. Columns in a relation are called attributes
    a. True
14. A foreign key can reference a primary key in the same relation
    a. True
15. A foreign key is a key in its relation
    a. False, key needs to uniquely identify row, foreign key doesn't
16. We cannot change the order of select and project operations in a query without changing its meaning
    a. True
17. The project operation is commutative
    a. False

18. We can use the rename operation to change the relation name and its attributes in relational algebra
    a. True
19. *project sname (student)* is a relational algebra query
    a. True
20. The join operation is not necessary as it can be represented by using other operations
    a. True
21. We can use the union operation on two relations if they have the same number of attributes
    a. False, also needs to be type compatible
22. A relationship in ER model can have attributes
    a. True
23. Attributes in ER model must be atomic
    a. False
24. Tuple relational calculus can represent the divide-by operation in relational algebra
    a. True
25. Domain relational calculus can never be a real query language for relational databases at is needs to use a lot of named or anonymous variables
    a. False
26. One tuple calculus query can represent unary, binary, aggregate operations and grouping functions together
    a. False
27. One SQL query can represent represent unary, binary, aggregate operations and grouping functions together
    a. True
28. SQL is based on relational algebra and domain relational calculus
    a. False, only based on algebra
29. SQL has the same expressive power as relational algebra
    a. False
30. SQL is a complete language that can do everything that database applications need
    a. True
31. In ER model, every real-world object such as a department is always represented as an entity
    a. False, can also be an attribute
32. In one-to-one relationship between entity sets A and B, every entity in A must have one and only one entity in B participating in the relationship
    a. True

33. A ternary relationship can be represented equivalent with three binary relationships
     a. False, if relationship has attribute it cannot be broken down
34. Normalization is the process of decomposing "bad" relations by breaking up their attributes into smaller relations
     a. True
35. A relation in 3NF is also in BCNF
     a. False
36. A relation in 2NF is also in NF2
     a. False
37. PL/SQL programs can be used to interact with users directly by taking input and displaying output
     a. False, PL/SQL engine is NOT interactive, SQL engine does the inputs
38. Dynamic SQL is more efficient than Static SQL
     a. False, dynamic is compiled at run-time
39. Impedance mismatch occurs between the database and application programs
     a. True
40. A transaction can contain several SQL statements
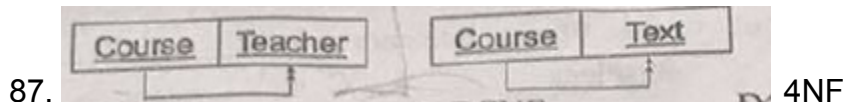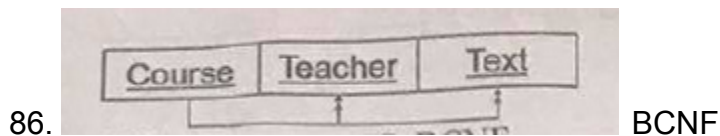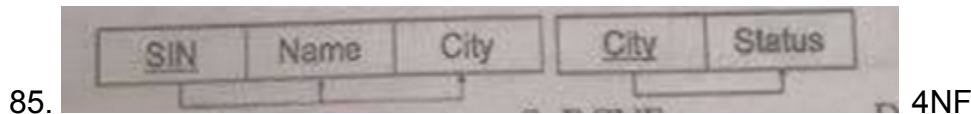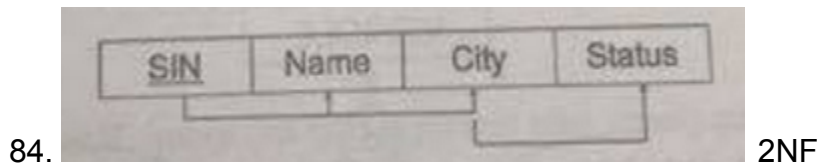   a. True

Part 2: Multiple Choice
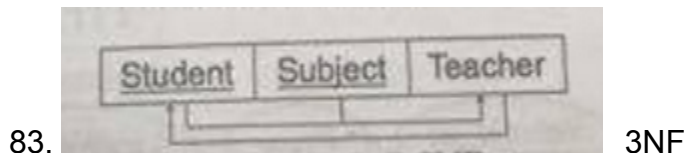41. The ___ data model cannot directly represent many to many relationships
     a. Hierarchical
42. In the ___ data model, the domain can have non-atomic values
     a. Object
43. The ___ designates the role played by a domain in a relation
     a. Attribute
44. ___ is a kind of users who uses the database frequently but know nothing about it
     a. End users
45. The person who proposed the relational model is
     a. E.F. Codd
46. The person who did not get Turing award is
     a. Ellison
47. The biggest relational database vendor is
     a. Oracle
48. Which of the following data model does not have a query language
     a. ER
49. There are ___ built-in integrity constraints in the relational model
     a. Three

50. Which of the following data model supports non-atomic attributes
    a. ER
51. Which of the following algebra operations can be defined by other operations
    a. JOIN
52. The operation used in *Student join Grade (S#=S#)* is called ___
    a. thetajoin
53. The join operation that does not lose any information is called
    a. Outer join, but in actuality it's fulljoin (not an option)
54. Which of the following tuple calculus queries is correct
    a. {S, N, A | Student(S, N, A)}
55. Which of the following algebra queries cannot be represented by tuple or domain calculus
    a. Student nfulljoin Grade
56. Which of the following query languages cannot use one query expression to represent the query "find student names for students whose average mark is above 80"
    a. Calculus
57. To represent divide-by operation in relational algebra, we need to use the following in tuple calculus
    a. forall
58. Compared to relational algebra and relational calculus, SQL is ___ expressive
    a. More
59. Identifying relationship sets are used to connect ___ to their owners
    a. Weak entity sets
60. The 4th generation language (4GL) is ___ in nature
    a. Declarative
61. In the client and server database architecture, it is better to have ___
    a. Thin client, fat server
62. In the three-tier client server database architecture, the intermediate layer is called ___
    a. Web server
63. The main benefit of three-tier client server DBS architecture is ___
    a. Enhanced security
64. A program normally processes one tuple at a time but a database query may return a set of tuples. To deal with this problem, a ___ has to be used in PL/SQL and embedded SQL programs
    a. Cursor
65. In order to distinguish C variables from attributes in the embedded SQL statement, C variables are prefixed with a ___
   a. Comma

66. Embedded SQL programs are ___ programs
     a. Application
67. In Oracle VM, sqlplus that is used to enter SQL statements is a(n) ___ program
     a. client-side
68. The prepare statement is sued in which dynamic SQL methods except ___
     a. Method 1
69. In dynamic SQL, the ___ statement instructs the DBMS server to parse the SQL statement and divide the execution plan
     a. Prepare
70. In embedded/dynamic SQL, the ___ statement instructs the DBMS server to execute the query
     a. Execute
71. To write a dynamic SQL program that allows the user to access any relation in the database, we have to use ___
     a.
72. The main problem with dynamic SQL is ___
     a. Run-time overhead
73. In PL/SQL, the purpose of select for update cursors is to ___ the selected data
     a. Lock
74. PL/SQL programs are ___ programs
     a. Server-side, maybe client & server-side
75. In PL/SQL, which statement does not require declare cursor and open cursor (implicit cursor)
     a. For loop
76. With ___, we can send more than one SQL statement to the DBMS server
     a. All of them
77. A functional dependency defines a ___ relationship between two sets of attributes
     a. many-to-one
78. Join dependency is used to define ___ normal form
     a. Fifth
79. When we disallow composite attributes, multivalued attributes and nested relations in a relation, then the relation is in ___ normal form
     a. First
80. When a relation is in ___ normal form, then there is at most one multi-valued dependency
     a. Fourth
81. When a relation is in ___ normal form, every non-key attribute is non-transitively functionally dependent on the primary key
     a. Third

82. When a relation is in ___ normal form, every non-prime attribute is fully functionally dependent on the primary key

    a. Second

Given the relation schemas below with primary key and functional/multivalued dependencies showing. Select the highest normal form the relation is in for questions 83 through 87

83.

Student	Subject	Teacher

                         3NF

84.

SIN	Name	City	Status

                         2NF

85.

SIN	Name	City	City	Status

                         4NF

86.

Course	Teacher	Text

                         BCNF

87.

Course	Teacher

Course	Text

                         4NF

Given the ER diagram for each question with entity set names, attributes and constraints shown, select the number of relations that should be generated (for questions 88 through 91)
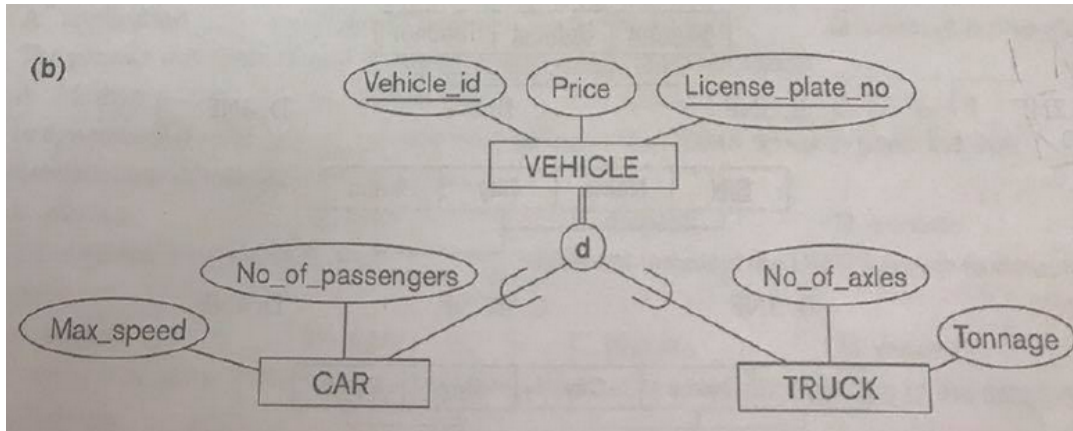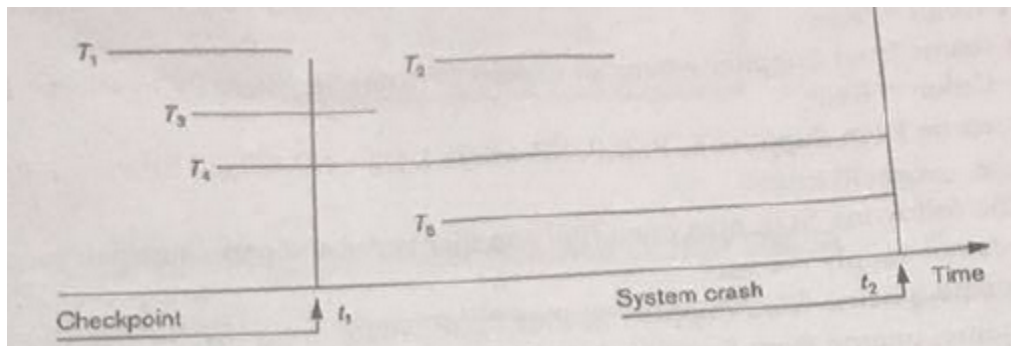
88.

                         three

89.

                         two
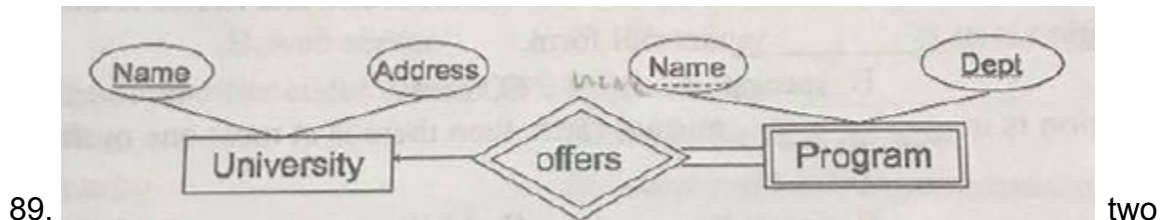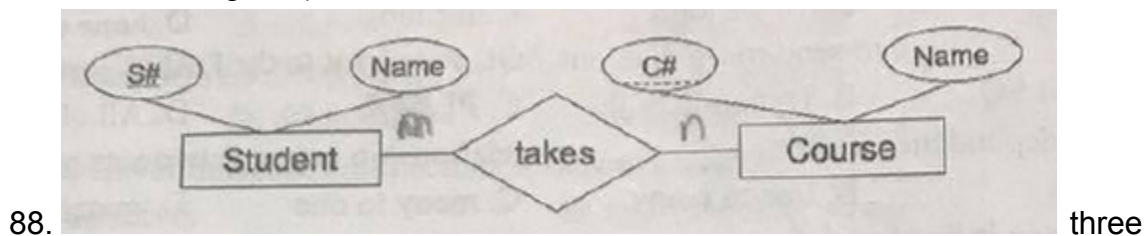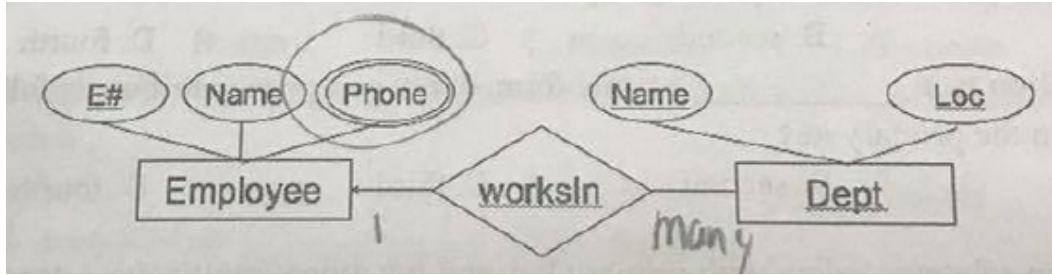
90. three

91. two

Given the following execution timeline of 5 transactions with checkpoint time t1 and system crash time t2 (for questions 92 through 93)

92. Which of the transaction pairs should be redone
   a. T2 and T3
93. Which transaction should be undone
   a. T4

94. Which of the following database system can support high availability, scalability, and load balancing
   a.
95. Which of the following database system does not support ACID properties
   a.

Given the following suppliers and parts database,

Supplier

S#	SNAME	STATUS	CITY
S1	Smith	20	London
S2	Jones	30	Paris
S3	Blake	30	Paris

SP

S#	P#	QTY
S1	P1	300
S1	P2	200
S1	P3	400
S2	P1	300
S2	P2	400

Part

P#	PNAME	COLOR	CITY
P1	Nut	Red	London
P2	Bolt	Green	Paris
P3	Screw	Blue	Oslo

96. Which of the following SQI query can find supplies who supply parts
    a. select sname from Supplier where S# in (select.s# from SP);

97. Which of the following SQL query can find suppliers who supply red parts
    a. select sname from Supplier S, Part P, SP where S.S#=SP.S# and
       SP.P#=P.P# and Color='Red';

98. Which of the following SQL query can find supplier name and part name pairs
    such that the supplier does not supply the part
    a. select sname, pname from Supplier S, Part P where not exists (select *
       from SP where S.S#=SP.S# and SP.P#=P.P#);

99. Which of the following SQL query can find suppliers who do not supply any part
    a. select sname from Supplier where not exists (select * from SP where
       supplier.s# = SP.s#);

100. Which of the following SQL query can find suppliers who supplies all parts
    a. select sname from Supplier S where not exists (select * from Part P where
       not exists (select * from SP where S.S#=SP.S# and SP.P#=P.P#));