SCHEDULE I / ITEM 5   **October 2006**

DATA BASE MANAGEMENT SYSTEMS (INFORMATICS)

Note: This examination consists of 7 questions on 2 pages.   **Marks**

Q. No	Time: 3 hours	Value	Earned
1	For the following relational database structure, write the appropriate SQL query to answer the given questions: BUILDING (address, use, value, height, parcel number) PARCEL (cadastral number, use, area, value) PERSON (name, SSN, date of birth) OWNBUILDING (address, date of transaction, price, person SSN) OWNPARCEL (cadastral number, date of transaction, price, person SSN) LIVEINBUILDING (building address, person SSN) a. How many buildings are there on parcel 123 ? b. What is the total value of the property (parcel + buildings) located at 55 Main Street? c. What is the name of the owner(s) of parcel 123 ? d. What is the total value of the properties (parcels + buildings) owned by John Smith? e. List the name of all persons who own a building where they do not live	15	
2	In a relational database management system, how do you implement the following associations: a. One-to-one where the association is facultative in one direction and mandatory in the other direction? b. Recursive one-to-many? c. Many-to-many with attribute to the association?	9	
3	You want to develop a new GIS package on top of a database management system. To do so, you have to design a database structure dealing with geometric primitives. You want to support isolated points (eg. for hydrants), isolated lines (eg. for some fences) and isolated polygons (eg. for buildings). You also want to support adjacent polygons (ex. for parcels) without storing redundant lines (eg. boundaries of adjacent parcels). Similarly, you want to avoid duplication of the points used to connect lines (eg. street intersections), leading you to call them nodes and to store them in a different place than the points that are not used to connect lines. Finally, you want to support loops (eg. a road going around an island).	26	

	Draw the database schema of the geometric engine of your new GIS. Write explicitly the name of all associations and all their multiplicities (cardinalities). (You can use UML, Entity-Relationship or Relational modeling technique).		
4	What are the steps required to develop a spatial database, from the discovery of the needs of the users to the delivery of a working system?	13	
5	What are integrity constraints? From the database schema you created in the previous number, give three examples.	10	
6	Describe one way to link database data in a DBMS (ex. a building address) with the cartographic data in a GIS (ex. a polygon). Give an example.	6	
7	Define each of the following: a. Database b. Database Management System c. Relational Table d. Tuple e. Data Definition Language (DDL) f. Primary key g. Foreign key	21	
	Total Marks:	100	