Seat
No.

T.Y. B.Tech. (Computer Science and Engineering) (CBCS) (Part-II) (Semester - VI) Examination, March - 2023
DATABASE ENGINEERING
Sub. Code : 81548

Day and Date : Sunday, 02 - 07 - 2023　　　　　　　**Total Marks : 70**
**Time : 10.30 a.m. to 01.00 p.m.**

Instructions :　　1)　**All Questions are compulsory.**
　　　　　　　　　2)　**Assume suitable data wherever necessary.**
　　　　　　　　　3)　**Figures to the right indicate full marks.**

Q1) Solve MCQs.　　　　　　　　　　　　　　　　　　　　**[2 Each]**

　　i)　Which of the following is a fundamental operation in relational algebra?

　　　　(a)　Set intersection

　　　　(b)　Natural join

　　　　(c)　Assignment

　　　　(d)　None of the mentioned

　　ii)　Which fundamental dependency types is/are not present in the following dependencies?

　　　　Empno -> EName, Salary, Deptno, DName

　　　　DeptNo -> DName

　　　　EmpNo. -> DName

　　　　(a)　Full functional dependency

　　　　(b)　Partial functional dependency

　　　　(c)　Transitive functional dependency

　　　　(d)　Both (b) and (c)

iii) Consider the following ERD
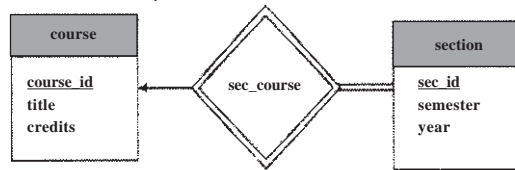
Which of the following is the correct reduction of the given ERD.

(a) course(course id, title, credits), section(sec id, semester, year)

(b) course (course id, title, credits), section(course id, sec id, semester, year)

(c) course(course id, title, credits), section (course id, sec_id, semester, year), sec_course(course id, sec id)

(d) course (course id, title, credits), section (course id, sec_id, semester, year), sec_course(course id, sec id, semester, year)

iv) Aggregate functions are functions that take a _____ as input and return a single value.

(a) Collection of values

(b) Single value

(c) Aggregate value

(d) Both (a) and (b)

v) The file organization that provides very fast access to any arbitrary record of a file is

(a) Ordered file

(b) Unordered file

(c) Hashed file

(d) B+ - tree

vi) A transaction is in _____ state after the final statement has been executed

(a) Active

(b) Partially Committed

(c) Committed

(d) None of the above

vii) In shadow paging, which of the page tables contains the modifications done by the active transaction?

(a) Current Page Table

(b) Shadow Page Table

(c) Both

(d) None

Q2) Solve any two of the following. **[7 Each]**

    a)   Define and differentiate between Super Key, Candidate Key and Primary Key. Give appropriate example.

    b)   Consider the following DB Schema and respective FD's for each relation in schema,

        Client (clientNo, cName)

            fdl: clientNo $\rightarrow$cName

        PropertyOwner(propertyNo, pAddress, rent, ownerNo, oName)

            fd1: propertyNo $\rightarrow$ pAddress, rent, ownerNo. oName

            fd2: ownerNo $\rightarrow$ oName

        Rental (clientNo, property No, rentStart, rentFinish)

            fd1: clientNo, propertyNo $\rightarrow$ rentStart, rentFinish

            fd2: clientNo, rentStart $\rightarrow$ propertyNo, rentFinish

            fd3: propertyNo, rentStart $\rightarrow$ clientNo, rentFinish

        Predict the highest normal form of the given schema. Normalize the above schema till BCNF.

    c)   Consider the following Database design

        Customer (<u>cid</u>, custname, custstreet, custcity)

        Account (<u>accno</u>, branchname, balance)

        Loan (<u>loanno</u>, branchname, amount)

        Borrower (<u>cid</u>, loanno)

        Branch (<u>branchname</u>, branchcity, asset)

        Depositor (<u>cid</u>, accno)

        Solve the following queries in SQL.

        i)   Display the name of customers who have both account and loan at the bank. **[2]**

        ii)   Update amount of loan to 10000 where loan number is "L-101".**[1]**

        iii)   Find the accno. custname and balance for customers who live in city that has "pur" as substring. **[2]**

        iv)   Find all customers who an account but no loan at bank. **[2]**

Q3) Solve any two of the following. **[7 Each]**
  a) List the types of database languages. Explain each type with appropriate example.
  b) Explain the rules for reduction of following notation in ERD, with appropriate examples.
    i) Weak Entity test
    ii) Multivalued attribute in Strong Entity test
    iii) Many to One relationship set.
  c) List and explain the different DML statements in SQL.

Q4) Solve any two of the following. **[7 Each]**
  a) Explain how Variable Length records are Represented in file.
  b)

T_3	T_4
lock-x (B)	
read (B)	
B := B - 50	
write (B)	
	lock-s (A)
	read (A)
	lock-s (B)
lock-x (A)	

Consider the above partial schedule. Check if the schedule is following the rules of 2PL. Also predict the state of execution of the given schedule.
  c) Explain Shadow paging in detail.

Q5) Solve any two of the following. **[7 Each]**
  a) Define the terms Dense Index and Sparse Index. Differentiate between them on basis of the Evaluation Criteria for indices.
  b) What is transaction? Explain its ACID properties of transaction.
  c) -

(a)	(b)	(c)
<T_0 start>	<T_0 start>	<T_0 start>
<T_0, A, 1000, 950>	<T_0, A, 1000, 950>	<T_0, A, 1000, 950>
<T_0, B, 2000, 2050>	<T_0, B, 2000, 2050>	<T_0, B, 2000, 2050>
	<T_0 commit>	<T_0 commit>
	<T_1 start>	<T_1 start>
	<T_1, C, 700, 600>	<T_1, C, 700, 600>
		<T_1 commit>

Elaborate the Recovery actions given the log as it appears at three instances of time.

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