Department of Computer Science and Engineering

University of Rajshahi

Sample Question 2

Course Title; Database Management System — Course code: CSE 301`

Full marks:100 — Time:4 Hours

1	Define DBMS. What are the disadvantages in File Processing System? What is metadata? What are instance and schema? What are the functions of database administrator?	3+5+2+3+7
2(a)	Design an ER diagram for an IT training group database that will meet the information needs for its training program. Clearly indicate the entities, relationships and the key constraints. The description of the environment is as follows : The company has 12 instructors and can handle upto 100 trainees for each training session. The company offers 5 Advanced technology courses, each of which is taught by a team of 2 or more instructors Each instructor is assigned to a maximum of two teaching teams or may be assigned to do research Each trainee undertakes one Advanced technology course per training session	10
(b)	Simplify the E-R diagram of Fig 1, Fig 2(a) and Fig 2(b).	6
(c)	Derive the table for relationship set and entity set from Fig 3 and 4, respectively	4
3(a)	Express the operation of Deletion, Insertion and updating in relational algebra.	6
(b)	What is view? How does view definition differ from relational algebra assignment operation? Discuss the problem with view if express update or insertion with it.	4
(c)	A relation s of schema (A,B,C,D) has three tuples: (1,2,3,4), (5,6,7,8), 9,10,11,12), another relation r of schema (B,C) has a tuple (2,3). Find the r÷s, show output of each operation (Natural join, Projection etc) involved in r÷s.	10
4(a)	Consider the relation bbc(name, region, area, population, gdp). Write SQL command for (a) list each country name where the population is larger than 'Bangladesh', (b) Which country has a populations that is more that Japan but less than India (c) find the largest country in each region, show the region, name and population (d) Which countries have gdp greater than any country in Europe?	16
(b)	Explain The Object Oriented Model. What are the approaches to be established to make transient objects persistent?	4
5(a)	What are tests those must be made in order to preserve the following referential integrity constraint $\prod_{\alpha}(r_2) \subseteq \prod_{K}(r_1)$ for Insert, Delete and Update operation. What is Triggers?	9+2
(b)	What is Assertions? Create an assertion to handle the constraint that The sum of all loan amounts for each branch must be less than the sum of all account balances at the branch. The relevant relations are *branch (branch_name, branch_city, assets, account (account_number, branch_name, balance) and loan (loan_number, branch_name, amount)*	5
(c)	In the authorization-grant graph as shown in Fig. 5, what poosible attemp may be occur to defeat authorization revocation and how to prior care to prevent that.	4
6(a)	What are the different states of transaction? Give some example of non-ACID Transactions.	3+2
(b)	What will happen if transaction T1 is followed by T2 instead of as described in schedule 1. Expain if there is any problem or inconstancy may occur in schedule, 2, and 3. (in Fig, 6, 7 and 8 respectively)	9
(c)	What are software RAID and hardware RAID? How can you measure the performance of storage disk?	2+4
7(a)	What is an Elevator Disk-arm–scheduling algorithm? When multiple disks are used, explain how can bit-level striping and Block-level striping improve transfer rate? Explain, where RAID level 1 better than RAID level 5 or vice-versa.	3+4+4
(b)	Consider the following sale relation schema (shown in Fig 9) : SaleForm(SaleID, SaleDate, CustomerID, FirstName, LastName, Address, City, State, ZIPCode, (ItemID, Description, ListPrice, Quantity, QuantityOnHand) with some tyical tuples. Decompose the relation in First 9Normal Form, Second Normal Form and Third Normal Form	9
8(a)	Show that decomposition of R1 = ({A, B, C}, {A→B, C→B}) into R2 = ({A, B}, {A→B}) and R3 = ({B, C}, {C→B}) is not lossless.	3
(b)	Is B → G in F^+ where R = {A, B, C, D, E} and F = {B → CD, E → F, D → E, B →A, AD → B, F →G} F+ mean usign fd thoes are given	4
(c)	Consider the following set F of functional dependencies on schema (A,B,C): A →BC, B → C, A →B, AB → C, compute the canonical cover for F.	5
(d)	R = (A, B, C), F = {A → B, B → C), R_1 = (A, B), R_2 = (A, C) is Lossless-join decomposition but is not dependency preserving.	4
(e)	R = (A, B, C, G, H, I), F = {A → B, A → C, CG → H, CG → I, B → H}, Is AG a candidate key?	4

Fig 1 (E-R diagram)

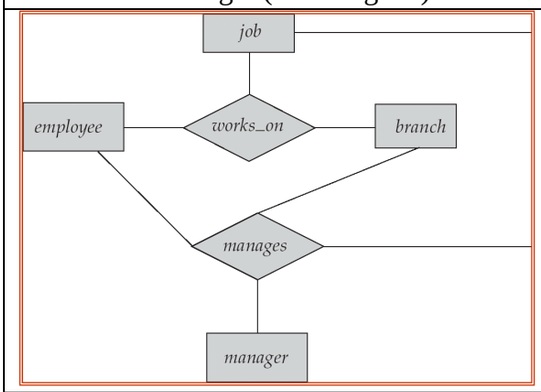

Fig 2(a) (E-R diagram)

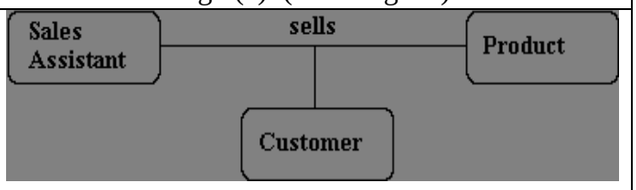

Fig 2(b) (E-R diagram)

Fig 3 (E-R diagram)

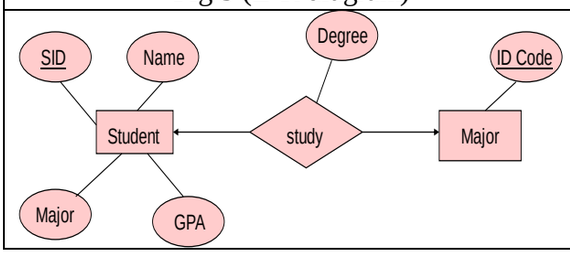

Fig 4 (E-R diagram)

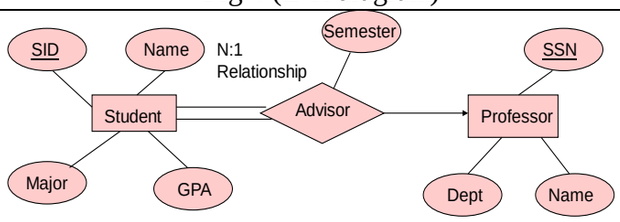

Fig. 5 (Authorization grant graph)

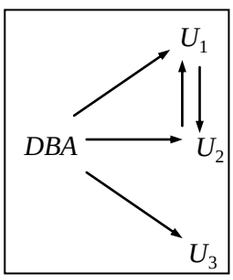

Fig. 6 (Schedule 1)

T_1	T_2
	read(A)
	$temp := A * 0.1$
	$A := A - temp$
	write(A)
	read(B)
	$B := B + temp$
	write(B)
read(A)	
$A := A - 50$	
write(A)	
read(B)	
$B := B + 50$	
write(B)	

Fig 7. (Schedule 2)

T_1	T_2
read(A)	
$A := A - 50$	
	read(A)
	$temp := A * 0.1$
	$A := A - temp$
	write(A)
	read(B)
write(A)	
read(B)	
$B := B + 50$	
write(B)	
	$B := B + temp$
	write(B)

Fig 8. (Schedule 3)

T_1	T_2
read(A)	
$A := A - 50$	
write(A)	
	read(A)
	$temp := A * 0.1$
	$A := A - temp$
	write(A)
read(B)	
$B := B + 50$	
write(B)	
	read(B)
	$B := B + temp$
	write(B)

Fig. 9 (relation sate)

SaleID	Date	CID	FirstName	LastName	Address	City	State	ZIP	ItemID	Description	ListPrice	Quantity	QOH
11851	7/15	15023	Mary	Jones	111 Elm	Chicago	IL	60601	15 27 32	Air Tank Regulator Mask 155	192.00 251.00 65.00	2 1 1	15 5 6
11852	7/15	63478	Miguel	Sanchez	222 Oro	Madrid			15 33	Air Tank Mask 2020	192.00 91.00	4 1	15 3
11853	7/16	15023	Mary	Jones	111 Elm	Chicago	IL	60601	41 75	Snorkel 71 Wet suit-S	44.00 215.00	2 1	15 3
11854	7/17	94552	Madeline	O'Reilly	333 Tam	Dublin			75 32 57	Wet suit-S Mask 1557 Snorkel 95	215.00 65.00 83.00	2 1 1	3 6 17