Ques 1. Database Anomalies

Consider the following relation with sample data.

AIRPORT KLX TABLE

Date	AirlineID	AirlineName	TerminalID	NumberOfGates	NumberOfDepartingFlights
11-Dec	UA	United	A	20	34
11-Dec	NW	Northwest	A	20	17
11-Dec	AA	American	A	20	11
11-Dec	DL	Delta	B	15	20
11-Dec	JB	Jet Blue	B	15	6
12-Dec	UA	United	A	20	29
12-Dec	DL	Delta	B	15	20
12-Dec	SWA	Southwest	C	15	17

The AIRPORT KLX Table captures the data about daily departing flights at the KLX Airport.

- Each airline operating at KLX airport has a unique Airline ID and an Airline Name.
- Each terminal at KLX airport has a unique Terminal ID and a fixed Number of Gates.
- Each airline is permanently assigned to one (and only one) terminal at the KLX Airport.
- Each terminal at KLX Airport can have multiple airlines assigned to it.
- Each day (Date), this table records the Number of Departing Flights at KLX Airport for each airline.

1. Using the Airport KLX Table, describe an example that illustrates the insertion anomaly. **[2 Marks]**
2. Using the AIRPORT KLX Table, describe an example that illustrates the deletion anomaly. **[2 Marks]**
3. Using the AIRPORT KLX Table, describe an example that illustrates the modification anomaly. **[2 Marks]**
4. In the AIRPORT KLX Table, identify **[6 Marks]**
   a) Full (key) Functional Dependencies
   b) Partial (key) Functional Dependencies (if any)
   c) Transitive Functional Dependencies (if any).

5. Normalize AIRPORT KLX relation up to BCNF. (Explain every step of your normalization and finally list all relations that you get because of decompositions. Do not forget to mention functional dependencies) **[8 Marks]**

Ques 2. Finding Keys and Normalization

Consider the following relation scheme and FDs:

Employee (EmpID, EmpName, Specialization, ManagerID, ProjID, ProjTitle, SupervisorName, SupervisorLocation, Bonus)

Given the following functional dependencies:

1) EmpID→EmpName
2) ProjID→ProjTitle, SupervisorName
3) SupervisorName→SupervisorLocation
4) {EmpID, ProjID, Specialization} → Bonus
5) {EmpID, Specialization} → ManagerID
6) ManagerID → Specialization

Answer the following questions:

1) Find all keys (candidate keys) **[5 Marks]**
(**Hint**: there are 2 candidate keys, both are composite keys)

2) Normalize this relation up to BCNF (explain all steps of your normalization, mention functional dependencies to justify the normalization process) **[5 Marks]**

Submission

For this lab, you must submit a PDF file containing:

1. Answers to Q1-1, Q1-2, Q1-3, Q1-4-a, Q1-4-b, Q1-4-c
2. Normalization of Airport KLX relation
3. Answers to Q2-1, Q2-2

Please submit your work prior to the due time. Rename the file as lab#_xy where # is the lab number, and x is your first name, and y is your last name.