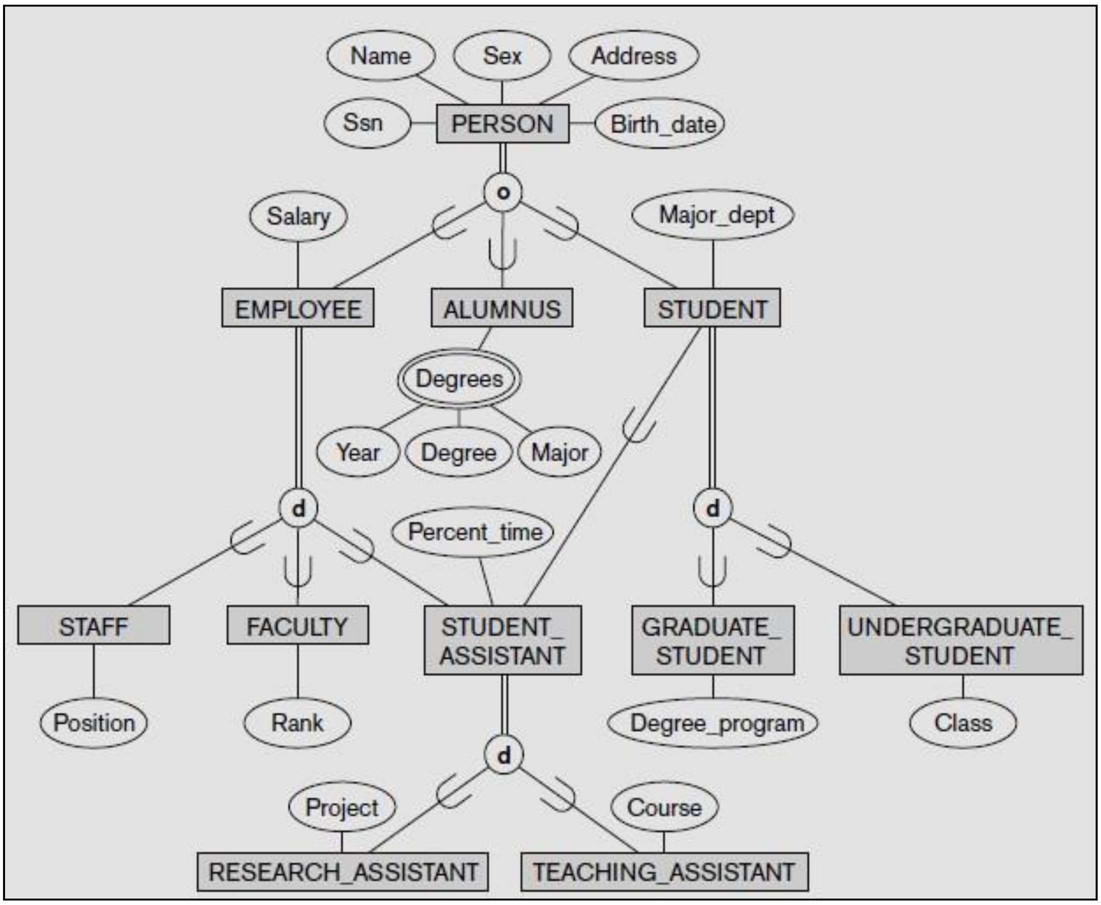
Consider the following EER then answer questions 1 and 5:



1. To satisfy the disjoint constraint in the the specialization {STAFF, FUCULTY, STUDENT ASSISTANT} of EMPLOYEE entity type.
    a) Just NOT NULL constraint
    b) CHECK constraint
    c) Before insert or update Trigger
    d) Foreign key with a NOT NULL constraint

2. To satisfy the total completeness constraint in the specialization {STAFF, FUCULTY, STUDENT ASSISTANT} of EMPLOYEE entity type.

    a) NOT NULL constraint
    b) In the application layer (required field)
    c) Before insert or update Trigger
    d) Both a and b

3. After mapping the above EER into relational DB schema, the STUDENT_ASSISTANT relation will include:

   (A) Two foreign keys referencing the EMPLOYEE and PERSON relations.

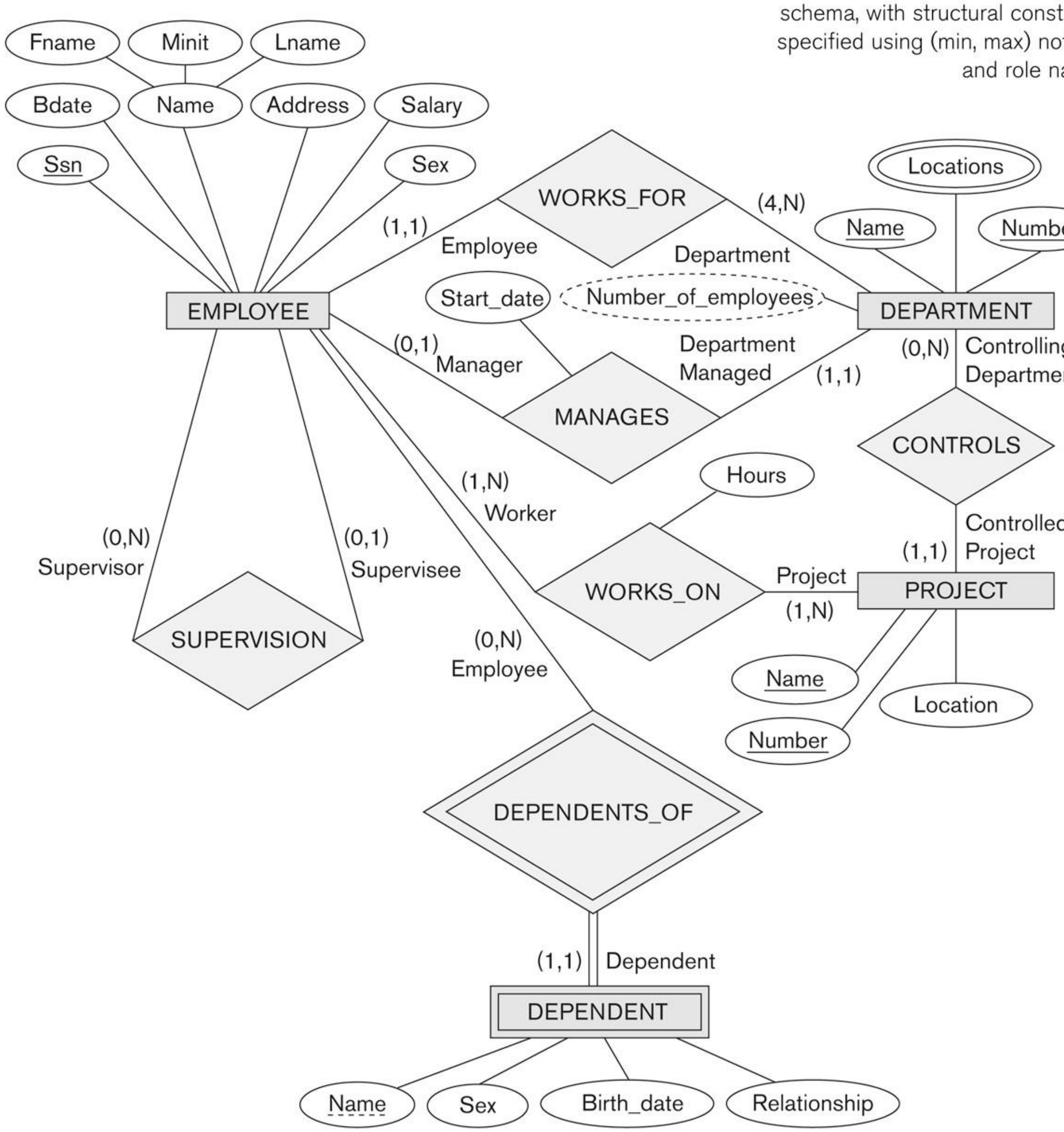
   (B) One foreign key referencing the EMPLOYEE relation.

   (C) One foreign key referencing the STUDENT relation.

   (D) Two foreign keys referencing the EMPLOYEE and STUDENT relations.

Consider the following EER then answer questions 1 and 5:

Figure 3.15
ER diagrams for the company schema, with structural constraints specified using (min, max) notation and role names.



Assuming the structural constraint (4, 35) that is defined on the participation of DEPARTMENT entity type in the relationship WORKS FOR with the EMPLOYEE entity type, answer questions 1 and 3.

4. It means that
   a) Each department must have at least 4 employees and at most 35 employees.
   b) Each department must have more than 4 and less than 35 employees.
   c) Each department must have more than 4 employees.
   d) Each department must have less than 35 employees.

5. Respecting insertion, updating and deletion The MIN part of constraint (5,20) can be satisfied in:
   a) Just Database layer
   b) Just Application layer
   c) Both of database and application layers.
   d) Non of the above

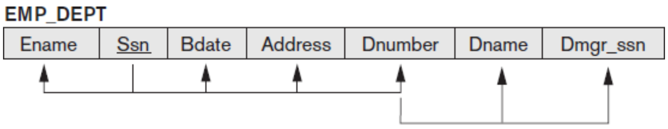
6. The MAX part of constraint (4, 35) can be satisfied in:
   a) Database layer using stored procedures
   b) Database layer using triggers
   c) Database layer using index
   d) Database layer using stored functions

7. To satisfy the participation (1,1) of EMPLOYEE entity type in relationship WORKS FOR:
   a) Just NOT NULL constraint
   b) CHECK constraint
   c) Foreign key with a Unique constraint
   d) Foreign key with a NOT NULL constraint

8. To simplify a complex query about detailed employees data combined and compared with Projects totals we can use:
   a) Views of aggregated data
   b) Stored Functions
   c) Stored procedures
   d) Both a and b

9. To simplify a complex query about detailed employees data combined and compared with Projects and departments totals we can use:
   a) Views of aggregated data
   b) Stored Functions
   c) Stored procedures
   d) Both a and b متكرر

10. In the shown relation scheme emp_dept:



   a) There is insertion anomaly only.
   b) There are insertion and modification anomalies.
   c) There are insertion, modification, and deletion anomalies.
   d) There are no update anomalies.

11. Joining relations on attributes that are not foreign key, primary key combination:
   a) Always produces spurious tuples give valid information.
   b) Always produces spurious tuples give invalid information.
   c) Might produce spurious tuples give valid information.
   d) Might produce spurious tuples give invalid information.

12. A functional dependency X → Y between two sets of attributes X and Y that are subsets of R specifies a constraint on the possible tuples that can form a relation state r of R. The constraint is that: for any two tuples t_1 and t_2 in r that
   a) have $t_1[X] = t_2[X]$, they must also have $t_1[Y] = t_2[Y]$ and vice versa.
   b) have $t_1[X] = t_2[X]$, they must also have $t_1[Y] \neq t_2[Y]$.
   c) have $t_1[X] = t_2[X]$, they must also have $t_1[Y] = t_2[Y]$.
   d) have $t_1[Y] = t_2[Y]$, they must also have $t_1[X] = t_2[X]$.

13. A functional dependency X → Y between two sets of attributes X and Y that are subsets of R specifies a constraint on the possible tuples that can form a relation state r of R. The constraint is that: for any two tuples t_1 and t_2 in r that
   a) have $t_1[X] = t_2[X]$, they must also have $t_1[Y] = t_2[Y]$ and vice versa.
   b) have $t_1[X] = t_2[X]$, they must also have $t_1[Y] \neq t_2[Y]$.
   c) have $t_1[X] = t_2[X]$, they must also have $t_1[Y] = t_2[Y]$ and may vice versa.
   d) have $t_1[Y] = t_2[Y]$, they must also have $t_1[X] = t_2[X]$.

if whenever two tuples t1 and t2 with $t_1[X] = t_2[X]$, they also have $t_1[Y] = t_2[Y]$ and vice versa then:
   a) X is a key attribute and Y is a non-key attribute.
   b) X is a key attribute and Y is a partial key attribute.
   c) Both of X and Y are key attributes.
   d) None of the above.

14. First normal form (1NF):
    a) Avoids update anomalies.
    b) Avoids partial functional dependencies.
    c) Avoids transitive functional dependencies.
    d) Avoid multivalued and composite attributes

15. Second normal form (2NF):
    a) Avoids update anomalies.
    b) Avoids partial functional dependencies.
    c) Avoids transitive functional dependencies.
    d) All of the above.

16. Third normal form (3NF):
    a) It is not necessarily in 2NF.
    b) It must be in 1NF and 2NF.
    c) Avoids transitive functional dependencies.
    d) BOTH b and c.

17. Third normal form (3NF):
    a) Avoids composite attributes
    b) Avoids partial functional dependencies.
    c) Avoids transitive functional dependencies.
    d) All of the above.

18. Which one of the following is true about primary index :
    a) It is dense index
    b) It is defined on anon-key attribute
    c) It has number of rows equal the number of data file blocks.
    d) None of the above.

19. Which one of the following is true about primary index :
    a) It is dense index
    b) It is defined on anon-key attribute
    c) It is a space index.
    d) None of the above.

20. Which one of the following is true about primary index :
    a) It is dense index
    b) It is defined on a key attribute that the data file is physically ordered on it
    c) It can be defined on anon-key attribute
    d) None of the above.

21. Which one of the following is true about clustering index :
    a) It is dense index
    b) It is defined on anon-key attribute that the data file is physically ordered on it
    c) It has number of rows equal the number of data file blocks.
    d) None of the above.

22. Which one of the following is true about clustering index :
    a) It is a dense index
    b) It is defined on a key attribute that the data file is physically ordered on it
    c) It has number of its rows equal the number of distinct index field values
    d) All of the above.

23. Which one of the following is true about clustering index :
    a) It is a dense index
    b) It is defined on a key attribute that the data file is physically ordered on it
    c) It is a space index
    d) None of the above.

24. Every time attribute A appears, it is matched with the same value of attribute B, but not the same value of attribute C. Therefore, it is true that:
    a. A → B.
    b. A → C.
    c. A → (B,C)
    d. (B,C) → A.

25. The different classes of relations created by the technique for preventing modification anomalies are called:
    a. normal forms.
    b. referential integrity constraints.
    c. functional dependencies.
    d. None of the above is correct.

26. Which one of the following is true about secondary index :
    a) It is a dense index if it defined on a non-key attribute
    b) It can be defined on a key or non-key attribute
    c) It is a space index if it defined on a key attribute
    d) None of the above.

For questions 27 to 29, consider the relation R = {A, B, C, D, E, F, G, H, I, J} and the set of functional dependencies F = { {A}→{D, E}, {B}→{F}, {F}→{G,H}, {D}→{I, J}, {A, B}→{C} }. and the decomposition D = {R1, R2, R3} for the relation schema R in which

R1 = {A, B, C, D, E}, R2 = {B, F, G, H}, R3 = {D, I, J}

27. Decomposition D, with respect to F,

a) has the dependency preservation and lossless join properties.
b) has the dependency preservation but not lossless join properties.
c) has the lossless join but not dependency preservation properties.
d) does not have lossless join nor dependency preservation properties.

28. R1 in decomposition D is in

a) 1NF
b) 2NF
c) 3NF
d) BCNF

29. R2 in decomposition D is in

a) 1NF
b) 2NF
c) 3NF
d) BCNF

30. Files with variable length records might be produced by

a) Storing records with optional fields.
b) Storing records with variable-length fields.
c) Storing records of different types.
d) All the above.

31. A functional dependency between two or more non-key attributes is called

a) Transitive dependency
b) Partial transitive dependency
c) Functional dependency
d) Partial functional dependency

32. What is ACID properties of Transactions?

a. Atomicity, Consistency, Isolation, Database
b. Atomicity, Consistency, Isolation, Durability
c. Atomicity, Consistency, Inconsistent, Durability
d. Automatically, Concurrency, Isolation, Durability

33. A transaction completes its execution is said to be

a. Saved
b. Loaded
c. Rolled
d. Committed

For questions 29 to 36, consider a file for employees has 20,000 of unspanned fixed length records of size 500 bytes stored on a disk with block size 1024 bytes. The field emp_no is the primary key. An index is constructed on another key field emp_civil_id with 10 bytes length with a block pointer 5 bytes.

34. How many blocks are needed to store the file?

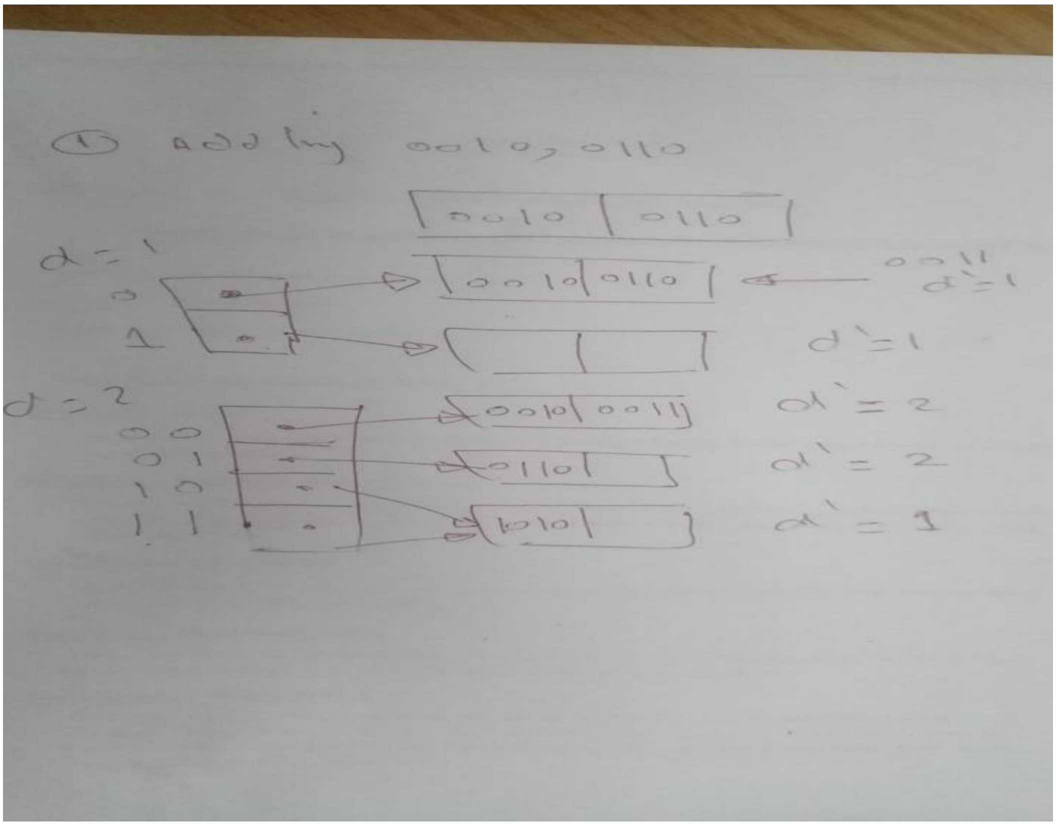
a) 9,766 blocks with blocking factor 2.048.
b) 6,667 blocks with blocking factor 3.
c) 10,000 blocks with blocking factor 2.
d) 1,000 blocks with blocking factor 20.

35. If the file is ordered on emp_id, it can be searched for a specific emp_id using

a) Binary search with average 14 block reads.
b) Binary search with average 13 block reads.
c) Sequential search with average 5,000 block reads.
d) Sequential search with average 500 block reads.

36. If the file is hashed on emp_no as a hash key and the first records whose hash leading binary digits: 0010, 0110, 0011 and 1010 are loaded into the file in the given order. Suppose the bucket size is one block, using the extendible hashing:

a) There are 3 buckets with local depths 2, 2, 2 and global depth 2.
b) There are 2 buckets with local depths 2, 2 and global depth 2.
c) There are 3 buckets with local depths 2, 2, 1 and global depth 2.
d) There are 3 buckets with local depths 2, 1, 1 and global depth 2.



37. If dynamic hashing is used, after loading the above records, the directory has:

الدكتور محلوش ف الفيديو

a) 3 leaf nodes and 2 internal nodes.
b) 3 leaf nodes and 3 internal nodes.
c) 2 leaf nodes and 3 internal nodes.
d) 2 leaf nodes and 2 internal nodes.

38. The difference between an index and the directory of extendible/dynamic hashing is:

a) Nothing.
b) An index is much larger than the directory.

c) Searching in a directory is based on the hash value of the field while searching in an index is based on the field value itself.

d) b) and c)

39. for the employee file described above, suppose that the index emp_civil_id is a B+ tree index of order p=3; after adding 4 records with emp_civil_id 5, 25, 4, and 29 with that order, the final tree will have:

a) 1 internal node with value 5 and 2 leaf nodes.

b) 1 internal node with value 25 and 2 leaf nodes.

c) 1 internal node with value 5 and 3 leaf nodes.

d) 1 internal node with value 25 and 3 leaf nodes.

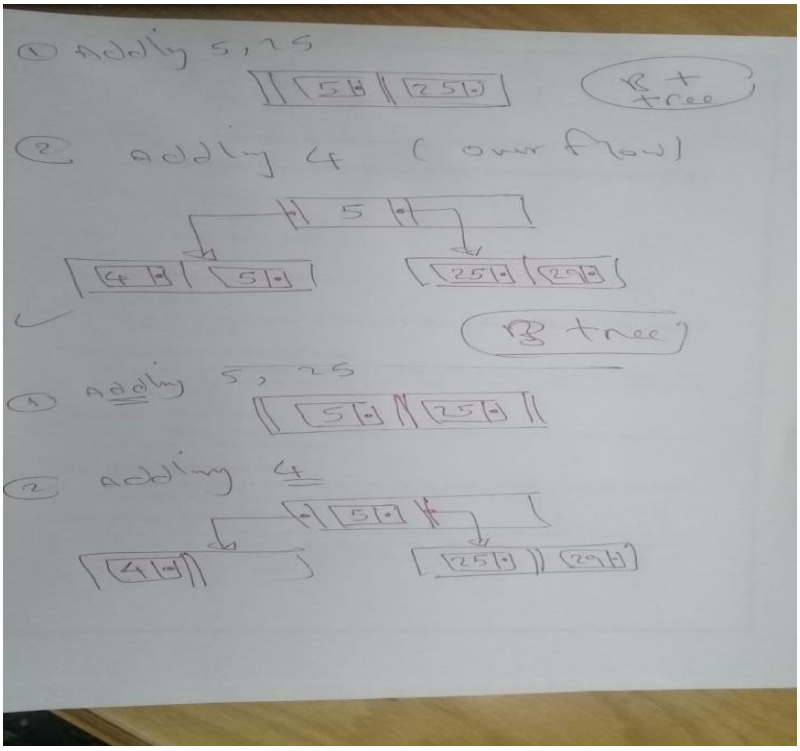
40. for the employee file described above, suppose that the index emp_civil_id is a B tree index of order p=3; after adding 4 records with emp_civil_id 5, 25, 4, and 29 with that order, the final tree will have:

a) 1 internal node with value 5 and 2 leaf nodes (4,5) , (25,29).

b) 1 internal node with value 25 and 2 leaf nodes (4,5) , (25,29).

c) 1 internal node with value 5 and 2 leaf nodes (4,) , (25, 29).

d) 1 internal node with value 25 and 2 leaf nodes (4,) , (25,29).



41. Suppose the employees file is ordered on the primary key, if the index on emp_civil_id is a single-level one, it is:

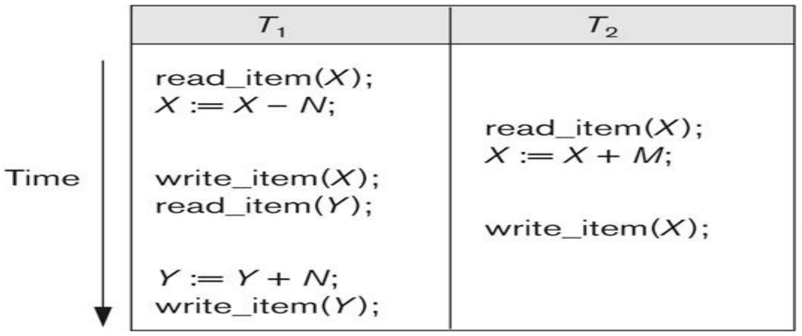
a) A secondary dense index using block anchors.

b) A primary dense index using block anchors.

c) A secondary dense index using record pointers.

d) A secondary non-dens index using record pointers.

42. Consider the following interleaved transactions and choose the problem that can happen:



T_1	T_2
read_item(X); $X := X - N$;	
	read_item(X); $X := X + M$;

write_item(X);
read_item(Y);	

	write_item(X);
$Y := Y + N$; write_item(Y);	

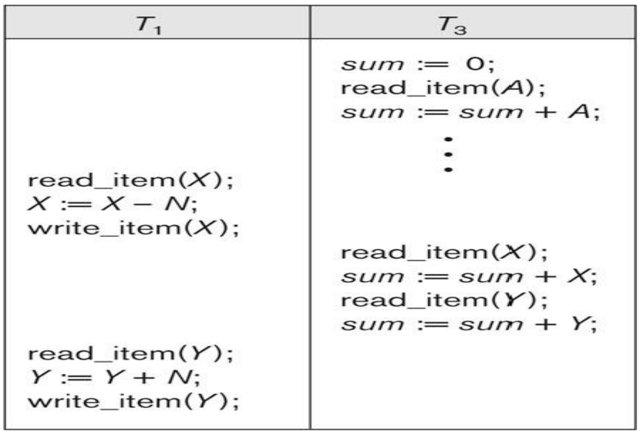
a) Dirty read problem.

b) Wrong summary problem.

c) Lost update problem

d) Update anomalies problem.

43. Consider the following interleaved transactions and choose the problem that can happen:



T_1	T_3

	sum := 0;
	read_item(A);
	sum := sum + A;
	⋮

read_item(X);
X := X − N;
write_item(X);	

	read_item(X);
	sum := sum + X;
	read_item(Y);
	sum := sum + Y;

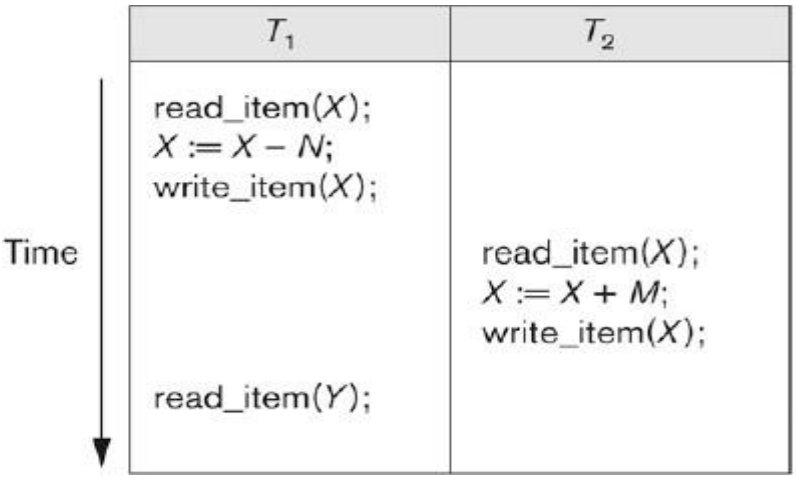
read_item(Y);
Y := Y + N;
write_item(Y);	

a)
b) Dirty read problem.
c) Wrong summary problem.
d) Lost update problem
e) Update anomalies problem.

44. For some relations, changing the data can have undesirable consequences called:

a. referential integrity constraints
b. modification anomalies
c. normal forms
d. transitive dependencies

45. Consider the following interleaved transactions and choose the problem that can happen if T1 finaly makes a rollback:



T_1	T_2

read_item(X);
X := X − N;
write_item(X);	

	read_item(X);
	X := X + M;
	write_item(X);

read_item(Y);	

a) Dirty read problem.
b) Wrong summary problem.
c) Lost update problem

d) Update anomalies problem.

46. If every non-key attribute is functionally dependent on the primary key, the relation will be in
    a) First Normal Form
    b) Second Normal Form
    c) Third Normal Form
    d) Fourth Formal Form

47. In DBMS FD stands for________
    a) Facilitate data
    b) Functional data
    c) Facilitate dependency
    d) Functional dependency

48. A relation that has no partial dependencies is in which normal form
    a) First
    b) Second
    c) Third
    d) BCNF

49. When the values in one or more attributes being used as a foreign key must exist in another set of one or more attributes in another table, we have created a(n:(
    a. transitive dependency.
    b. insertion anomaly.
    c. referential integrity constraint.
    d. normal form.

50. A functional dependency is a relationship between or among:
    a. tables
    b. rows
    c. relations
    d. attributes