VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY (VSSUT), ODISHA
Odd Mid Semester Examination for Academic Session 2024-25

COURSE NAME: **B.Tech.** SEMESTER: **3rd**

BRANCH NAME: **Computer Science & Engineering/Information Technology**

SUBJECT NAME: **Database Engineering**

FULL MARKS: **30** TIME: **90 Minutes**

Answer **All** Questions.

The figures in the right hand margin indicate Marks. *Symbols carry usual meaning.*

Q1. Answer all Questions. [2 × 3]

a) Define the following types of keys with an example of each: candidate key, primary key, foreign key and super key. - CO1

b) Design a generalization–specialization hierarchy for a motor-vehicle sales company. The company sells commercial vehicles like trucks and buses as well as non-commercial vehicles motor cycles and cars. - CO2

c) Compute the attribute closure of the following set of functional dependencies $F = \{A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A\}$ for relation schema $R = (A, B, C, D, E)$. - CO3

Q2. [4+4]

a) Describe the three level architecture of the database system along with a neat labeled diagram. - CO1

b) What is data abstraction? Discuss the three levels of data abstraction along with the mappings in between the levels

OR

a) Consider a database used to record the marks that students get in exams related to different courses. Construct an E-R diagram that models *students*, *exams* and *courses* as entity sets, and uses a *ternary relationship*, for representation of the association among them. - CO1

b) Differentiate between a *relation schema and relation instance*. Design a relational database schema corresponding to the E-R diagram constructed in Q. 2a).

Q3. [4+4]

a) Consider the following relational schema: - CO2

PHYSICIAN (regno, name, telno, city)
PATIENT (pname, street, city)
VISIT (pname, regno, date_of_visit, fee)

Give an expression in SQL for each of queries below:

i) Get the name and regno of physicians who are in Delhi.
ii) Find the name and city of patient(s) who visited a physician on 13 August 2023.
iii) Get the name of the physician and the total number of patients who have visited her.
iv) Give the name of physicians whose fee > 500.

b) Differentiate between the following:
   i) WHERE and HAVING clause in SQL.
   ii) Strong entity set and weak entity set.

OR

a) Consider the following relations for a database that keeps track of business trips of salespersons in a sales office: - CO2

   SALESPERSON (SSN, Name, start_year, Dept_no)
   TRIP (SSN, From_city, To_city, Departure_Date, Return_Date, Trip_ID)
   EXPENSE(TripID, Account#, Amount)

   Specify the following queries in relational algebra:
   i) Give the details for trips that exceeded Rs. 20000.00 in expenses.
   ii) Print the SSN of salesmen who took trips to 'Mumbai'.

b) What is a non-procedural query language in DBMS?. What are the differences between tuple relational calculus and domain relational calculus?

Q4. [4+4]

a) Given the set of functional dependencies for a relation schema $R(A, B, C)$ as follows: - CO3
$F = \{A \rightarrow BC, B \rightarrow C, A \rightarrow C, AB \rightarrow C\}$. Find the minimal cover for F.

b) What do you mean by integrity constraint? Discuss any three important types of integrity constraints used in DBMS.

OR

a) Suppose that we decompose the relation schema $R = (A, B, C, D, E)$ into $R1 = (A, B, C)$ and $R2 = (A, D, E)$ with the following set of functional dependencies: $F = \{A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A\}$. Show that whether the decomposition satisfies both the properties of decomposition or not. - CO3

b) For a relation schema $R = (A, B, C, D, E)$ and set of functional dependencies as: $F = \{AB \rightarrow C, B \rightarrow D, A \rightarrow E\}$. Determine whether the relation R satisfies the BCNF. If not, make the relation in BCNF.