Total No. of printed pages = 4

MCA 202104

Roll No. of candidate | | | | | | | | | | |

19/4/21 2021

M.C.A. 1st Semester End-Term Examination

ADVANCED DATABASE SYSTEMS

(New Regulation w.e.f. 2020-2021)

(New Syllabus w.e.f. 2020-2021)

Full Marks – 70 Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer question No. 1 compulsory. Answer any *four* from the rest.

1. Following by choosing the correct option (Each question carries 1 marks) $(10 \times 1 = 10)$

(i) A database is

(a) A Collection of interrelated records

(b) A Collection of relations

(c) Collection of data and metadata.

(d) All the above

(ii) ER diagram is a

(a) Conceptual data model

(b) Physical data model

(c) Representational data model

(d) All the above

(iii) Find the False statement from the following

(a) A Multivalued attribute takes the values from same domain

(b) Composite attributes values are always from same domain

(c) Derived attributes is calculated from stored attributes

(d) Entity set is sometimes called Extension

[Turn over

(iv) Suppose WorksFor is a relationship type with two participating entity types Employee and company. Say, it represents the full-time job of the employees. What is the appropriate cardinality ratio for "Employee : Company"?

(a) 1:1 (b) 1:M

(c) M:1 (d) M:N

(v) Consider two entity sets A = $\{a,b,c,d\}$ and B = $\{w,x,y\ z)$ and they participate in a relationship R. The instances of R are given as: $\{(a,w),(a,x),(c,y),(d,z),(c,z)\}$. Which one of the following is correct:

(a) Cardinality ratio of A:B is one-to-many; A participates partially; B participates completely

(b) Cardinality ratio of A:B is many-to-one; A participates completely; B participates completely

(c) Cardinality ratio of A:B is one-to-many; A participates completely; B participates partially

(d) Cardinality ratio of A:B is many-to-many; A participates partially; B participates partially

(vi) In a relation R(ABC) if, A $\rightarrow$ B and B $\rightarrow$ C then the which statement is true and most appropriate

(a) Relation R(ABC) is In 1NF

(b) Relation R(ABC) is in 1NF and 2NF

(c) Relation R(ABC) is in INF, 2NF and 3NF.

(d) Relation R(ABC) is in INF, 2NF and 3NF. BCNF.

(vii) Partial dependency may create

(a) Insertion anomaly

(b) Deletion anomaly

(c) Updation anomaly

(d) All the above

(viii) Anchor record means

(a) First record in a block

(b) First record in a file

(c) Last record in a block

(d) None of the above

(ix) Skew never occurs in

(a) Round robin partitioning (b) Range partitioning

(c) Hash partitioning (d) All the above options

(x) Which statement is false?

(a) Single loop join is costlier than single loop Join

(b) Nested loop join is costlier than single loop Join

(c) Sort merge join needs always sorted data in tie joined relations

(d) None of above is false

2. A recruitment agency invites application from different job applicants. The information of the applicants includes appno, name, qualification, experience, passing year and percentage of marks, phone number and email. The job information includes like jobcode, jobname, salary, qualification exp in years, last apply date etc. A an applicant apply for many jobs and a job also has many applicants.

(a) Draw an ER diagram assuming the entities, attributes and their relationships with proper justification on the statement above. (assume any data). (8)

(b) Convert the ER diagram into equivalent relational schema. (7)

3. Given the following relational schema:

EMP (empno, ename, joindate, salaray, commission, deptno)

DEPT (dno, dname, location, mgrname)

PROJECT(pno, pname, Plocation)

EMPPROJ(empno, pno, Joindate, leavingdate)

(a) Write relational algebra expression to find out the Project number (i.e. Pno) where no employee is assigned yet. (3)

(b) Write an SQL statement that finds ename and their departments managers names. (3)

(c) Write an SQL statement that finds deptno and total salary paid the each – department. (3)

(d) Write relational algebra expression to find the ename and salary who are working in Plocation "KOLKATA". (3)

(e) Find the pair of relations where Natural join is possible. (3)

4. (a) State Armstrong's Inference Rules. (3)

(b) Given a relation R(ABCDEFG) with the following set of FD's FD: $\{A \rightarrow BC, C \rightarrow D, E \rightarrow F, AE \rightarrow G\}$. Represent the relation in 3NF? (3)

(c) What is Multivalued dependency? Explain with the help of an example. (3)

(d) What do you mean by intraquery and interquery parallelism? (3)

(e) Write any method which can solve the problem of skew in parallel databases? (3)

5. (a) A relation R(ABCDE) has the FD's $\{A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A\}$

(i) decomposed into R1(ABC), R2(ADE). Find the decomposition is lossless or not. (3)

(ii) decomposed into R1(ABC), R2(ADE), Find the decomposition is dependency preserving or not. (3)

(b) What is the difference between binary lock and shared/exclusive locks in concurrency control technique? (3)

(c) Discuss any procedure to detect deadlock situation in distributed databases? (3)

(d) What do you mean by AFIM and BFIM in database recovery techniques? How these are maintained? (3)

6. (a) Given a relation R(PQRSTUV) with FD : {PQ→RS, Q→TUV, U→V Find the candidate keys. (4)

(b) Discuss the Symmetric parallel join with its disadvantages. (4)

(c) What do you mean by a checkpoint? How it helps in recovery control techniques? (4)

(d) What do you mean by heuristic query optimisation explain? (3)

7. Write short notes on (any *three*) (3 × 5 = 15)

(a) Semi join technique.

(b) Left outer join Vs Right outer join.

(c) Timestamp based concurrency control

(d) Data independence.