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**University Examinations 2014/2015**

THIRD YEAR, SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER TECHNOLOGY, BACHELOR OF BUSINESS INFORMATION TECHNOLOGY.

AND

THIRD YEAR, FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY.

**CIT 3302/CIT 3326/CIC 3378: ADVANCED DATABASE SYSTEMS/DATABASE DESIGN AND MANAGEMENT.**

**DATE: AUGUST 2015 TIME: 2 HOURS**

**INSTRUCTIONS:** *Answer question* ***one*** *and any other* ***two*** *questions*

**QUESTION ONE (30 MARKS)**

1. Citing appropriate examples discuss the following concepts as used in databases: (6 marks)
2. Transaction
3. Deadlock
4. Consistent database state
5. Differentiate between the following concepts: (6 marks)
6. Database replication and database fragmentation
7. Database and data warehouse
8. Rollback and roll forward
9. A typical banking institution has several branches and several customers, at a given point in time multiple transactions are taking place. Using illustrations from the given scenario discuss the problems that can arise should the concurrent transactions not be managed. For each problem propose a solution. (9 marks)
10. Discuss the four transparency features of a distributed database management system. (6 marks)
11. Briefly discuss the relationship types in entity relationship modelling. (3 marks)

**QUESTION TWO (20 MARKS)**

1. Discuss the four properties of transactions (8 marks)
2. SQL is a DDL and a DML discuss the distinctions between the two and state any two SQL commands that fall in each category. (4 marks)
3. Consider the relational schemas below. Draw an entity relationship diagram (ERD) for the logical design. Clearly show the relationships and the cardinalities. Show clearly also the Primary Key (PK) and/or Foreign Key (FK) applied in each relation. SUPPLIER (SupplierNo. SupplierName, SupplierArea, SupplierStreet, SupplierCity)

PART (PartNo, PartName, UnitPrice, SupplierNo)

LINE\_ITEM(OrderNo, PartNo, Part\_Quality)

ORDER(OrderNo, Order\_date) (8 marks)

**QUESTION THREE (20 MARKS)**

1. Discuss any two problems that are avoided when the relations are normalized up to at least the Third Normal Form (3NF). (3 marks)
2. Meru University of Science and Technology intends to develop an online examination processing system. The system will enable the students to remotely access their results. Among other requirements security is considered to be a very crucial component of the system. Using the above scenario answer the following questions:
3. Citing examples discuss the three objectives in designing a secure system (6 marks)
4. Discuss the role that a security policy document will play in the above scenario (3 marks)
5. Discuss any four major security threats that might face the system and for each threat state a countermeasure. (8 marks)

**QUESTION FOUR (20 MARKS)**

1. Discuss the concept of a distributed DBMS in respect to how data is stored and updated. ( 6 marks)
2. A leading mobile phone service provider has been in existence for the last fifteen years over that period they have used a database to store all customer transactions. Advise on any four kinds of patterns that can be mined from the data. (8 marks)
3. Discuss the use of locks in concurrency control; elaborate on how locks work, the types of locks and any TWO problems that can be caused by locks. (6 marks)

**QUESTION FIVE (20 MARKS)**

1. Consider the following table structure:

Product(P\_code, P\_description, P\_indate, P\_price, P\_quantity, V\_code)

Vendor(V\_code, V\_name, V\_contact, V\_address)

P\_code and V\_code are the primary keys to the product and vendor tables respectively and V\_code is the foreign key in the product table. Write SQL queries that will:

1. Create the product table.
2. Create a view that contains the names of the products to be ordered (use a reorder level of 50)
3. Output the name of the product with the highest price
4. Output the average price of products supplied by a vendor whose code is 0034.
5. Outputs the names of all products alongside the names of the vendors who supply them.
6. Modify the data type of the attribute V\_name to varchar(50)
7. Delete the records of a vendor whose vendor code is 0098
8. Update the contacts of a vendor whose vendor code is 0198
9. Add a column called V\_AccNo to the vendor table.
10. Delete the column called V\_AccNo from the vendor table. (20 marks)