GURU NANAK INSTITUTE OF TECHNOLOGY

An Autonomous Institute under MAKAUT

2020-2021

DATABASE MANAGEMENT SYSTEM

CS503

TIME ALLOTTED: 3 HOURS **FULL MARKS: 70**

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable

GROUP – A

(Multiple Choice Type Questions)

Answer any ***ten(10)*** from the following, choosing the correct alternative of each question: **10×1=10**

			Marks	CO No
1.	i.	What relationships does Referential integrity control? a. Attributes in a table b. Operations of an object c. Instances of a class d. Tables in a database	1	CO1
	ii.	_____ refers to the correctness and completeness of the data in a database? a. Data security b. Data integrity c. Data constraint d. Data independence	1	CO1
	iii.	Which one of the following statements is false? a. The data dictionary is normally maintained by the database administrator. b. Data elements in the database can be modified by changing the data dictionary. c. The data dictionary contains the name and description of each data element. d. The data dictionary is a tool used exclusively by the database administrator.	1	CO1
	iv.	Updatesthatviolate_____aredisallowed. a. Integrityconstraints b. Transactioncontrol c. Authorization d. DDLconstraints	1	CO2
	v.	Which of the following is TRUE? a. Every relation in 3NF is also in BCNF b. A relation R is in 3NF if every non-prime attribute of R is fully functionally dependent on every key of R c. Every relation in BCNF is also in 3NF d. No relation can be in both BCNF and 3NF	1	CO2

vi.	The ability to modify the schema definition in one level should not affect the schema definition in the next higherlevel is called a. Data Independence b. Integrity Constraint c. Data Abstraction d. Data Isolation	1	CO1
vii.	Which one of the following statements about normal forms is FALSE? a BCNF is stricter than 3NF b Lossless, dependency-preserving decomposition into 3NF is always p c Lossless, dependency-preserving decomposition into BCNF is always d Any relation with two attributes is in BCNF	1	CO2
viii.	In 2-phase locking a transaction must a. release all it locks at the same time b. NOT obtain any new locks once it has started releasing locks c. only obtain locks on items not used by any other transactions d. ensure that deadlocks will never occur.	1	CO4
ix.	The relation schema Student_Performance (name, courseNo, rollNo, grade) has the following FDs: name,courseNo->grade rollNo,courseNo->grade name->rollNo rollNo->name The highest normal form of this relation scheme is a. 2NF b. 3NF c. BCNF d. 4NF	1	CO2
x.	Which domain constraint cannot be defined in table level a. Primary Key b. Foreign key c. Not Null d. All of these	1	CO3
xi.	Identify the correct statement(s). a) `employee (id#, emp_name)` is a relation instance b) `{12, Jessica}` is an instance of a relation schema c) `{12, Jessica}` specifies a relation schema d) `{12, Jessica}` is neither a relation schema nor an instance of a relation a. Option a is correct b. Option b is correct c. Option c is correct d. Option d is correct	1	CO3

xii. Which of the following is the way to undo the effects of an aborted transaction? 1 CO4

a. Compensation transaction
b. Roll Back
c. Recovery
d. Error Control

GROUP – B
(Short Answer Type Questions)

(Answer any *three*(3) of the following) **3 x 5 = 15**

		Marks	CO No
2	Two relation R1(A1,A2,A3) and R2(B1,B2,B3) are there. R1 and R2 have no common attribute in them. But we need to combine the information from R1 and R2. Which Relational Algebra operation has to be performed? Explain Briefly	5	CO2
3	Consider a schema R(A, B, C, D) and functional dependencies A -> B and C -> D. Then the decomposition of R into R1 (A, B) and R2(C, D).Explain whether the decomposition is dependency preserving and loss less join?	5	CO2
4	Given the following relation instance. x y z 1 4 2 1 5 3 1 6 3 3 2 2 Derive different functional dependency from the table.	5	CO2
5	1. A table has fields F1, F2, F3, F4, and F5, with the following functional dependencies: F1->F3 F2->F4 (F1,F2)->F5 In terms of normalization, what is the highest form of normalization. Explain Briefly	5	CO2
6. a)	What is the difference between serial and serializable schedule? Illustrate with example.	2	CO4
b)	Give the serial schedule of the following schedule S (First check if it's view serializable or not). **S : $R_1(A)$, $W_2(A)$, $R_3(A)$, $W_1(A)$, $W_3(A)$**	3	CO4

GROUP – C
(Long Answer Type Questions)

(Answer any *three(3)* of the following) **3 x 15 = 45**

			Marks	CO No
7.	(a)	What do you mean by selection, projection and cross product in relation algebra? Explain briefly.	6	CO2
	(b)	Perform natural join, left outer join, right outer join and full outer	9	CO3,CO5

join on following table

Student

SID	Name	Std
101	Arun	10
102	Manoj	11
103	Abhishek	12

Subjects

SID	Subject
101	Math
102	English
103	Music
104	Sports

8. (a) Consider the following relation REFRIG (Model #, Year, Price, Manuf_plant, Color) and with the following dependencies: F = { M→MP, {M,Y} → P, MP→C} Evaluate each of the following as a candidate key for REFRIG, giving reasons why it can or cannot be a key : { M }, {M, Y }, { M, C } — 5 — CO2

(b) Based on the above key determination state whether this relation is in BCNF or in 3NF, giving proper reasons. — 5 — CO2

(c) Let T1, T2 and T3 be transactions that operate on the same data items A, B and C. Let r1(A) mean that T1 reads A, w1(A) means that T1 writes A and so on for T2 and T3. Consider the following schedule: S1 : r2(c), r2(B), w2(b), r3(B), r3(C), r1(A), w1(A), w3(B), w3(C), r2(A), r1(B), w1(B), w2(A) Is the schedule serializable? — 5 — CO4

9. (a) Consider the relational database of
employee (*person-name*, *street*, *city*)
works (*person-name*, *company-name*, *salary*)
company (*company-name*, *city*)
manages (*person-name*, *manager-name*)
Give an expression in the relational algebra for each request:
a. Modify the database so that Jones now lives in Newtown.
b. Give all employees of First Bank Corporation a 10 percent salary raise. — 10 — CO3,CO5
c. Give all managers in this database a 10 percent salary raise.
d. Give all managers in this database a 10 percent salary raise, unless the salary would be greater than $100,000. In such cases, give only a 3 percent raise.
e. Delete all tuples in the *works* relation for employees of Small

Bank Corporation.

	(b)	Explain weak and strong entity with an example.	5	CO1
10.	(a)	State the properties of transaction with proper example.	4	CO4
	(b)	Consider the following schedule of three transactions T1, T2 and T3. Check whether the schedule is serializable or not.	3	CO4

Time	T1	T2	T3
1	Read (A, a)		
2		Write (A, a)	
3			Read (A, a)
4	Write (A, a)		
5			Write (A, a)

	(c)	What is 2 phase locking protocol?	3	CO4
	(d)	What is deadlock prevention scheme? Illustrate with example.	3	CO4
	(e)	Why deadlock cannot occur in timestamp based protocol?	2	CO4
11.	(a)	Consider a university database for the scheduling of classrooms for final exams. This database could be modeled as the single entity set *exam*, with attributes *course-name*, *section-number*, *room-number*, and *time*. Alternatively, one or more additional entity sets could be defined, along with relationship sets to replace some of the attributes of the *exam* entity set, as • *course* with attributes *name*, *department*, and *c-number* • *section* with attributes *s-number* and *enrollment*, and dependent as a weak entity set on *course* • *room* with attributes *r-number*, *capacity*, and *building* Show an E-R diagram illustrating the use of all three additional entity setslisted.	12	CO1
	(b)	Explain what application characteristics would influence a decision to includeor not to include each of the additional entity sets.	3	CO1