Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Computer Science and Technology
300 level 1st Semester Examination – Jul. / Aug. 2016
CST325-2 Advanced Database Management Systems

Uva Wellassa University

Instructions to candidates
Duration: Two (02) hours
Number of questions: Five (05) essays
Answers four (04) questions only
Mark allocation: 100

1.

a. Write the important factors of file processing.

(5 mark)

b. Consider the following magnetic disk configuration.
A modern disk has 25 single surface platters. Platters are organized into 2201 cylinders. Each track of a cylinder has 500 sectors of 1024 bytes. Currently, disk arm is located parallel to a diameter of the disk and head is just above the 1101st cylinder. The disk head can move between 10 tracks with in one (01) minute . Assume that data is stored in two (02) consecutive tracks in the outermost cylinder and the end point of the cylinder and the end point of the track is just below the disk arm. A disk can rotate 7500 rounds per minute.

i. Compute the unformatted disk capacity.
ii. Compute the seek time to locate the target sectors.
iii. Compute the rotational delay.
iv. Compute the access time for reading the two consecutive tracks.
v. What is the data transfer rate, if the complete track of data can be transferred within a revolution?

(12 mark)

c.

i. Briefly explain how you could insert elements to a B+ tree.

(3 mark)

ii. Illustrate your method by inserting the following sequence of numbers into a B+ tree (initially an empty tree) of order 1.

12, 3, 37, 4, 9, 22, 41, 18, 8, 29

(5 mark)

2.

a. State the use of normalization.

(4 mark)

b. Describe the difference between Boyce Code Normal Form (BCNF) and Third normal form (3NF).

(8 mark)

(18) (40)

c. A sample of out patient clinic appointment is given below.

Table 01 : Out patient clinic appointment

Clinic No: 4521						
Clinic Name: Skin Complaints			Clinic Date: 06/07/2016			
Consultant Name: A.Boyle			Speciality: Dermatology			
Consultant Phone_No: 72451						
Patient No	P_Name	P_Address	Condition	Time	GP Name	GP Address
51623	J.Smith	Belfast	Acne	10.00	B.Wilson	Belfast
61725	G.Pogue	Larne	Psoriasis	10.15	T.Kelly	Ballyclare
45126	M.O'kane	Moira	Acne	10.30	N.vance	Lisburn
35612	F.Dwyer	Belfast	Alopecia	10.45	K.Lennon	Belfast
35923	S.Hughes	Belfast	Dermatitis	11.00	P.Green	Belfast

Represent the above form (Table 01) as relational scheme and normalize up to Third Normal Form (3NF) using dependency diagrams to justify decompositions.

(13 mark)

3.

a. Briefly describe the use of query optimization.

(3 mark)

b. Briefly explainany anytwo(02) query processing methods.

(6 mark)

c. Consider the following query in SQL.

```
SELECT e.lastname
FROM employee e, works_on w, project p
WHERE p.pname= 'Aquarius'
AND p.pnumber=w.pno
AND w.essn=e.ssn
AND e.bdate>'1997-12-31'
```

i. Express the above query in relational algebra and draw the initial query tree (canonical form).

(6 mark)

ii. Apply heuristic optimizations to optimize the above query and draw heuristically optimized query tree. Indicate the heuristics used to optimize the given query.

(10 mark)

4.

a. Briefly explain the term Transaction in a database context.

(4 mark)

b. Consider the following three(03) transactions T1, T2 and T3(Table 02).

Table 02: Scheduled Transactions

T1	T2	T3
Read (x); X = X-10; Write (X); Read (Y); Y = Y+10; Write (Y);	Read (X); X = X+5; Write (x);	Sum = 0; Read (X); Sum = Sum+X; Read (Y); Sum = Sum+Y;

Assume that the initial values of X and Y are 100 and 50 respectively. Find the final values of the variables X, Y, and/or Sum after the transactions have been done serially in the given order for each the following cases.

i. T1, T2.
ii. T2, T1.
iii. T1, T2, T3.
iv. T2, T1, T3.

(10 mark)

c. Explain the three(03) most common problems that might be arise during the concurrent transactions, with the aid of transactions given in (b.)

(7 mark)

d. Give any two (02) methods to solve the problem that you have written for part c.

(4 mark)

5.

a. Briefly explain Distributed Database Management System (DDBMS) with the aid of a diagram.

(3 mark)

b. Compare and contrast Homogenious and Heterogenious DDBMS.

(5 mark)

c. State the major advantages of DDBMS.

(5 mark)

d. Brifely describe the two(02) types of data fragmentation.

(3 mark)

e. State the significant difference between Distributed and Parallel Databases.

(5 mark)

f. Give any two (02) ways of lock management in DDBMS.

(4 mark)