Test-1 Review  
C442 / I451 / C690  
Database Systems  
(Chapters 1, 2, 3, 5, 8)  

Part - 1  
What is a database?  
Persistent vs. non-persistent data.  
What is a DBMS?  
Why use a database?  
  Redundancy, shareability, inconsistency, standards, integrity, data independence  
Advantages of databases over traditional file systems.  
When not to use a DBMS?  
Database Models (relational, hierarchical, network and object oriented)  

Part - 2  
Data Models (set of concepts used to describe the structure of a database)  
  1) High level or conceptual (entities, relationships, attributes) (ER)  
  2) Representational or Implementation data model (relational, hierarchical, network, OO)  
  3) Low level or physical (record format, access mechanism)  
Database Schema (structure or intension of the database)  
Database State (occurrences, instances or the extension of the database)  
DBMS architecture (ANSI/SPARC model)  
  1) External view (individual user or programmer's view)  
  2) Conceptual view (representation of the entire database as known to user community)  
  3) Internal view (storage view)  
Mapping between views  
Physical and logical data independence  
Data sub-languages (DDL and DML)  
Database query facilities (procedural and non-procedural)  
  1) Form based (QBE)  
  2) Menu based  
  3) Natural language  
  4) Query language (SQL, QUEL)  

Part - 3  
ER Modeling (a conceptual design tool for database design)  
  1) Entities  
  2) Relationships  
  3) Attributes  
Be prepared to produce an ER based on a description of an organization.  
Types of attributes (simple, composite, single and multi-valued, stored, derived and NULL)  
When can an attribute have a null value?  
Keys, composite keys, domains, weak entities, owner or identifying entities  
Recursive relationships, degree of a relationship  
Cardinality and ordinality.  

Part - 4  
Relational Data Model and Relational Algebra  
Definitions for database, relation, attribute, tuple, domain under the relational model.
Relation Schema (relation name, list of attributes, domain of each attribute)
Degree of a relation (number of attributes in the schema)
Basic properties of relations: (no duplicate tuples, unordered, all attributes are atomic)
Relational model constraints:
  1) Domain constraints (attributes should be atomic & from their domain)
  2) Key constraints (all tuples of a relation must be distinct)
  3) Entity integrity constraints (no primary key value can be NULL)
  4) Referential integrity constraints
  5) Semantic integrity constraints
Keys (super keys, candidate key, primary key, foreign key)

Operations on Relations:
  1) Update operations:
      Insert
      Delete
      Modify
  2) Relational Algebra Operators:
      select
      project
      join
      union
      intersection
      difference
      cartesian product
      divide