

KONGU ENGINEERING COLLEGE, PERUNDURAI, ERODE- 638 060
EVEN SEMESTER 2022 - 23
CONTINUOUS ASSESSMENT TEST II – April 2022
Regulation 2020

Roll. No.

Programme : B.Tech	Date :
Branch : IT	Time :
Semester : IV	
Code : 20ITT42	Duration : 1 ½ hrs
Subject : Database Management Systems	Maximum Marks : 50

PART - A (10 × 2 = 20 Marks)

ANSWER ALL THE QUESTIONS

- Differentiate between Strong entity and Weak entity sets.
An entity set that does not have sufficient attributes to form a primary key is termed a weak entity set. An entity set that has a primary key is termed a strong entity set. [CO2,K2]
- List the different types of attributes.
1.Simple and Single valued attribute
2. Composite attribute
3. Derived and Null attribute [CO2,K1]
- Check the functional dependencies of a relation are satisfied or not? Consider a relation R (A, B, C, D) with the following instance. [CO3,K3]

A	B	C	D
1	1	2	3
1	2	2	3
1	3	2	3
2	4	5	6
5	6	7	8

Which of the following functional dependencies are satisfied or not satisfied by this relation?

(a) $BD \rightarrow AC$ - Satisfied
(b) $A \rightarrow CD$ - Satisfied
(c) $AD \rightarrow BC$ - Not Satisfied
(d) $D \rightarrow B$ - Not Satisfied
- Identify the different types of anomaly that can arise in the given table with sample records. Consider the relation Treatment with the schema *Treatment* (*doctorID*, *doctorName*, *docaddress*, *patientID*, *diagnosis*) and functional dependencies;
FDs: {(doctorID → doctorName), ((doctorID, patientID) → diagnosis)} [CO3,K3]

<u>doctorID</u>	<i>doctorName</i>	<i>docaddress</i>	<u>patientID</u>	<i>diagnosis</i>
D001	Mohan	Salem	PAT123	Fever
D002	Vijay	Erode	PAT110	Alergy
D003	Jenifer	Chennai	PAT112	Eye
D002	Vijay	Erode	PAT121	Cold
D001	Mohan	Salem	PAT145	Pain

The candidate key is (doctorID, patientID)

 - Insertion anomaly because not able to enter doctorID without patientID
 - Deletion anomaly because to delete the patient details, the corresponding doctor details also deleted.
 - Updating anomaly in docaddress attribute.

5.	Find the canonical cover for the following relation schema R and set of Functional Dependencies R(A,B,C,D,E), F = {AC → E, C → D, D → A}. {C → DE, D → A}.	[CO3,K3]
6.	Define normalization. The step by step process of decomposing a complex relation into small tables.	[CO3,K2]
7.	Suppose that we decompose the schema R = (A, B, C, D, E) into (A, B, C) and (A, D, E). Show that this decomposition is a lossless-join decomposition if the following set F of functional dependencies holds: {A → BC, CD → E, B → D, E → A}. (A, B, C) ∩ (A, D, E) → A ; It retrieve the table (A,B,C) using the FD A → BC .So, this decomposition is a lossless-join decomposition.	[CO3,K3]
8.	Make a statement about how to change from non-3NF to 3NF. Eliminate non key to key attribute FD , then it is changed from non-3NF to 3NF.	[CO3,K1]
9.	Relation R has eight attributes ABCDEFGH. Fields of R contain only atomic values. F = {CH → G, A → BC, B → CFH, E → A, F → EG} is a set of functional dependencies (FDs) so that F+ is exactly the set of FDs that hold for R. How many candidate keys does the relation R have? There are total 4 candidate keys AD, BD, ED and FD.	[CO3,K3]
10.	Let R = ABCDE is a relational scheme with functional dependency set F = {A → B, B → C, AC → D}. Find the attribute closures of A and E. A ⁺ = ABCD E ⁺ = E	[CO3,K3]
PART – B (3 × 10 = 30 Marks)		
11.	<p>i).Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted. (5 Marks)</p> <p>ii).Construct appropriate tables for the above ER Diagram. (5 Marks)</p> <p>Patient(SS#, name, insurance,date-admitted,date-checked-out) Doctor (dss#, name, specialization) Test(test_id, test-name, date, time, result, SS#) Doctor-patient (dss#, SS#) Performed_by(dss#, test_id)</p>	[CO2,K3]
12.	<p>i). Summarize the different RAID techniques used in the database. (5 Marks)</p> <p>(a) RAID 0: nonredundant striping (b) RAID 1: mirrored disks (c) RAID 5: block-interleaved distributed parity (d) RAID 6: P + Q redundancy</p> <p>Diagram – 2Marks Explanation about each RAID level -3Marks</p>	[CO3,K2]

ii). Explain the different types of file organization. (5 Marks)

A file is organized logically as a sequence of records. These records are mapped onto disk blocks. Files are provided as a basic construct in operating systems, so we shall assume the existence of an underlying *file system*.

Explanation about

1. Heap file Organization
2. Sequential file Organization
3. B+ Tree file Organization
4. Hash file Organization
5. Multi table file Organization

13. i). Find all keys for R.

Consider a relation R with attributes ABCDEFGH and functional dependencies S as follows: $S = \{A \rightarrow CD, ACF \rightarrow G, AD \rightarrow BEF, BCG \rightarrow D, CF \rightarrow AH, CH \rightarrow G, D \rightarrow B, H \rightarrow DEG\}$ (5 Marks)

[CO3,K3]

LHS	Result	Decision
A^+	ACDBEFGH	Result includes all the attributes of relation R. Hence, A is one candidate key.
ACF^+	ACDBEFGH	ACF is a super key but not candidate key.
AD^+	ACDBEFGH	AD is a super key but not candidate key.
BCG^+	$= BCGD$ from $BCG \rightarrow D$	Result does not include all the attributes of relation R. Hence, (BCG) cannot be a candidate key.
CF^+	ACDBEFGH	Result includes all the attributes of relation R. Hence, (CF) is one candidate key.
D^+	$= DB$ from $D \rightarrow B$	Result does not include all R. Hence, D cannot be a key.
H^+	$= HDEG$ from $H \rightarrow DEG$ $= HDEGB$ from $D \rightarrow B$	Result does not include all R. Hence, H cannot be a key.

Super Keys : A, ACF, AD and CF :3 Marks

Candidate Keys : A, CF :1 Mark

Primary key : A :1 Mark

ii). Decompose the table upto BCNF . (5 Marks)

Step 1! find the candidate key

i) $\{\text{countyname, Lot \#}\}^+ = \{\text{countyname, Lot \#, propid, Area, price, taxrate}\}$
 ii) $\{\text{propid}\}^+$

Step 2! check the given table is in 1NF

Step 3! check the partial fd after 1NF and eliminate partial fd.
 countyname \rightarrow taxrate

Diagram showing decomposition into two tables:

propid	countyname	Lot #	Area	price
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FDs for first table: f01, f03, f04

countyname	taxrate
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FD for second table: f02

Step 4! check for Transitive fd after 2NF

Diagram showing decomposition into two tables:

propid	countyname	Lot #	Area
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FDs for first table: f01, f04

Area	price
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FD for second table: f03

Step 5!

Diagram showing decomposition into two tables:

propid	Lot #	Area
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FD for first table: f01, f04

Area	countyname
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FD for second table: f04

14. Apply 4NF for the given Student database. Also explain about multi-valued dependencies, 5NF and 6NF with relevant examples. (10 Marks)

[CO3,K3]

StudentID	Areas of Interest	Hobbies
100	OS, DBMS	Singing, Painting
101	JAVA	Reading

4 NF – 4Marks

From the table, the multivalued FDs are
 F: $\{(\text{StudentID} \twoheadrightarrow \text{AreasofInterest}), (\text{StudentID} \twoheadrightarrow \text{Hobbies})\}$. So the Student table is decomposed as

StudentID	AreasofInterest
100	OS
100	DBMS
101	JAVA

StudentID	Hobbies
100	Singing
100	Painting
100	Acting
101	Reading

Explanation about 5NF- 3 Marks

Explanation about 6NF- 3 Marks

Bloom's Taxonomy Level	Remembering (K1)	Understanding (K2)	Applying (K3)	Analysing (K4)	Evaluating (K5)	Creating (K6)
Percentage	7%	23%	70%	-	-	-