NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCES
COMPUTER SCIENCE DEPARTMENT
MAY 2001 EXAMINATIONS

SUBJECT: **Database Concepts**
CODE: **SCS1202**

INSTRUCTIONS TO CANDIDATES
This question paper consist of seven (7) questions answer any Five (5)

Time three (3) hours

1. Discuss the differences between the following file organisations:
   (a) serial
   (b) index-sequential
   (c) sequential
   (d) Random
   Compare their storage and access efficiencies. To what type of application is each of the organisations suited? [20]

2. Given the relation schemes:

ENROLL (S#,C#,Section)	S# represents student number
TEACH (Prof,C#,Section)	C# represents course number
ADVISE(Prof,S#)	Prof is the thesis advisor of S#
PRE_REQ (C#,Pre_C#)	Pre_C# is prerequisite course
GRADES (S#,C#,Grade,Year)	
STUDENT(s#,Sname)	Sname is student name

   Give queries expressed in relational algebra, tuple calculus, and domain calculus for the following queries:
   (a) List all students taking courses with Dube or Tutani
   (b) List all students taking at least one course that their advisor teaches
   (c) List the courses that student Felix Ruzvidzo can enroll in, i.e, has passed the necessary prerequisite courses but not the course itself. [20]

3. (a) Explain the difference between a traditional file oriented system and a database system [10]

   (b)What are the problems caused by data redundancies? Can data redundancies be completely eliminated when the database approach is used? Why or Why not? [10]

4. Drinkers drink wines in certain quantities on given dates. A drinker of a certain type is characterized by a unique national registration number, a name, and the city in which the drinker lives. A wine is characterized by a unique identification number, vineyard, vintage, and the percentage of alcohol.

   Indicating the primary key for each entity set, and ensuring that each entity set corresponds to a 3NF relation, produce an entity -relationship diagram for this miniature Database. [20]

5. (a) Briefly describe each of the three major database schemas. [12]

   (b) Define the following terms as used in the database environment [8]
   - (i) Data independence
   - (ii) Data integrity
   - (iii) Data abstraction

6. (a) Discus the following data models: [15]
   - (i) Network data model
   - (ii) Hierarchical data model
   - (iii) Relational data model

Define the following terms. [5]
- (i) Association
- (ii) Relationship
- (iii) Aggregation
- (iv) Specialisation
- (v) Generalisation

7. What is the role of each of the following in a Database management system:
   - (i) Database Administrator
   - (ii) Data Manager
   - (iii) Data Definition Language
   - (iv) Data Manipulation Language
   - (v) File manager
   - (vi) Data dictionary
   - (vii) Application programmer
   - (viii) Query processor [20]

END OF QUESTION PAPER