The Open University of Sri Lanka
Master of Arts in Teacher Education
Final Examination 2005
CSE1175: Database Management Systems
Duration: Two Hours

Date: 11.05.2006	Time: 10.00 a.m. – 12.00 noon

Answer **FOUR** questions **ONLY.**

(01)

(a) Discuss very briefly each of the following terms:

(i) Field   (ii) Record   (iii) File

(b) What is *data redundancy*? Which characteristics of the file system can lead to it?

(c) What is a *DBMS* and what are its functions?

(d) In an organization, there are employees ($e_1, e_2, \ldots, e_n$), departments ($d_1, d_2, \ldots, d_n$) and projects ($p_1, p_2, \ldots, p_n$). By considering the relationships *manages, works_for* and *works_on* between employees, departments and projects, explain the three types of relationships associated among data. State clearly any assumptions you make.

(02)

(a) Discuss the difference between a *composite key* and a *composite attribute*. How would each be indicated in an ER diagram?

(b) What two causes of action are available to a designer when a *multivalued attribute* is encountered? Which action is better and why? Explain with an example.

(c) Given the following business rules, create the appropriate ER diagram for each of the specified relationships:

    a. A company operates four departments
    b. Each department employs employees
    c. Each of the employees may or may not have one or more dependants
    d. Each employee may or may not have an employment history

(d) Using the ER diagram **components** developed in the above question, create an ER diagram that includes **all** the components.

(03)

(a) State *four* types of *users* in a database system.

(b) A particular organization needs to keep track of its employees. They keep each employee's name, job description and address. The management needs to list employees according to the surname and the city they live. The name of the file containing the data is called as "EMPLOYEE". Identify the suitable fields for this file to achieve the needs of the management. Use proper naming conventions.

(c) "*Within the broad key classification, several specialized keys can be defined*" Discuss what you mean by the following:

(i) Primary Key
(ii) Foreign Key

(d) Suppose that you have the entity relationship model shown in the following figure:
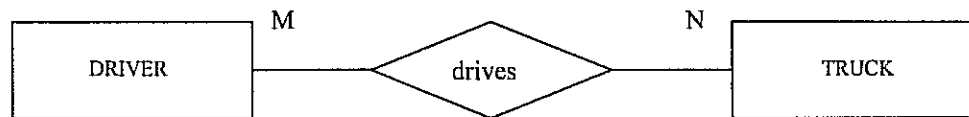

Note: During some time interval, a *DRIVER* can drive many different *TRUCK*s and any *TRUCK* can be driven by many *DRIVERS*s

How would you convert this model into an entity relationship model that displays only 1:M relationships? (Make sure that you draw the revised entity relationship model)

(04)

(a) Attributes in a database are classified as *Composite* and *Simple*. Explain.

(b) What do you mean by the *degree* of a relationship?

(c) What are the three types of *relationships* with one, two and three participants?

(d) Give an example each for the first two types.

(e) "*A participating entity in a relationship is either Optional or Mandatory*" Explain with an example. Note: Consider a relationship with two entities.

(05)
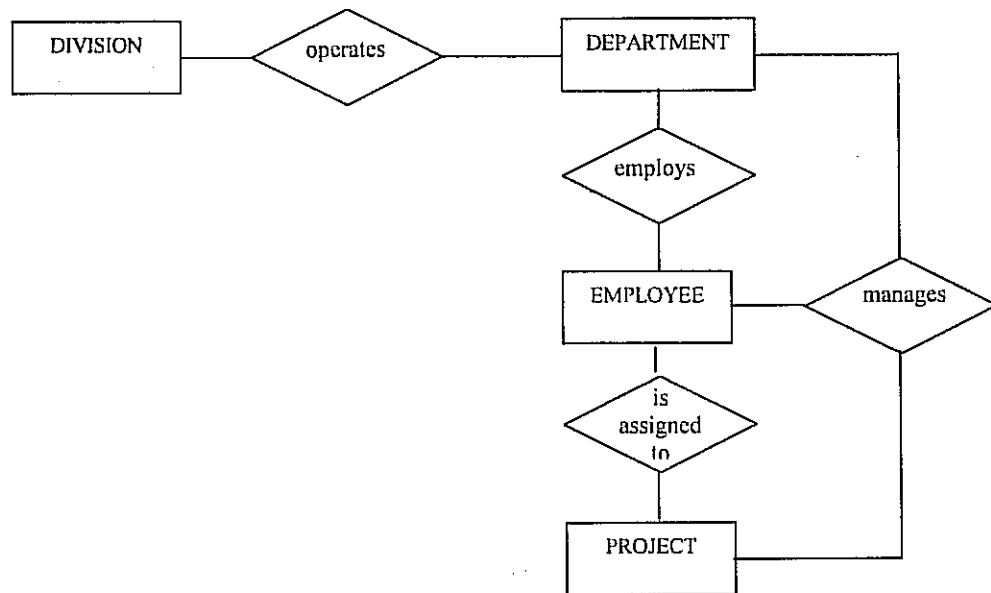
Use the following business rules to write all appropriate *connectivities* in the ER diagram given above.

- A department employs many employees, but each employee is employed by one department.
- Some employees are not assigned to any department.
- A division operates many departments, but each department is operated by one division.
- An employee may be assigned to many projects and a project may have many employees assigned to it.
- A project must have at least one employee assigned to it.
- One of the employees manages each department.
- One of the employees runs each division.

(a) Write all the *cardinalities* into the model.

(b) Modify the ER model to avoid M:N relationships. Then, rewrite the *connectivities* and *cardinalities* to match the changes you have made.

(06)

(a) What is *normalization*? When is a table in *1NF*, *2NF* and *3NF*?

(b) You are given the *dependency diagram* as shown below:
   Identify and discuss each of the indicated dependencies.

PROJ_NUM	PROJ_NAME	EMP_NUM	EMP_NAME	JOB_CLASS	CHG_HOUR	HOURS
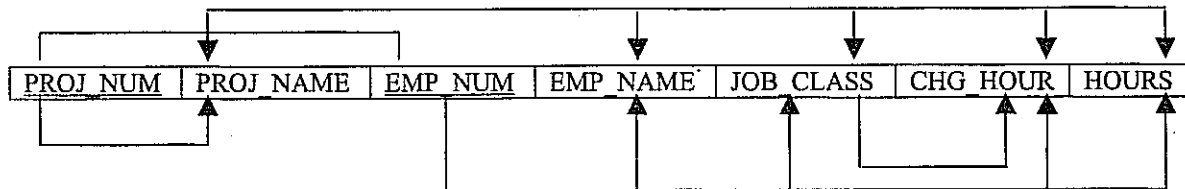
(c) Create a database for the above attributes in (b) whose tables are at least in 2NF, showing the dependency diagrams for each table.

(d) Create a database for the above attributes in (b) whose tables are at least in 3NF, showing the dependency diagrams for each table.

(e) What three *data anomalies* are likely to be the result of *data redundancy*? How can such anomalies be eliminated?

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