	ii.	Define 3NF. For the following, indicate its normal form. If the relation is not in third normal form, decompose it into 3NF. Functional dependencies (other than those implied by primary key) are also shown. CLASS (Course_No, Section_No, Room, Capacity); Room → Capacity	**6**
OR	iii.	Check the given relation is in 3NF or not. R(A,B,C,D,E) {A --> BC , A --> C , D --> C , D --> E} If it is not in 3NF then decompose relation in 3NF.	**6**
Q.5	i.	What is Transaction? List and Explain ACID Property of Transaction with examples.	**4**
	ii.	Define Schedule. Explain following terms with suitable examples: (a) Conflict Serializable Schedule (b) Recoverable schedule	**6**
OR	iii.	Define Lock. Explain Two Phase Locking Protocol with suitable examples.	**6**

Q.6		Attempt any two:	
	i.	Briefly explain importance of index file. Explain B+ tree index file with example.	**5**
	ii.	Define Data warehouse, Mention its characteristics.	**5**
	iii.	Explain various Query Optimization techniques with examples.	**5**

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Total No. of Questions: 6 *Total No. of Printed Pages:4*

Enrollment No.....

Faculty of Engineering

End Sem (Even) Examination May-2018

CS3CO06 Database Management System

Programme: B.Tech. Branch/Specialisation: CS

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1	i.	For each attribute of a relation, there is a set of permitted values, called the _____ of that attribute. (a) Domain (b) Relation (c) Set (d) Schema	**1**
	ii.	Given the basic ER and relational models, which of the following is INCORRECT? (a) An attribute of an entity can have more than one value (b) An attribute of an entity can be composite (c) In a row of a relational table, an attribute can have more than one value (d) In a row of a relational table, an attribute can have exactly one value or a NULL value	**1**
	iii.	_____ is an attribute, or set of attributes, that uniquely identifies a tuple within a relation (a) Foreign key (b) Superkey (c) Matching key (d) None of these	**1**
	iv.	With regard to the expressive power of the formal relational query languages, which of the following statements is true? (a) Relational algebra is more powerful than Tuple relational calculus (b) Relational algebra has the same power as Tuple relational calculus (c) Relational algebra has the same power as safe Tuple relational calculus (d) None of these	**1**

P.T.O.

v. Consider Relation R(A,B,C,D,E) with Functional dependency set **1**
{ A ---> BC, D ---> C, D ---> E }
Which of the following is candidate key for relation R.?
(a) AB (b) AD (c) DC (d) DE

vi. If R(A,B,C,D,E,F) is relation and {ABD} is candidate key of **1**
relation R then the number of prime attribute for relation R is
(a) 2 (b) 3 (c) 0 (d) 4

vii. Which of the following statment is true? **1**
(a) Every Cascadless Schedule is recoverable schedule.
(b) Every Recoverable schedule is cascadless.
(c) Every view serializable schedule is conflict serializable.
(d) None of these

viii. Which of the following scenarios may lead to an irrecoverable error **1**
in a database system?
(a) A transaction writes a data item after it is read by an uncommitted transaction
(b) A transaction reads a data item after it is read by an uncommitted transaction
(c) A transaction reads a data item after it is written by a committed transaction
(d) A transaction reads a data item after it is written by an uncommitted transaction

ix. Consider a B+-tree in which the maximum number of keys in a **1**
node is 5. What is the minimum number of keys in any non-root node?
(a) 1 (b) 2 (c) 3 (d) 4

x. Indexing is automatically perform on _____. **1**
(a) Primary key (b) Composite key
(c) Both (a) and (b) (d) None of these

Q.2 i. Define DBMS. **2**

ii. (a) Draw and explain three level architecture of DBMS. **8**
(b) Describe how the following components of an E-R diagram are transformed to relations: (give suitable examples)
I. Relationship (1: N) II. Relationship (M:N)

OR iii. In college database, we have following: **8**
(a) A college contains many departments
(b) Each department can offer any number of courses
(c) Many instructors can work in a department
(d) An instructor can work only in one department
(e) For each department there is a Head
(f) An instructor can be head of only one department
(g) Each instructor can take any number of courses
(h) A course can be taken by only one instructor
(i) A student can enroll for any number of courses
(j) Each course can have any number of students
Draw an ER diagram for the data set described above. Make sure to indicate all cardinality constraints specified above. The ER diagram should not contain redundant entity sets, relationships, or attributes. Also, use relationships whenever appropriate.

Q.3 i. Define tuple relational calculus and domain relational calculus. **3**

ii. What do you mean by Relational Algebra? Explain any five Relational Algebra operations with example. **7**

OR iii. Write SQL statements (Query) for following tables: **7**
Student(rollno, stuname, age, city, branchcode)
Branch(branchcode, branchname)
(a) Retrieve students details whose branchcode is 50.
(b) Find an average age of all students.
(c) Find the name of student whose name start with A and end with H
(d) Change age of student to 20 whose rollno is 1.
(e) Delete student details whose age is 21.
(f) Retrieve branch information in descending order.
(g) Find the name of student whose branchname is computer science.

Q.4 i. Define following terms: well-formed relation, Functional dependency, Normalization. **4**

Marking Scheme
CS3CO06 Database Management System

Q.1 i. For each attribute of a relation, there is a set of permitted values, called the _____ of that attribute. **1**
(a) Domain

ii. Given the basic ER and relational models, which of the following is INCORRECT? **1**
(c) In a row of a relational table, an attribute can have more than one value

iii. _____ is an attribute, or set of attributes, that uniquely identifies a tuple within a relation **1**
(b) Superkey

iv. With regard to the expressive power of the formal relational query languages, which of the following statements is true? **1**
(c) Relational algebra has the same power as safe Tuple relational calculus

v. Consider Relation R(A,B,C,D,E) with Functional dependency set { A ---> BC, D ---> C, D ---> E } Which of the following is candidate key for relation R.? **1**
(b) AD

vi. If R(A,B,C,D,E,F) is relation and {ABD} is candidate key of relation R then the number of prime attribute for relation R is **1**
(b) 3

vii. Which of the following statment is true? **1**
(a) Every Cascadless Schedule is recoverable schedule.

viii. Which of the following scenarios may lead to an irrecoverable error in a database system? **1**
(d) A transaction reads a data item after it is written by an uncommitted transaction

ix. Consider a B+-tree in which the maximum number of keys in a node is 5. What is the minimum number of keys in any non-root node? **1**
(b) 2

x. Indexing is automatically perform on _____. **1**
(a) Primary key

Q.2 i. Definition DBMS. **2**

ii. (a) Three level architecture of DBMS. 2 marks **8**
Explanation 2 marks
(b) Describe how the following components of an E-R diagram are transformed to relations: (give suitable examples)
I. Relationship (1: N) 2 marks
II. Relationship (M:N) 2 marks

OR iii. In college database, we have following: **8**
(a) A college contains many departments and Each department can offer any number of courses 1 mark
(c) Many instructors can work in a department 1 mark
(d) An instructor can work only in one department 1 mark
(e) For each department there is a Head 1 mark
(f) An instructor can be head of only one department 1 mark
(g) Each instructor can take any number of courses 1 mark
(h) A course can be taken by only one instructor 1 mark
(i) A student can enroll for any number of courses and each course can have any number of students 1 mark

Q.3 i. Three differences between tuple relational calculus and domain relational calculus 1 mark each (1 mark *3) **3**

ii. Relational Algebra **2 marks** **7**
Explanation of any five Relational Algebra operation with example**1 marks each (1 mark * 5)** **5 marks**

OR iii. Write SQL statements (Query) **7**
1 mark for each statement (1 mark *7)

Q.4 i. Well-formed relation 1 mark **4**
Functional dependency 1 mark
Normalization. 2 mark

ii. Explanation of 3rd Normal form(3NF) **1 mark** **6**
For checking 3NF 2 marks
For decompose 3 marks

OR iii. Check the given relation is in 3NF or not. 2 marks **6**
R(A,B,C,D,E)

		{A --> BC , A --> C , D --> C , D --> E}		
		If it is not in 3NF then decompose relation in 3NF.	4 marks	
Q.5	i.	Transaction	1 mark	**4**
		Transaction state diagram	3 marks	
	ii.	Definition Schedule	1 mark	**6**
		(a) Conflict Serializable Schedule with examples	2.5 marks	
		(b) Recoverable schedule with examples	2.5 marks	
OR	iii.	Definition Lock	2 marks	**6**
		Two Phase Locking Protocol	2 marks	
		Examples.	2 marks	
Q.6		Attempt any two:		
	i.	Importance of index file	2 marks	**5**
		B+ tree index file	2 marks	
		Example.	1 mark	
	ii.	Data warehouse	2 marks	**5**
		Its characteristics	3 marks	
	iii.	Any five Query Optimization techniques with example		**5**
		1 mark each	(1 mark *5)	