



NATIONAL OPEN UNIVERSITY OF NIGERIA
University Village, 91 Cadastral Zone, Nnamdi Azikwe Expressway, Jabi, Abuja
FACULTY OF SCIENCES
COMPUTER SCIENCE DEPARTMENT
2020_2 EXAMINATION

DAM 461: STATISTICAL DATABASE SYSTEM

Credit: 3 units

TIME ALLOWED: 2½ Hours

INSTRUCTION: Answer Question 1 and any other FOUR (4) Questions

1a (i). What is the major difference between data and information? **(2 marks)**

1a (ii). What is a relational database? **(2 marks)**

1a (iii) Mention the two approaches to database systems and state their major difference. **(2 marks)**

1b (i). Define the following:

- a. *Data Model* **(1 mark)**
- b. *Database schema* **(1 mark)**
- c. *Database state* **(1 mark)**

Use the information below to answer question 1b (ii)

UPS prides itself on having up-to-date information on the processing and current location of each shipped item. To do this, UPS relies on a company-wide information system. Shipped items are the heart of the UPS product tracking information system. Shipped items can be characterized by item number (unique), weight, dimensions, insurance amount, destination, and final delivery date. Shipped items are received into the UPS system at a single retail center. Retail centers are characterized by their type, uniqueID, and address. Shipped items make their way to their destination via one or more standard UPS transportation events (i.e., flights, truck deliveries). These transportation events are characterized by a unique scheduleNumber, a type (e.g, flight, truck), and a deliveryRoute.

1b (ii) Create an Entity Relationship diagram that captures this information about the UPS system. Be certain to indicate identifiers and cardinality constraints. **(7 marks)**

1c (i). Differentiate between statistical database and statistical DBMS? **(2 marks)**

1c (ii). Describe the Statistical Object Representation Model (STORM). **(2 marks)**

1c (iii). Explain the concept of the relationship between Query Denial and Information Leakage. **(2 marks)**

2a (i). Differentiate between

- a. Composite and Simple attributes **(2 marks)**
- b. Single-valued and Multivalued attributes **(2 marks)**

2a (ii) State three functions of a current generation DBMS. **(3 marks)**

2b. Who is a database actor? List and describe the functions/roles of any four database actors you know? **(5 marks)**

3a.(i). State four advantages of using a DBMS. **(4 marks)**

3a (ii). Describe the following categories of DBMS languages:

- a. Data Definition Language **(1 mark)**
- b. Data Manipulation Language **(1 mark)**

3b. Explain the following models:

- i. Relational Model **(2 marks)**
- ii. Hierarchical Model **(2 marks)**
- iii. Object-relational model **(2 marks)**

4a (i). Describe a client/server architecture. **(2 marks)**

4a (ii). Mention 2 examples of specialized servers. **(1 mark)**

4a (iii) State three functions of the database system utilities? **(3 marks)**

4b (i). What is an entity type? Differentiate between weak and strong entity types. **(4 marks)**

4b (ii) Give four examples of queries associated with the statistical Database? **(2 marks)**

5a (i). Explain the concept of perturbation. **(3 marks)**

5a (ii). What do you understand by The SPEA Smart Airport Statistical Data Management System (SMART STAT)? **(2 marks)**

5b (i). Differentiate between data confidentiality and statistical disclosure. **(4 marks)**

5b (ii). Describe the three kinds of data contained in a statistical database. **(3 marks)**

6a. Given the tables below:

(a) Database with Statistical Access with $N = 13$ Students

Name	Sex	Major	Class	SAT	GP
Allen	Female	CS	1980	600	3.4
Baker	Female	EE	1980	520	2.5
Cook	Male	EE	1978	630	3.5
Davis	Female	CS	1978	800	4.0
Evans	Male	Bio	1979	500	2.2
Frank	Male	EE	1981	580	3.0
Good	Male	CS	1978	700	3.8
Hall	Female	Psy	1979	580	2.8
Iles	Male	CS	1981	600	3.2
Jones	Female	Bio	1979	750	3.8
Kline	Female	Psy	1981	500	2.5
Lane	Male	EE	1978	600	3.0
Moore	Male	CS	1979	650	3.5

(b) Attribute Values and Counts

Attribute A_j	Possible Values	$ A_j $
Sex	Male, Female	2
Major	Bio, CS, EE, Psy, . . .	50
Class	1978, 1979, 1980, 1981	4
SAT	310, 320, 330, . . . 790, 800	50
GP	0.0, 0.1, 0.2, . . . 3.9, 4.0	41

What are the results of the following statistical queries?

- count (Female · CS)
- sum(Female · CS, SAT)
- Count(Male · (CS + EE))
- max(Female · CS, SAT)
- min(Male · (CS + EE)), GP)
- count(Male · Bio) **(6 marks)**

6b. Describe the following:

- query restriction **(2 marks)**
- query size restriction **(2 marks)**
- partitioning **(2 marks)**