# Question Paper

Exam Date & Time: 23-Dec-2022 (09:30 AM - 12:30 PM)

## MANIPAL ACADEMY OF HIGHER EDUCATION

**INTERNATIONAL CENTRE FOR APPLIED SCIENCES**
**END SEMESTER THEORY EXAMINATION - DECEMBER 2022**
**III SEMESTER B.Sc. (Applied Sciences) in Engg.**

**Database Management Systems [ICS 231 - S2]**

**Marks: 50** **Duration: 180 mins.**

**Answer all the questions.**

**Missing data may be suitably assumed.**

1) A) What are the different levels of data abstraction in a Database Management System? Explain with the help of a diagram. (3)

B) What is a Primary Key and Candidate Key? How Candidate Key is it different from a Super key? Explain with examples. (3)

C) Consider the following schema: (4)

Suppliers(sid: integer, sname: string, address: string)
Parts(pid: integer, pname: string, color: string)
Catalog(sid: integer, pid: integer, cost: real)
The key fields are underlined, and the domain of each field is listed after the field name. Therefore sid is the key for Suppliers, pid is the key for Parts, and sid and pid together form the key for Catalog. The Catalog relation lists the prices charged for parts by Suppliers. Write the following queries in relational algebra
i) Find the names of suppliers who supply some red part.
ii) Find the pids of parts supplied by at least two different suppliers
Find the sids of suppliers who supply every part.

2) A) Consider the Bank Database schema: (4)
*branch (branch_name: string, branch_city: string, assets: real)*
*account (account_number: integer, branch_name: string, balance: real)*
*depositor (customer_name: string, account_number: integer, customer_city: string)*
The key fields are underlined, and the domain of each field is listed after the field name. Therefore branch_name is the key for branch, account_number is the key for account, and customer_name and account_number together form the key for depositor. The depositor relation lists the customer name(s) for