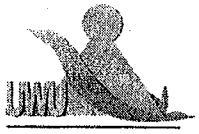
Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Computer Science and Technology
300 level 1st Semester Examination – Sept. / Oct. 2015
CST 325-2/IIT 411-2 Advance Database Management Systems



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)

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d. Find the primary key for the relation R(A,B,C,D,E) , A➔A,B,C , D➔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*	**Clerk Number:**	*210*
	Manhattan, KS 66502	**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(X)			
read(Y)				
read(Z)				
				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