

The Open University of Sri Lanka
 B.Sc. Degree Programme: LEVEL 05
 Department of Mathematics and Computer Science
 Final Examination 2010/2011
CSU3278 – DATABASE MANAGEMENT SYSTEMS
DURATION: Three Hours (3 hours)



Date: 20/06/2011

Time: 9.30am – 12.30 pm

Answer **FOUR** Questions **Only**

QUESTION 1

- 1.1) Describe the difference between *data* and *information* using an example.
- 1.2) What is *data independence* and why it is important?
- 1.3) What is meant by the term *data anomaly*? Explain the three types of data anomalies using well defined single example.
- 1.4) Compare and contrast the database systems and file systems.
- 1.5) Briefly describe the terms database security management, data integrity management, data dictionary management in the context of DBMS functions.

QUESTION 2

- 2.1)
 - a) What is meant by an attribute in ER models?
 - b) Give three different types of attributes using suitable examples. You should use the correct symbols to illustrate the attribute type.
- 2.2)
 - a) Draw an ER diagram for the following situation stating appropriate assumptions.

A personal computer (PC) consists of many essential hardware parts in its system unit. These hardware parts could be a product of different manufacturers (Eg. VGA card produced by several manufacturers such as ATI or NVIDIA). Manufacturers sell these hardware parts through different resellers. Retail vendors order the hardware parts in large quantities from those resellers (not from manufacturers). Customers can only purchase these hardware parts from different retail vendors. A PC could be assembled from hardware parts purchased from a single vendor or from multiple vendors. Multiple PCs could be owned by a single customer.

- b) Give relations with appropriate attributes matching the ER diagram you have drawn for 2.2 a) above.

QUESTION 3

- 3.1) Explain the keywords *Relation*, *Attribute*, *Tuple* in the context of the relational model.
- 3.2) Consider the following items that are likely to be in a library administration system. Categorize these items into entities (entity types), attributes, an occurrence of an entity (tuple) or none of these.
- Book, ISBN (International Standard Book Number), Author, Author Name, Librarian, Programming in Pascal, Introduction to operating systems, Loan Date, Fine
- 3.3) Compare and contrast *Hierarchical database model* and *Network database model* by taking a suitable example.
- 3.4) a) What is meant by the term *Relationship* in a Relational model?
b) Explain the importance of *foreign key* in a relationship in the context of relational model.

QUESTION 4

- 4.1) State four types of users in a database system and briefly describe their functions.
- 4.2) In the context of relational database modeling, what are the three types of relationships with one, two and three participants? Also give an example for each type of relationship.
- 4.3) What two courses of action are available to a designer when a multi-valued attribute is encountered? Which action is better and why explain using an example.
- 4.4) Stating the assumptions, draw an ER diagram to match the following requirement.

An Institution has a group of scientists who conduct various experiments using chemical substances. Each experiment is requiring standard set of chemicals and testing equipment. The Equipments could be reusable but chemicals are not. They have to be ordered from internal store of the institution. The Store need to keep standard set of chemicals in stock and the stock need to be always updated when a scientist orders for specific set of chemicals for experiments. Scientist can place an order for essential equipments and chemicals that are needed to carryout multiple experiments at once. The store has to purchase chemicals and equipments from different suppliers. Sometimes more than one scientist can participate in conducting experiment.

QUESTION 5

- 5.1) Why normalization is required for a relation.
- 5.2) State rules used to convert a relation to 1NF, 2NF, 3NF. (NF-Normal Form).
- 5.3) Obtain the 2NF and 3NF relations from following table. Identify suitable Keys to the relations you obtain. State assumptions you make.

Stuid	stuname	staffid	staffname	classcode	enrollgrade
125	Janaka	25	nishantha	21334	A
125	Janaka	20	palitha	32456	C
135	Kumara	20	palitha	28458	B
144	Kelum	25	nishantha	27563	C
144	Kelum	20	palitha	32456	B

- 5.4) Is it possible to convert the relation given above to BCNF ? if yes, then obtain the relation in BCNF.

QUESTION 6

- 6.1) By means of a example, Explain the term *cardinality*.
- 6.2) Draw partial ERDs for each of the following cases. State any assumptions you make.
- Each soldier in a camp belongs to a single platoon. One or more platoons engage in a mine cleaning operation.
 - A doctor can serve in several clinics and patients may or may not be present for a particular clinic.
 - A record room in a school may be occupied by one or more employees. A student may request for a personal record from a record room
 - A worker may attend to several training workshops and a workshop may have several works as participants
 - A computer technician may repair a personal computer.
- 6.3) Write SQL statements to create the following three table structures including creation of proper primary and foreign keys. Primary keys are underlined. Jobtype and empid are foreign keys in the table Payment. (Do not write SQL to insert data into tables)

Table name: *jobrate*

<u>jobtype</u>	brate	arate
A	2000	1000
B	5000	1500

Table name: payment

<u>jobid</u>	<u>jobtype</u>	<u>bhrs</u>	<u>ahrs</u>	<u>empid</u>
a100	a	8	2	H2301
a102	a	6	2	H2305
a103	b	3	1	H2305

Table name: person

<u>empid</u>	<u>firstname</u>	<u>lastname</u>	<u>age</u>	<u>hometown</u>
H2301	kamal	silva	31	gampaha
H2302	kisani	pathirana	22	kandy
H2303	janaka	perumal	25	colombo

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