Test

Databases

Time: 60 min.

1. Which of the following are used in DBMS files?
(i) Data dictionary (ii) DML
(iii) Query language (iv) Transaction log
(A) (i) and (ii) (B) (ii) and (iii)
(C) (iii) and (iv) (D) (i) and (iv)

2. Which among the following is not a problem of file management system?
(A) Data redundancy
(B) Lack of data independence
(C) Program independence
(D) None of these

3. A transparent DBMS
(A) cannot hide sensitive information from users
(B) keeps its logical structure hidden from users
(C) keeps its physical structure hidden from users
(D) All of the above

4. If the field size is too small, for the longest piece of data to be entered,
(A) database program will be freezed
(B) field will automatically expand
(C) part of the data will be cut off
(D) All of the above

5. Which of the following functional dependencies are satisfied by the instance from the below relation?

A	*B*	*C*
1	7	3
1	9	5
1	11	5
5	3	3

(A) $AB \rightarrow C$ and $C \rightarrow B$
(B) $BC \rightarrow A$ and $B \rightarrow C$
(C) $BC \rightarrow A$ and $A \rightarrow C$
(D) $AC \rightarrow B$ and $B \rightarrow A$

6. Let E_1 and E_2 be two entities in an E/R diagram with single-valued attributes, R_1 and R_2 are two relationships between E_1 and E_2, R_1 is one to many R_2 is many-to-one. R_1 and R_2 do not have any attributes of their own. What is the minimum number of tables required to represent this situation in the relation model?
(A) 2 (B) 3
(C) 4 (D) 5

7. Which of the following is true about DBMS?
(i) Low-level DMLs are record-at-a time
(ii) High-level DMLs are set oriented or set-at-a time
(iii) Query in high-level DML specify which data to retrieve rather than how.
(iv) When used as standalone, DML is called 'host language'
(A) (i) only (B) (i) and (iii)
(C) (i), (ii) and (iii) (D) (iii) and (iv)

8. In which of the following, the structure of data files is stored?
(A) Metadata (B) Database catalog
(C) Database schema (D) Data model

9. A schedule is a collection of
(A) Data models (B) Transactions
(C) Schemas (D) Tables

10. Select from the following which matches the term 'Impedance mismatch problem':
(A) In compatibility of storage and data structure
(B) Mismatch in user authentication
(C) File structure mismatching
(D) None of these

11. Which of the following is not a/an integrity constraint?
(A) Entity integrity
(B) Candidate key constraint
(C) Business rules
(D) None of the above

12. Select from the following which is concerned with 'Query Optimizer':
(A) Extracts DML commands from an application program in a high-level language
(B) Parsing and analyzing interactive query
(C) Rearrangement and reordering of operations and elimination of redundancies
(D) Performance monitoring

13. Which of the following does not belong to database model?
(A) Relational Model (B) Distributed Model
(C) Hierarchical Model (D) Network Model

14. What is the correct sequence of database design process?
(i) Create conceptual schema
(ii) Data model mapping
(iii) Requirement collection and analysis
(iv) Physical design
(A) iii →i →ii → iv
(B) iii → ii → i → iv
(C) i → ii → iii → iv
(D) i → iii → ii → iv

15. Consider the following schema definitions
Employee {Name, SSN, Address, DNo}
Department {DName, DNumber, Manager, SSN}
Which among the following expressions represent the query $\Pi_{\text{name, address}}(\sigma_{\text{Dname = 'Res'} \wedge \text{DNumber = DNo}}$ (Department $\bowtie$ Employee)?

(A) Retrieve the name and address of employees who work for the project no 'Dno'
(B) Retrieve the name and address of all employees who control the 'Res' department.
(C) Retrieve the name and address of all employees who work for the 'Res' department.
(D) None of these

16. Select from the following which closely resembles the concept 'Degree of a relationship':
(A) Number of entities participating in a relation
(B) Number of entity types participating in a relation
(C) Number of strong entity types in a relation
(D) Number of weak entity types in a relation

17. Consider the following statements in a database:
(i) No primary key value can be NULL
(ii) A tuple in one relation which refers to another relation must refer to an existing tuple in that relation
(iii) The value of x determines the value of y in all states of a relation, where x and y are two attributes of the relation Which of the following combinations matches the given statements in order?
(A) Referential integrity, functional dependency, entity integrity.
(B) Functional dependency, entity integrity, referential integrity
(C) Entity integrity, functional dependency, referential integrity.
(D) Entity integrity, referential integrity, functional dependency

18. Consider the following relation schemas:

Works (emp_name, comp_name,salary)

Livesin (emp_name, street, city)

Location (comp_name, city)

Manager (manager_name)

What is returned by the following relational algebra expression

$\pi_{emp\_name}(\sigma_{comp-name=Time \wedge Works.emp\_name=livesin.emp\_name}$

(Works $\bowtie$ Livesin)
(A) Names of all employees who work for TIME
(B) Names of all employees of TIME who lives in the same city
(C) Names of people who live in the same city
(D) None of these

19. Consider the following SQL query:
Select distinct $a_1, a_2, \ldots, a_n$ from $r_1, r_2 \ldots r_m$ where P
This query is equivalent to one of the following relational algebra expression:
(A) $\pi_{a_1, a_2 \ldots a_n}\sigma_P(r_1 \times r_2 \times \cdots \times r_m)$
(B) $\pi_{a_1, a_2 \ldots a_n}\sigma_P(r_1 r_2 \times \cdots \times r_m)$
(C) $\pi_{a_1, a_2 \ldots a_n}\sigma_P(r_1 \cup r_2 \cup \times \ldots \times \cup r_m)$
(D) $\pi_{a_1, a_2 \ldots a_n}\sigma_P(r_1 r_2 \times \ldots \times r_m)$

20. Let $R_1(A, B, C)$ and $R_2(D, E)$ be two relation schemas with primary keys A and D and C be a foreign key in R_1 referring to R_2. Suppose there is no violation of the above referential integrity constraint in the instances r_1 and r_2, which of the following relational algebra expression would necessarily produce an empty relation?
(A) $\pi_D(r_2) - \pi_C(r_1)$
(B) $\pi_C(r_1) - \pi_E(r_2)$
(C) $\pi_D(r_1 \bowtie_{C=D} r_2) - \pi_B(r_1)$
(D) $\pi_C(r_1 \bowtie_{C=E} r_2)$

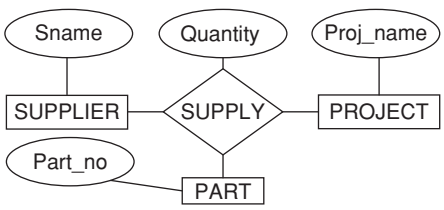
21. Let r be an instance for the schema $R = (A, B, C, D)$. Let $r_1 = \pi_{A,B,C}(r) r_2 = \pi_{A,D}(r)$ and $S = r_1 \bowtie r_2$. Also given that the decomposition of r into r_1 and r_2 is lossy, which of the following is true?
(A) $S \subset r$ (B) $r \cup s = r$
(C) $r \subset s$ (D) $r \bowtie s = s$

22. Which of the following is/are logical database structures?
(A) Network (B) Tree
(C) Chain (D) All of the above

23. A relational database management system manages data in more than one file at a time by using which of the following combinations?
(A) Tables and tuples
(B) Relations and tuples
(C) Tables and Relations
(D) Attributes and tuples

24. Let Emp = (Name, ID, ADDRESS, PHONE, SPOUSE, LIVINGAT) be a relation scheme with following FDs, which one of the following is a key
ADDRESS → Phone
SPOUSE → NAME
SPOUSE, ADDRESS → PHONE
NAME → ID
(A) ADDRESS, PHONE
(B) SPOUSE, ADDRESS
(C) NAME, SPOUSE
(D) NAME, ADDRESS

25. Consider the following E-R diagram



Select the most appropriate statement from the following for the above ER diagram:

(A) Represents a ternary relationship
(B) Represents a binary relationship
(C) Represents a ternary relationship with instances of the form (s, j, p)
(D) Represents 1 – to – many relationships

26. If two relations R_1 and R_2 are such that they are of the same degree and domain of the corresponding fields are also the same, then which one of the following is true about R_1 and R_2?
(A) $R_1 \subset R_2$
(B) $R_1 \cup R_2 = R_2 \cup R_1$
(C) R_1 and R_2 are union compatible
(D) None of these

Common data questions for 27 and 28: Let Employee and Guests be two relations with attributes (id, mobl_no, name, address) and (id, mob–no, comps_working, shifts) Relations respectively {id, mob_no} is the key for both.

27. Which of the following queries are equivalent?
(i) π_{id} (Employee $\bowtie$ Guests)
(ii) π_{id} (Employee) $\bowtie$ π_{id}(Guests)
(iii) π_{id}{(Employee–Guest) $\cap$ Guest–Employee)}
(iv) π_{id} { $\pi_{id, mob}$(Employee) $\cap$ $\pi_{id, mob}$(Guest)}
(A) (ii) and (iii) (B) (ii), (iii) and (iv)
(C) (i), (ii) and (iv) (D) (ii) and (iv) only

28. What does the following relational algebra expression represent?
π_{id} (π_{id, mob_no}(Employee–Guests))
(A) Id of all employees working with the company
(B) Id of all permanent employees
(C) Id of part time employees
(D) None of these

Common data for questions 29 and 30:

29. Let R_1 and R_2 be two relations with attributes a_1 and a_2. P_1 and P_2 be two predicates.
Select the expression from the following which is wrong:
(A) $\sigma_{P_1}(\sigma_{P_1}(R_1)) \rightarrow \sigma_{P_2}(\sigma_{P_2}(R_1))$
(B) $\sigma_{P_1}(\pi_{a_1}(R_1)) \rightarrow \pi(\sigma_{a_1}(\sigma_{P_1}(R_1)))$
(C) $\sigma_{P_1}(R_1 \cup R_2) \rightarrow \sigma_{P_1}(R_1) \cup \sigma_{P_2}(R_2)$
(D) $\pi_{a_2}(\sigma_{a_1}(R_1)) \rightarrow \sigma_{P_1}(\pi_{a_2}(R_1))$

30. Select from the following corresponding TRC for the wrong expression in the above question:
(A) $\{t/\ \exists u, R_1(t[P_1]) = R_2(u[P_1])\}$
(B) $\{t/\ \forall u, R_1(t[P_1]) = R_1(u[P_1])\}$
(C) $\{t/\ \exists u, R_1(t[P_1]) \neq R_2(u([P_1])\}$
(D) $\{t/\square(t \in R_1)\}$

Answer Keys

1. D	**2.** D	**3.** C	**4.** C	**5.** B	**6.** B	**7.** C	**8.** B	**9.** B	**10.** A
11. B	**12.** C	**13.** B	**14.** A	**15.** C	**16.** A	**17.** D	**18.** C	**19.** A	**20.** A
21. C	**22.** D	**23.** C	**24.** B	**25.** C	**26.** C	**27.** C	**28.** B	**29.** A	**30.** B