

THE OPEN UNIVERSITY OF SRI LANKA
DEPARTMENT OF MATHEMATICS & COMPUTER SCIENCE
B.Sc. DEGREE PROGRAMME : LEVEL 04
CPU2241- DATABASE MANAGEMENT SYSTEMS
FINAL EXAMINATION – 2015/2016
DURATION: Three Hours (03 Hours)



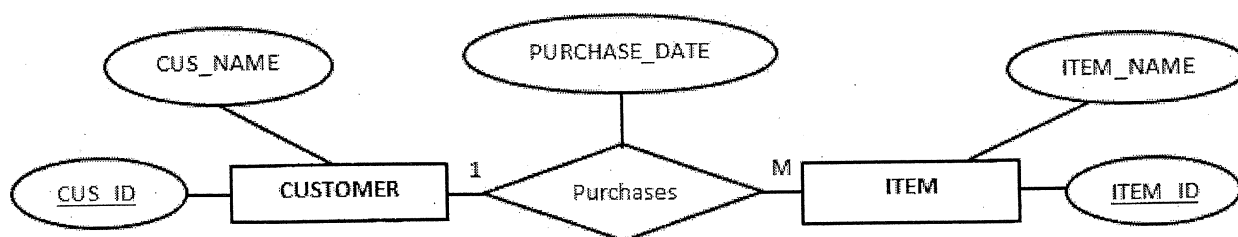
Date: 24.07.2016

Time: 9.30 a.m. – 12.30 p.m.

Answer FOUR (4) Questions ONLY.

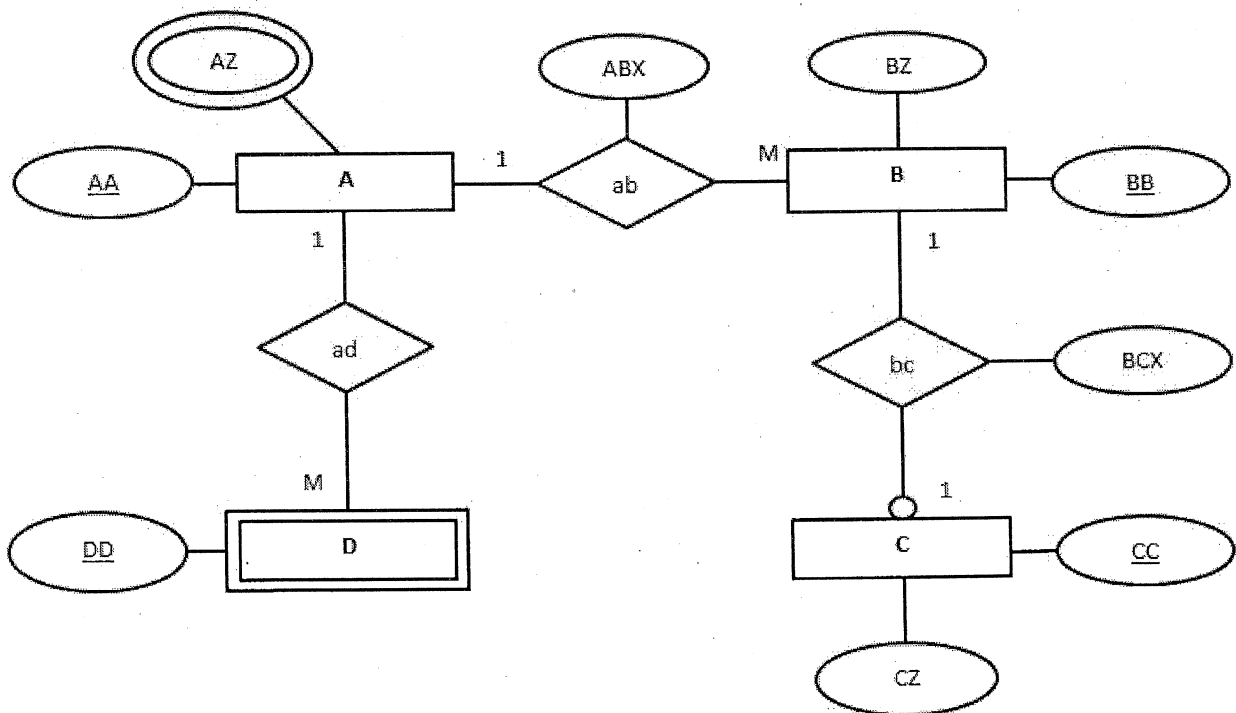
QUESTION 01

- 1) State the three main disadvantages of using file system data management.
- 2) State whether the following statements are **True** or **False**. If **False** state why.
 - a) Meta data are the instructions and rules that govern the design and use of the database system.
 - b) DBMS is the database system's heart.
 - c) The conversion from a manual file system to a matching computer file system is the task of a database administrator.
 - d) Relational database model is a conceptual database model.
 - e) Qualified to be selected, but not selected as primary key are known as Secondary Keys.
- 3) Describe both functional dependence and full functional dependence database concepts.
- 4) Briefly describe the following terms of a database system.
 - a) Field
 - b) Record
 - c) File
- 5) What is a database model?
- 6) Why we call Entity Relationship model is an effective communication tool?
- 7) What is meant by referential integrity?
- 8) Draw the appropriate relational schema for the following ER diagram.



QUESTION 02

- 1) A DBMS can be classified according to the “expected type and extent of use”. State the two types of DBMSs under the above classification and briefly describe each DBMS type.
- 2) Fill in the blanks with appropriate terms.
 - a) Good relevant & timely is the key to good decision making.
 - b) handles all the complicated activities required to translate the designer’s view of the structures into structures that are usable to the computer.
 - c) A poorly designed database is likely to become a breeding ground for data.
 - d) Manage the dbms use and ensures that the database is functioning properly.
 - e) In data model, each **child** has only one **parent**.
 - f) is a collection of programs that manages the data structures and controls the access to the data stored in the database.
- 3) What is database communication interface? Give one example of a communication interface.
- 4) Consider the following ER diagram.



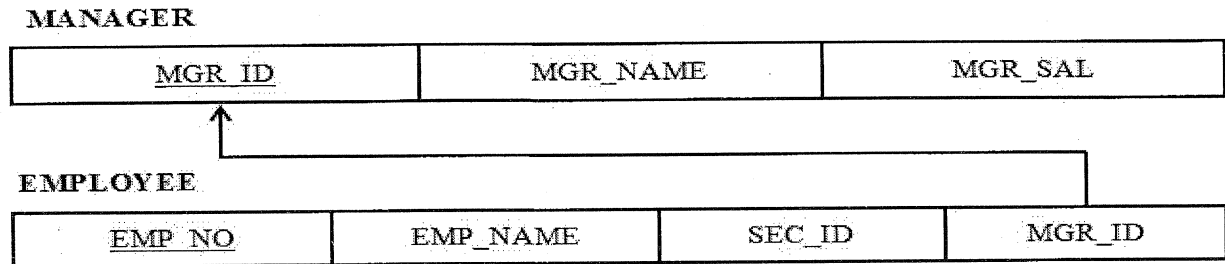
Draw the appropriate relational schema for the given ER diagram.

- 5) The following shows a part of the relational schema drawn for 'ABC_COMPANY' database. Create this database and implement the tables on it.

Primary keys should not allow NULL values. Foreign keys should change accordingly on deletions and updates.

MGR_ID, MGR_SAL, EMP_NO, SEC_ID: INTEGER

MGR_NAME, EMP_NAME: VARCHAR (30)



QUESTION 03

Consider the following tables.

A

TYRE_SIZE	BRAND
R12	DUNLOP
R13	BRIDGESTONE
R14	MAXXIS
R15	DUNLOP
R16	NANKANG

B

TYRE_SIZE
R12
R15

C

MANAGER_NAME	DEPARTMENT
PERERA	IT
LIYANAGE	SALES
SILVA	ACCOUNTS
GUNARATHNA	PROCUMENT
WICKRAMASINGHA	TRANSPORT

D

MANAGER_NAME	DEPARTMENT
PERERA	IT
GUNARATHNE	PROCUMENT
SILVA	ACCOUNTS
RAJAPAKSHA	MAINTENANCE

F

TRANSMISSION	ENGINE_POWER
A/T	1300
M/T	1500
A/T	1500

E

BRAND	MODEL
TOYOTA	AQUA
NISSAN	LEAF
TOYOTA	COROLLA
NISSAN	SUNNY

- 1) What are the output tables you get, when you apply the following relational database operators to the above tables (A, B, C, D, E and F are table names)?
 - a) **A DIVIDE B**
 - b) **C DIFFERENCE D**
 - c) **C INTERSECT D**
 - d) **E PRODUCT F**
- 2) Write suitable SQL queries to do the following tasks.
 - a) Select the BRAND and MODEL from table E, which has the MODEL ending with character 'a'
 - b) Select the TYRE_SIZES of DUNLOP brand from table A.
 - c) Select the MANAGER_NAMES and length of the MANAGER_NAMES from table C.
 - d) Select the first three letters of MANAGER_NAMES from table D.

3)

Consider a bank database system.

The bank has customers. Each customer has an ID to identify them. Apart from that they keep the name and address of the customer.

Each customer must own at least one account and each account must be owned by only one customer.

Each account has an ID to identify it. Apart from that it keeps the account type.

Each customer may maintain many fixed deposits and each fixed deposit must be maintained by only one customer.

Each customer may requests a loan and each loan must be requested by only one customer.

Each fixed deposit and loan has an id to identify it. Apart from that it keeps the interest rate.

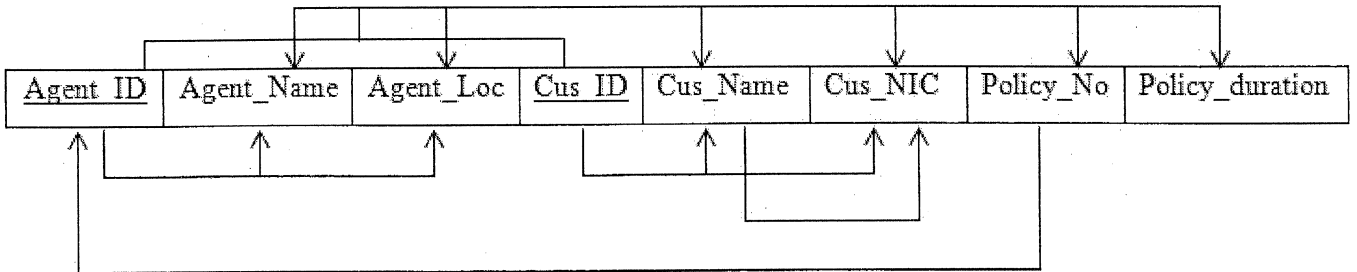
Draw the complete ER diagram (use Chen notation).

- Show the proper connectivity of the relationships.
- Show the cardinalities of each entity with each relationship.
- Represent the relationship`s participation as optional or mandatory.

- 4) Draw the appropriate relational schema for the above ER diagram drawn for part (3).

QUESTION 04

- 1) What is de-normalization?
- 2) Consider the following diagram.



- a) What is the Normal form that this table is currently in?
- b) What is “Partial Dependency”? If there are any partial dependencies in the above diagram, identify and mark them.
- c) What is “Transitive Dependency”? If there are any transitive dependencies in the above diagram, identify and mark them.
- d) Normalize this table conform to both Third Normal Form (3NF) and the Boyce-Codd Normal Form (BCNF).

Clearly show the steps (1NF, 2NF, 3NF and BCNF) you follow and mark the primary keys of each decomposed table.

- 3) By looking at the two tables (**ACTOR** and **MOVIE**) in the ‘**FILM**’ database, write the outputs of the following SQL queries.

ACTOR

ACT_ID	ACT_NAME	ACT_AGE	ACT_SAL	MOV_NO
100	Hemal Ranasinghe	32	150000	1
101	Janith Wickramage	30	145000	3
102	Roshan Ranawana	35	160000	3
103	Jackson Anthony	67	143000	2
104	Bimal Jayakody	39	155000	1
105	Uddika Premarathne	36	148000	4

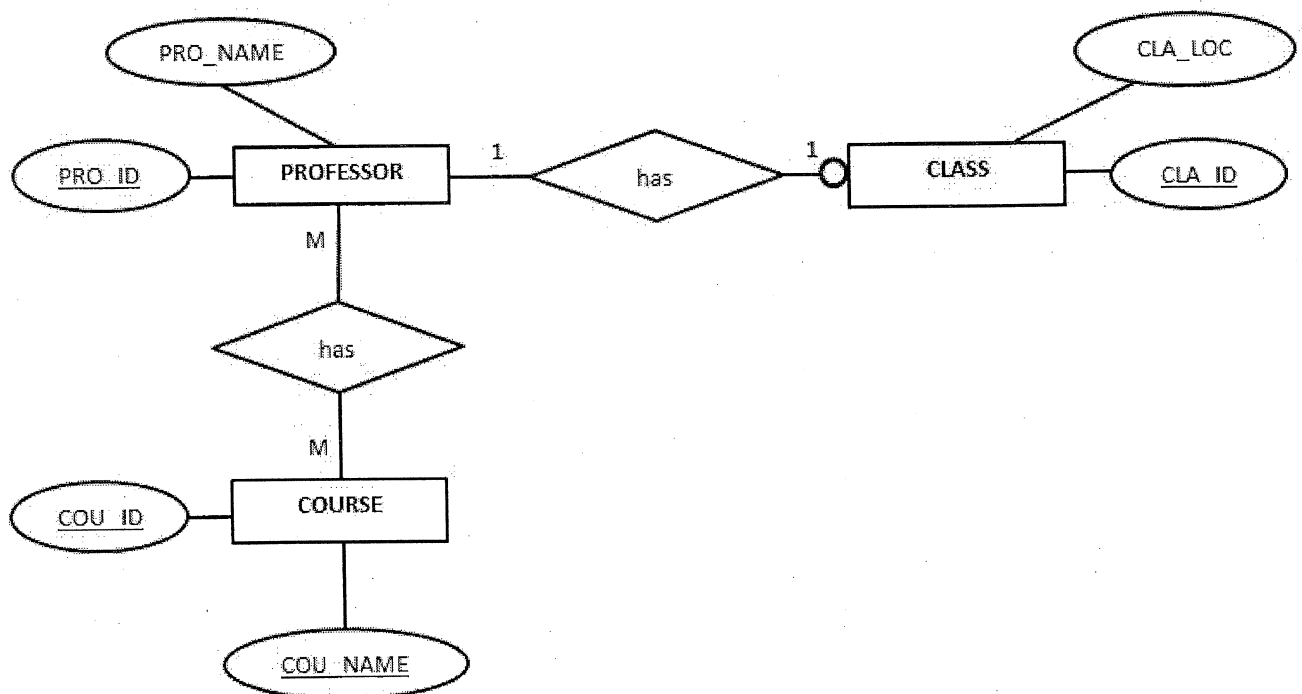
MOVIE

MOV_NO	MOV_NAME	MAIN_ACT_ID	MEMBERS
1	Adaraneeya kathawak	100	16
2	Kusa Paba	103	20
3	Hiri poda wessa	102	12
4	Paththini	105	32

- a) SELECT ACT_ID FROM ACTOR WHERE ACT_NAME LIKE '%y';
 - b) SELECT MAX(ACT_SAL) FROM ACTOR WHERE NOT EXISTS(SELECT * FROM MOVIE WHERE MEMBERS > 35);
 - c) SELECT ACT_ID FROM ACTOR WHERE ACT_AGE > ANY (SELECT ACT_AGE FROM ACTOR WHERE ACT_SAL > 145000);
 - d) SELECT MOV_NO, COUNT(*) FROM ACTOR GROUP BY MOV_NO;
 - e) SELECT ACT_NAME, REPLACE(ACT_NAME, 'o', 'u') FROM ACTOR;
 - f) SELECT MOV_NAME, INSTR(MOV_NAME, 'a') FROM MOVIE WHERE MEMBERS < 20;
 - g) SELECT SUBSTRING(MOV_NAME, 1, 4) FROM MOVIE;
 - h) SELECT ACT_NAME, LENGTH(ACT_NAME) FROM ACTOR;
- 4) State the difference between **GROUP BY** and **ORDER BY** clauses.

QUESTION 05

- 1) State the difference between **TRANSLATE** and **REPLACE** functions.
- 2) Draw the appropriate relational schema for the following ER diagram.



3) Read the following description.

Temporary employees of ABC Company work on many departments. The table below lists the no of hours of each employee who worked under several departments.

The **DEP_ID** and the **EMP_ID** together uniquely identify the no of hours of each employee under several departments.

DEP_ID	EMP_ID	DEP_NAME	NIC	EMP_NAME	DURATION
100	11233	IT	661122537V	S.Munasinghe	120
200	11420	SALES	681020332V	A.Abeyrathne	160
100	11420	IT	681020332V	A.Abeyrathne	80
400	11233	ACCOUNTS	661122537V	S.Munasinghe	100

The attributes have the following functional dependencies.

- DEP_ID, EMP_ID → DEP_NAME, NIC, EMP_NAME, DURATION
- DEP_ID → DEP_NAME
- EMP_ID → NIC, EMP_NAME
- NIC → EMP_NAME

- a) What is the Normal Form that this table is currently in?
- b) If there are any partial dependencies and transitive dependencies, identify and show them.
- c) Normalize this table conform to Third Normal Form (3NF).
Clearly show the steps (1NF, 2NF and 3NF) you follow and mark the primary keys of each decomposed table.
- d) What is the main requirement of a table to be in Boyce-Codd Normal Form (BCNF)?
- e) Are the tables you acquire in part(c) also in BCNF?

QUESTION 06

- 1) What are Data Definition Language (DDL) and Data Manipulation Language (DML)?
- 2) What is Data Control Language (DCL)?

3) Consider a small hospital system.

The hospital has wards, doctors and patients. Each ward has an ID to identify it. Apart from that it keeps the ward name.

Each doctor has an ID to identify them. Apart from that they keep name and phone number. Each doctor works on at least one ward and each ward is worked by at least one doctor.

Each patient has an ID to identify them. Apart from that they keep the name and address. Each doctor treats at least one patient and each patient is treated by at least one doctor.

Each patient may admit to a ward and each ward is admitted by at least one patient.

Draw the complete ER diagram (use Chen notation)

- Show the proper connectivity of the relationships.
- Show the cardinalities of each entity with each relationship.
- Represent the relationship's participation as optional or mandatory.

4) Consider the following tables 'Doctor' and 'Ward' in the hospital database.

DOC_ID	DOC_Name	DOC_Sal	WARD_ID	WARD_ID	WARD
10	Ruvan	150000	1	1	Accident
20	Sherrif	125000	2	2	Cardiology
30	Senaka	130000	3	3	Orthopedic
40	Saman	160000	2		

- Write a statement to modify the **DOC_SAL** into 135000 of **DOC_ID** 30.
- Use **INNER JOIN** operator to join the above two tables.
- Draw the resulting table you get after joining the tables.
- Write a SQL statement to show all the doctor details, whose names contain the character 'e'.
- Write a SQL statement to show the average salary, minimum salary and maximum salary of doctors and group them according to the **WARD_ID**.

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