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Reg. No.....

Name.....

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MAY 2024

Fourth Semester

Vocational Course—Computer Science

DATA BASE MANAGEMENT SYSTEMS

(For B.Sc. Mathematics—Model II)

[2013–2016 Admissions]

Time : Three Hours Maximum Marks : 80

Part A

Answer **all** *questions.*
Each question carries 1 *mark.*

1. What do you mean by program-data independence ?
2. What is DDL ?
3. What is composite attribute ?
4. What is degree of a relation ?
5. What is SQL expression ?
6. What is INFORMATION SCHEMA associated with SQL ?
7. What is atom constructor ?
8. What is encapsulation of operations ?
9. What is a file ?
10. Define the term host language.

(10 × 1 = 10)

Part B

Answer any **eight** *questions.*
Each question carries 2 *marks.*

11. What are online transaction processing application ?
12. Explain the terms entity type and entity set.
13. Draw a basic object-oriented database.
14. Explain the difference between an attribute and a value set.

Turn over

15. With an example, give the structure of a nested querry.

16. Let the following relation schemas be given :

$R = (A, B, C)$
$S = (D, E, F)$

Let the relations $r(R)$ and $s(S)$ be given. Give an expression in SQL that is equivalent to (a) $r \times s$; (b) $\pi_{A,F}\left(\sigma_{C} = D^{(r \times s)}\right)$.

17. When is it preferable to use a dense index rather than a sparse index ?

18. What are the advantages of recursive partitioning ?

19. How does the remapping of bad sectors by disk controllers affect data retrieval rates ?

20. Why a physical OID must contain more information than a pointer to a physical storage location ?

21. What is a transaction log ?

22. What is lost update problem ?

(8 × 2 = 16)

Part C

Answer any **six** *questions.*
Each question carries 4 *marks.*

23. What are the five main functions of a database administrator ?

24. Define the concept of aggregation. Give two examples of where this concept is useful.

25. An E-R diagram can be viewed as a graph. What do the graph is acyclic mean in terms of a structure of an enterprise schema ?

26. Let R = (A, B) and S = (A, C) and let $r(R)$ and $s(S)$ be relations. Write relational algebra expressions equivalent to the following domain-relational Calculus expressions :

(a) $\{\langle a,b,c\rangle \mid \langle a,b\rangle \in r \wedge \langle a,c\rangle \in s\}$.

(b) $\left\{\langle a\rangle \middle| \exists b\left(\langle a,b\rangle \in v\right) \vee \forall c\left(\exists d\left|\left(\langle d,c\rangle \in s\right) \Rightarrow \langle a,c\rangle \in s\right.\right)\right\}$.

27. Let R = (A, B, C) and let r_1 and r_2 both be relations on schema R. Give an expression in SQL that is equivalent to each of the following queries :

(a) $r_1 \cup r_2$.

(b) $r_1 \cap r_2$.

28. What are the advantages of views over tables ?

29. Give an example of a database application in which the reserved space method of representing variable length records is preferable to the pointer method.

30. How does data encryption affect index schemes ?

31. What are the advantages and disadvantages of hash indices relative to B^+-tree indices ?

$(6 \times 4 = 24)$

Part D

Answer any **two** *questions.*
Each question carries 15 *marks.*

32. Construct a E-R diagram for a hospital with a set of patients and a set of doctors. Associate with each patient a log of the various tests and examinations conducted.

33. Write an SQL without using a 'with' clause, to find all branches where the total account deposite is less than the average total account deposite at all branches :

    (a) Using a nested query in the 'from' clauser.

    (b) Using a nested query in a 'having' clause.

34. What are the causes of bucket flow in a hash file organization ? What can be done to reduce the occurrence of bucket overflows ?

35. Explain the three steps in query processing.

$(2 \times 15 = 30)$