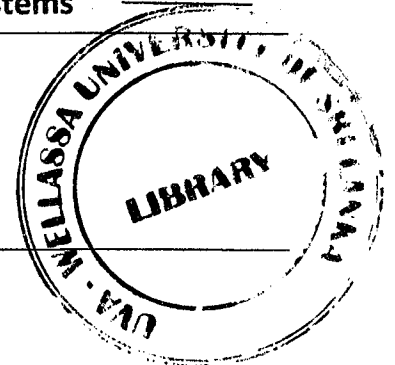


Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Computer Science and Technology
300 level 1st Semester Examination – Sept. / Oct. 2015
CST 325-2/IIT 411-2 Advance Database Management Systems



Instructions to candidates

Duration: two (02) hours

Number of questions: Five (05) Essay questions

Answers four (04) questions only

Mark allocation: 100 (All questions carry equal mark)

01.

- a. Briefly describe, what is meant by **file processing** in Database Management System. (3 mark)
- b. Explain significant difference between **heap** and **sequential** file structure. (3 mark)
- c. Briefly describe what is meant by **Hash function** in file indexing. (3 mark)
- d. Briefly explain the term **multilevel index** with a simple example. (4 mark)
- e. Answer the following question using the details of a hard disk given below.
 - Number of surfaces are 64
 - Number of sectors / cylinder are 4096
 - Number of tracks per surface is 2048
 - Number of bytes per sector are 512
 - i. Find the number of platters in the disk
 - ii. Find how many sectors per track
 - iii. Calculate the total size of the disk (7 mark)
- f. Consider a hard disk with rotational rate of 5,000 RPM, an average seek time of 4 ms and an average of 1000 sectors per track. Find the average time to read a random sector from disk by summing the estimation of seek time, rotational latency, and transfer time. (5 mark)

02.

- a. Explain why we use normalization in database design. (3 mark)
- b. State **three (03)** characteristics of a normalized database. (3 mark)
- c. Define Second Normal Form (2NF) with a simple example. (4 mark)

d. Find the primary key for the relation $R(A,B,C,D,E)$, $A \rightarrow B,C$, $D \rightarrow E$.

(5 mark)

e. Normalize the following Table (*Sales Order*) up to Third Normal Form (3NF).

(10 mark)

Sales Order

Fiction Company
 202 N. Main
 Mahattan, KS 66502

CustomerNumber:	1001	Sales Order Number:	405
Customer Name:	ABC Company	Sales Order Date:	2/1/2000
Customer Address:	100 Points Manhattan, KS 66502	Clerk Number:	210
		Clerk Name:	Martin Lawrence

Item Ordered	Description	Quantity	Unit Price	Total
800	widgit small	40	60.00	2,400.00
801	tingimajigger	20	20.00	400.00
805	thingibob	10	100.00	1,000.00
Order Total				3,800.00

03.

a. Briefly describe what is **query processing** in database.

(3 mark)

b. Briefly explain the purpose of **query optimization** in Database Management System and give any **three(03)** query optimization techniques.

(4 mark)

c. List **three(03)** operations performed in query processing with suitable examples.

(5 mark)

d. Map the following SQL query into relational algebra.

```
SELECT STUDENT .SNAME
FROM STUDENT, ATTEND, EXAM
WHERE EXAM .ExNAME='ADBMS' AND EXAM.Ex_NUMBER=ATTEND.Ex_NO AND
STUDENT.REGNO=ATTEND.S_REG AND STUDENT.Batch='CST12';
```

(5 mark)

e. Apply **Heuristic-Based** query optimization technique to optimize the above query in (d).

(8 mark)

04.

- a. Briefly describe the term **Transaction** in database context. (5 mark)
- b. List all the properties of transaction and briefly describe **two (02)** of them. (4 mark)
- c. Describe the states of transaction with the aid of a diagram. (6 mark)
- d. Explain what is scheduling in database and briefly describe the schedules given below
 - i. Serial schedule
 - ii. Equivalent schedule
 - iii. Serializable schedule(10 mark)

05.

- a. Briefly explain the role of concurrent execution in transaction with your own words. (4 mark)
- b. Describe the **Dirty Read** and **Lost Update** anomalies with suitable examples. (5 mark)
- c. State clearly how **Two Phase Lock (TPL)** can solve **Lost Update** problem. (6 mark)
- d. Describe what **Precedence Graph** means and explain why we need it. (4 mark)
- e. Draw a precedence graph for the following schedule (**Schedule1**) and describe your answer. (6 mark)

T ₁	T ₂	T ₃	T ₄	T ₅
read(Y) read(Z)	read(X)			read(V) read(W) write(W)
	read(Y) write(Y)	write(Z)		
read(U)			read(Y) write(Y) read(Z) write(Z)	
read(U) write(U)				

Schedule1

