

United College of Engineering and Research, Allahabad

Department of Computer Science & Engineering

B.Tech CSE- V Semester

Set-3

Course Name: Database Management System

AKTU Course Code: KCS-501

Time: 60 Minutes

Max. Marks: 40

- All Questions are compulsory.
- All Questions carry one mark.

Q. No.	Questions
1	<p>A schema with attributes A, B, C, D and E following set of functional dependencies are given $A \rightarrow B$ $A \rightarrow C$ $CD \rightarrow E$ $B \rightarrow D$ $E \rightarrow A$ Which of the following functional dependencies is NOT implied by the above set?</p> <p>(A) $CD \rightarrow AC$</p> <p>(B) $BD \rightarrow CD$</p> <p>(C) $BC \rightarrow CD$</p> <p>(D) $AC \rightarrow BC$</p>
2	<p>A database of research articles in a journal uses the following schema. (VOLUME, NUMBER, STARTPAGE, ENDPAGE, TITLE, YEAR, PRICE)</p> <p>The primary key is (VOLUME, NUMBER, STARTPAGE, ENDPAGE) and the following functional dependencies exist in the schema. (VOLUME, NUMBER, STARTPAGE, ENDPAGE) \rightarrow TITLE (VOLUME, NUMBER) \rightarrow YEAR (VOLUME, NUMBER, STARTPAGE, ENDPAGE) \rightarrow PRICE</p> <p>The database is redesigned to use the following schemas. (VOLUME, NUMBER, STARTPAGE, ENDPAGE, TITLE, PRICE) (VOLUME, NUMBER, YEAR)</p> <p>Which is the weakest normal form that the new database satisfies, but the old one does not?</p> <p>(A) 1NF</p>

	<p>(B) 2NF</p> <p>(C) 3NF</p> <p>(D) BCNF</p>
3	<p>A Relation R with FD set $\{A \rightarrow BC, B \rightarrow A, A \rightarrow C, A \rightarrow D, D \rightarrow A\}$. How many candidate keys will be there in R?</p> <p>(A) 1</p> <p>(B) 2</p> <p>(C) 3</p> <p>(D) 4</p>
4	<p>Consider a relation R (A, B, C, D, E, F, G, H), where each attribute is atomic, and following functional dependencies exist.</p> <p>$CH \rightarrow G$</p> <p>$A \rightarrow BC$</p> <p>$B \rightarrow CFH$</p> <p>$E \rightarrow A$</p> <p>$F \rightarrow EG$</p> <p>The relation R is _____ .</p> <p>(A) in 1NF but not in 2NF</p> <p>(B) in 2NF but not in 3NF</p> <p>(C) in 3NF but not in BCNF</p> <p>(D) in BCNF</p>
5	<p>Relational database schema normalization is NOT for:</p> <p>(A) reducing the number of joins required to satisfy a query.</p> <p>(B) eliminating uncontrolled redundancy of data stored in the database.</p> <p>(C) eliminating number of anomalies that could otherwise occur with inserts and deletes.</p> <p>(D) ensuring that functional dependencies are enforced.</p>
6	<p>Consider the following statements regarding relational database model:</p> <p>(a) NULL values can be used to opt a tuple out of enforcement of a foreign key.</p>

	<p>(b) Suppose that table T has only one candidate key. If Q is in 3NF, then it is also in BCNF.</p> <p>(c) The difference between the project operator (Π) in relational algebra and the SELECT keyword in SQL is that if the resulting table/set has more than one occurrences of the same tuple, then Π will return only one of them, while SQL SELECT will return all. One can determine that:</p> <p>(A) (a) and (b) are true.</p> <p>(B) (a) and (c) are true.</p> <p>(C) (b) and (c) are true.</p> <p>(D) (a), (b) and (c) are true.</p>
7	<p>Every time the attribute A appears, it is matched with the same value of attribute B but not the same value of attribute C. Which of the following is true?</p> <p>(A) $A \rightarrow (B, C)$</p> <p>(B) $A \rightarrow B, A \twoheadrightarrow C$</p> <p>(C) $A \rightarrow B, C \twoheadrightarrow A$</p> <p>(D) $A \twoheadrightarrow B, B \rightarrow C$</p>
8	<p>Relation R has eight attributes ABCDEFGH. Fields of R contain only atomic values. $F = \{CH \rightarrow G, A \rightarrow BC, B \rightarrow CFH, E \rightarrow A, F \rightarrow EG\}$ 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?</p> <p>(A) 3</p> <p>(B) 4</p> <p>(C) 5</p> <p>(D) 6</p>
9	<p>For the relation R(ABCDEFGH) with $FD's = \{CH \rightarrow G, A \rightarrow BC, B \rightarrow CHF, E \rightarrow A, F \rightarrow EG\}$ such that F^+ is exactly the set of FDs that hold for R.} Consider the FDs given in above question. The relation R is</p> <p>(A) in 1NF, but not in 2NF.</p> <p>(B) in 2NF, but not in 3NF.</p> <p>(C) in 3NF, but not in BCNF.</p> <p>(D) in BCNF</p>
10	<p>Which of the following is TRUE?</p>

	<p>(A) Every relation in 3NF is also in BCNF</p> <p>(B) A relation R is in 3NF if every non-prime attribute of R is fully functionally dependent on every key of R</p> <p>(C) Every relation in BCNF is also in 3NF</p> <p>(D) No relation can be in both BCNF and 3NF</p>
11	<p>Consider the following relational schema: Suppliers(<u>sid:integer</u>, sname:string, city:string, street:string) Parts(<u>pid:integer</u>, pname:string, color:string) Catalog(<u>sid:integer</u>, <u>pid:integer</u>, cost:real) Assume that, in the suppliers relation above, each supplier and each street within a city has a unique name, and (sname, city) forms a candidate key. No other functional dependencies are implied other than those implied by primary and candidate keys. Which one of the following is TRUE about the above schema?</p> <p>(A) The schema is in BCNF</p> <p>(B) The schema is in 3NF but not in BCNF</p> <p>(C) The schema is in 2NF but not in 3NF</p> <p>(D) The schema is not in 2NF</p>
12	<p>Consider the following relational schemes for a library database: Book (Title, Author, Catalog_no, Publisher, Year, Price) Collection (Title, Author, Catalog_no) with in the following functional dependencies: I. Title Author --> Catalog_no II. Catalog_no --> Title, Author, Publisher, Year III. Publisher Title Year --> Price Assume {Author, Title} is the key for both schemes. Which of the following statements is true?</p> <p>(A) Both Book and Collection are in BCNF</p> <p>(B) Both Book and Collection are in 3NF only</p> <p>(C) Book is in 2NF and Collection is in 3NF</p> <p>(D) Both Book and Collection are in 2NF only</p>
13	<p>Consider the relation scheme $R = \{E, F, G, H, I, J, K, L, M, N\}$ and the set of functional dependencies $\{E, F \rightarrow G, F \rightarrow I, J, E, H \rightarrow K, L, K \rightarrow M, L \rightarrow N\}$ on R. What is the key for R?</p>

	(A) {E, F} (B) {E, F, H} (C) {E, F, H, K, L} (D) {E}																														
14	<p>Given the following two statements:</p> <p>S1: Every table with two single-valued attributes is in 1NF, 2NF, 3NF and BCNF.</p> <p>S2: $AB \rightarrow C$, $D \rightarrow E$, $E \rightarrow C$ is a minimal cover for the set of functional dependencies $AB \rightarrow C$, $D \rightarrow E$, $AB \rightarrow E$, $E \rightarrow C$.</p> <p>Which one of the following is CORRECT?</p> <p>(A) S1 is TRUE and S2 is FALSE.</p> <p>(B) Both S1 and S2 are TRUE.</p> <p>(C) S1 is FALSE and S2 is TRUE.</p> <p>(D) Both S1 and S2 are FALSE.</p>																														
15	<p>The maximum number of superkeys for the relation schema $R(E, F, G, H)$ with E as the key is</p> <p>(A) 5</p> <p>(B) 6</p> <p>(C) 7</p> <p>(D) 8</p>																														
16	<p>Given the STUDENTS relation as shown below.</p> <table><tr><th><i>StudentID</i></th><th><i>StudentName</i></th><th><i>StudentEmail</i></th><th><i>StudentAge</i></th><th><i>CPI</i></th></tr><tr><td>2345</td><td>Shankar</td><td>shankar@math</td><td>X</td><td>9.4</td></tr><tr><td>1287</td><td>Swati</td><td>swati@ee</td><td>19</td><td>9.5</td></tr><tr><td>7853</td><td>Shankar</td><td>shankar@cse</td><td>19</td><td>9.4</td></tr><tr><td>9876</td><td>Swati</td><td>swati@mech</td><td>18</td><td>9.3</td></tr><tr><td>8765</td><td>Ganesh</td><td>ganesh@civil</td><td>19</td><td>8.7</td></tr></table> <p>For (StudentName, StudentAge) to be the key for this instance, the value X should not be equal to</p>	<i>StudentID</i>	<i>StudentName</i>	<i>StudentEmail</i>	<i>StudentAge</i>	<i>CPI</i>	2345	Shankar	shankar@math	X	9.4	1287	Swati	swati@ee	19	9.5	7853	Shankar	shankar@cse	19	9.4	9876	Swati	swati@mech	18	9.3	8765	Ganesh	ganesh@civil	19	8.7
<i>StudentID</i>	<i>StudentName</i>	<i>StudentEmail</i>	<i>StudentAge</i>	<i>CPI</i>																											
2345	Shankar	shankar@math	X	9.4																											
1287	Swati	swati@ee	19	9.5																											
7853	Shankar	shankar@cse	19	9.4																											
9876	Swati	swati@mech	18	9.3																											
8765	Ganesh	ganesh@civil	19	8.7																											

	<p>(A) 18</p> <p>(B) 19</p> <p>(C) 20</p> <p>(D) 21</p>
17	<p>Which one of the following statements about normal forms is FALSE?</p> <p>(A) BCNF is stricter than 3NF</p> <p>(B) Lossless, dependency-preserving decomposition into 3NF is always possible</p> <p>(C) Lossless, dependency-preserving decomposition into BCNF is always possible</p> <p>(D) Any relation with two attributes is in BCNF</p>
18	<p>Let r be a relation instance with schema $R = (A, B, C, D)$. We define $r_1 = \Pi_{A, B, C}(r)$ and $r_2 = \Pi_{A, D}(r)$. Let $s = r_1 * r_2$ where $*$ denotes natural join. Given that the decomposition of r into r_1 and r_2 is lossy, which one of the following is TRUE?</p> <p>(A) $s \subset r$</p> <p>(B) $r \cup s$</p> <p>(C) $r \subset s$</p> <p>(D) $r * s = s$</p>
19	<p>Consider a relation scheme $R = (A, B, C, D, E, H)$ on which the following functional dependencies hold:</p> <p style="text-align: center;">$\{A \rightarrow B, BC \rightarrow D, E \rightarrow C, D \rightarrow A\}$.</p> <p>What are the candidate keys of R?</p> <p>(A) AE, BE</p> <p>(B) AE, BE, DE</p> <p>(C) AEH, BEH, BCH</p>

	(D) AEH, BEH, DEH
20	<p>The relation scheme Student Performance (name, courseNo, rollNo, grade) has the following functional dependencies:</p> <p>name, courseNo \rightarrow grade</p> <p>rollNo, courseNo \rightarrow grade</p> <p>name \rightarrow rollNo</p> <p>rollNo \rightarrow name</p> <p>The highest normal form of this relation scheme is</p> <p>(A) 2 NF</p> <p>(B) 3 NF</p> <p>(C) BCNF</p> <p>(D) 4NF</p>
21	<p>Consider the following functional dependencies in a database:</p> <p>Data_of_Birth \rightarrow Age</p> <p>Age \rightarrow Eligibility</p> <p>Name \rightarrow Roll_number</p> <p>Roll_number \rightarrow Name</p> <p>Course_number \rightarrow Course_name</p> <p>Course_number \rightarrow Instructor</p> <p>(Roll_number, Course_number) \rightarrow Grade</p> <p>The relation (Roll_number, Name, Date_of_birth, Age) is:</p> <p>(A) In second normal form but not in third normal form</p> <p>(B) In third normal form but not in BCNF</p> <p>(C) In BCNF</p> <p>(D) None of the above</p>
22	<p>Relation R with an associated set of functional dependencies, F is decomposed into BCNF. The redundancy (arising out of functional dependencies) in the resulting set relations is.</p> <p>(A) Zero</p> <p>(B) More than zero but less than that of an equivalent 3NF decomposition</p>

	(C) Proportional to the size of F+ (D) Indeterminate															
23	Relation R is decomposed using a set of functional dependencies, F and relation S is decomposed using another set of functional dependencies G. One decomposition is definitely BCNF, the other is definitely 3NF, but it is not known which is which. To make a guaranteed identification, which one of the following tests should be used on the decompositions? (Assume that the closures of F and G are available). (A) Dependency-preservation (B) Lossless-join (C) BCNF definition (D) 3NF definition															
24	From the following instance of a relation scheme R (A, B, C), we can conclude that : <table><tr><td>A</td><td>B</td><td>C</td></tr><tr><td>1</td><td>1</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td></tr><tr><td>2</td><td>3</td><td>2</td></tr><tr><td>2</td><td>3</td><td>2</td></tr></table> (A) A functionally determines B and B functionally determines C (B) A functionally determines B and B does not functionally determine C (C) B does not functionally determine C (D) A does not functionally determine B and B does not functionally determine C	A	B	C	1	1	1	1	1	0	2	3	2	2	3	2
A	B	C														
1	1	1														
1	1	0														
2	3	2														
2	3	2														
25	Consider a schema R(A,B,C,D) and functional dependencies A->B and C->D. Then the decomposition of R into R1(AB) and R2(CD) is (A) dependency preserving and lossless join (B) lossless join but not dependency preserving (C) dependency preserving but not lossless join (D) not dependency preserving and not lossless join															
26	R(A,B,C,D) is a relation. Which of the following does not have a lossless join, dependency															

	preserving BCNF decomposition? (A) $A \rightarrow B, B \rightarrow CD$ (B) $A \rightarrow B, B \rightarrow C, C \rightarrow D$ (C) $AB \rightarrow C, C \rightarrow AD$ (D) $A \rightarrow BCD$															
27	Given the following relation instance. <table><tr><td>x</td><td>y</td><td>z</td></tr><tr><td>1</td><td>4</td><td>2</td></tr><tr><td>1</td><td>5</td><td>3</td></tr><tr><td>1</td><td>6</td><td>3</td></tr><tr><td>3</td><td>2</td><td>2</td></tr></table> Which of the following functional dependencies are satisfied by the instance? (A) $XY \rightarrow Z$ and $Z \rightarrow Y$ (B) $YZ \rightarrow X$ and $Y \rightarrow Z$ (C) $YZ \rightarrow X$ and $X \rightarrow Z$ (D) $XZ \rightarrow Y$ and $Y \rightarrow X$	x	y	z	1	4	2	1	5	3	1	6	3	3	2	2
x	y	z														
1	4	2														
1	5	3														
1	6	3														
3	2	2														
28	Consider the relation $X(P, Q, R, S, T, U)$ with the following set of functional dependencies $F = \{$ $\{P, R\} \rightarrow \{S, T\},$ $\{P, S, U\} \rightarrow \{Q, R\}$ $\}$ Which of the following is the trivial functional dependency in F^+ is closure of F ? (A) $\{P, R\} \rightarrow \{S, T\}$ (B) $\{P, R\} \rightarrow \{R, T\}$ (C) $\{P, S\} \rightarrow \{S\}$ (D) $\{P, S, U\} \rightarrow \{Q\}$															
29	Which of the following is NOT a superkey in a relational schema with attributes V, W, X, Y, Z and primary key $V Y$? (A) $V X Y Z$															

	<p>(B) V W X Z</p> <p>(C) V W X Y</p> <p>(D) V W X Y Z</p>
30	<p>Let R (A, B, C, D, E, P, G) be a relational schema in which the following functional dependencies are known to hold: $AB \rightarrow CD$, $DE \rightarrow P$, $C \rightarrow E$, $P \rightarrow C$ and $B \rightarrow G$. The relational schema R is</p> <p>(A) in BCNF</p> <p>(B) in 3NF, but not in BCNF</p> <p>(C) in 2NF, but not in 3NF</p> <p>(D) not in 2NF</p>
31	<p>Let $R = (A, B, C, D, E, F)$ be a relation scheme with the following dependencies: $C \rightarrow F$, $E \rightarrow A$, $EC \rightarrow D$, $A \rightarrow B$. Which of the following is a key of R?</p> <p>(A) CD</p> <p>(B) EC</p> <p>(C) AE</p> <p>(D) AC</p>
32	<p>If every non-key attribute is functionally dependent on the primary key, then the relation is in _____ .</p> <p>(A) First normal form</p> <p>(B) Second normal form</p> <p>(C) Third normal form</p> <p>(D) Fourth normal form</p>
33	<p>Consider a schema R(A, B, C, D) and following functional dependencies.</p> <p>$A \rightarrow B$</p> <p>$B \rightarrow C$</p> <p>$C \rightarrow D$</p> <p>$D \rightarrow B$</p> <p>Then decomposition of R into $R_1(A, B)$, $R_2(B, C)$ and $R_3(B, D)$ is _____ .</p>

	<p>(A) Dependency preserving and lossless join.</p> <p>(B) Lossless join but not dependency preserving.</p> <p>(C) Dependency preserving but not lossless join.</p> <p>(D) Not dependency preserving and not lossless join.</p>
34	<p>Consider a schema $R(MNPQ)$ and functional dependencies $M \rightarrow N, P \rightarrow Q$. Then the decomposition of R into $R_1(MN)$ and $R_2(PQ)$ is _____.</p> <p>(A) Dependency preserving but not lossless join</p> <p>(B) Dependency preserving and lossless join</p> <p>(C) Lossless join but not dependency preserving</p> <p>(D) Neither dependency preserving nor lossless join.</p>
35	<p>For a database relation $R(A, B, C, D)$ where the domains of A, B, C and D include only atomic values, only the following functional dependencies and those that can be inferred from them are : $A \rightarrow C, B \rightarrow D$ The relation R is in _____.</p> <p>(A) First normal form but not in second normal form.</p> <p>(B) Both in first normal form as well as in second normal form.</p> <p>(C) Second normal form but not in third normal form.</p> <p>(D) Both in second normal form as well as in third normal form.</p>
36	<p>Let $R = (A, B, C, D, E, F)$ be a relation schema with the following dependencies $C \rightarrow F, E \rightarrow A, EC \rightarrow D, A \rightarrow B$. Which of the following is a key of R?</p> <p>(A) CD</p> <p>(B) EC</p> <p>(C) AE</p> <p>(D) AC</p>
37	<p>Consider the schema $R(A, B, C, D)$ and the functional dependencies $A \rightarrow B$ and $C \rightarrow D$. If the decomposition is made as $R_1(A, B)$ and $R_2(C, D)$, then which of the following is TRUE?</p> <p>(A) Preserves dependency but cannot perform lossless join</p> <p>(B) Preserves dependency and performs lossless join</p>

	<p>(C) Does not perform dependency and cannot perform lossless join</p> <p>(D) Does not preserve dependency but perform lossless join</p>
38	<p>Consider the schema $R(A, B, C, D)$ and the functional dependencies $A \rightarrow B$ and $C \rightarrow D$. If the decomposition is made as $R_1(A, B)$ and $R_2(C, D)$, then which of the following is TRUE?</p> <p>(A) Preserves dependency but cannot perform lossless join</p> <p>(B) Preserves dependency and performs lossless join</p> <p>(C) Does not perform dependency and cannot perform lossless join</p> <p>(D) Does not preserve dependency but perform lossless join</p>
39	<p>Which of the following statements is TRUE?</p> <p>D_1 : The decomposition of the schema $R(A, B, C)$ into $R_1(A, B)$ and $R_2(A, C)$ is always lossless.</p> <p>D_2 : The decomposition of the schema $R(A, B, C, D, E)$ having $AD \rightarrow B$, $C \rightarrow DE$, $B \rightarrow AE$ and $AE \rightarrow C$, into $R_1(A, B, D)$ and $R_2(A, C, D, E)$ is lossless.</p> <p>(A) Both D_1 and D_2</p> <p>(B) Neither D_1 nor D_2</p> <p>(C) Only D_1</p> <p>(D) Only D_2</p>
40	<p>Which of the following statements is TRUE? D_1 : The decomposition of the schema $R(A, B, C)$ into $R_1(A, B)$ and $R_2(A, C)$ is always lossless. D_2 : The decomposition of the schema $R(A, B, C, D, E)$ having $AD \rightarrow B$, $C \rightarrow DE$, $B \rightarrow AE$ and $AE \rightarrow C$, into $R_1(A, B, D)$ and $R_2(A, C, D, E)$ is lossless.</p> <p>(A) Both D_1 and D_2</p> <p>(B) Neither D_1 nor D_2</p> <p>(C) Only D_1</p> <p>(D) Only D_2</p>

Answer

1-B	2-B	3-C	4-A	5-A	6-D	7- B	8-B	9-A	10-C
11-A	12-C	13-B	14-A	15-D	16-B	17-C	18-C	19-D	20-B
21-D	22-A	23-C	24-C	25-C	26-C	27-B	28-C	29-B	30-D
31-B	32-B	33-A	34-A	35-A	36-B	37-A	38-B	39-D	40-D