



Daffodil International University
Department of Software Engineering
Faculty of Science & Information Technology
Final Examination, Fall 2025

Course Code: SE 223; Course Title: Database Systems

Sections & Teachers: NJ(A), TRT (B, C, E, F), CP(D, O), KRA(F, I, J), SS(G), KMH(H), MMST(K, L), AR(M, N)

Time: 2:00 Hrs

Marks: 40

Answer **ALL** Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1. **Wildlife Tracking**

RID	RName	Specialty	BCLocation	EID	EDate	HabitatTypes	AID	Species	Observation	TrackingID	HealthStatuses
R001	Dr. Elena Vargas	Ornithology	Amazon Basin	EXP101	2023-04-15	Rainforest	A101,A102	Macaw, Jaguar	Colorful plumage, Aggressive	TD001, TD002	Healthy, Injured
R002	Prof. Marcus Hale	Mammalogy	African Plains	EXP301	2023-09-10	Grassland	A301,A302	Lion, Zebra	Pride hunting, Grazing	TD004	Healthy, Malnourished
R003	Dr. Sofia Chen	Herpetology	Southeast Asia	EXP401	2024-01-05	Jungle	A401,A501	Cobra	Venomous bite	TD001, TD005	Recovering

RID—ResearcherID

RName —ResearcherName

BCLocation—BaseCampLocation

EID—ExpeditionIDs

EDate—ExpeditionDates

AID—AnimalID

✓a)	Analyze the UNF table above. Identify and explain at least 2 potential anomalies that this table can have due to its unnormalized structure, and also provide detailed reasons for each.	[Marks-4]	CLO-4 Level-4 A
✓b)	"Ignore all the values given in the table; Only work with the given attribute." Normalize the UNF table step-by-step from 1NF to 3NF (and briefly discuss if BCNF is achieved or needed).	[Marks-8]	5
✓c)	Describe the concepts of full functional dependency and partial dependency, including how they lead to different normalization issues.	[Marks-4]	A
✓d)	Define the exact rule(s) that a relation must satisfy to be in 1NF, 2NF, 3NF, and BCNF.	[Marks-4]	3

2	☒	Based on the normalized tables from Question 1 (in 3NF), draw an Entity-Relationship Diagram (ERD). Include all entities, attributes, PKs, FKs, and relationships with cardinalities	[Marks-5]	CLO-2 Level-3
3	a)	Using the normalized tables from Part 1 (Question 1), assume the following schema has been implemented in a relational database. Write SQL statements to solve the following problems: - List all researchers whose name contains "a" and whose BaseCampLocation contains "Asia". - Display ResearcherName, ExpeditionID, and ExpeditionDate for all expeditions. Order the result by ExpeditionDate descending. - Find all expeditions that took place between '2023-01-01' and '2024-06-30' (inclusive). Show ExpeditionID, ExpeditionDate, and HabitatType. - Count how many animals of each species are in the Animals table. Order by count descending. - List every HabitatType that appears in at least 2 expeditions. Show HabitatType and the number of expeditions. - List all animals (AnimalID, Species) along with their HealthStatus from the Tracking table. - Show ResearcherName, Species, and ObservationNote for every observation recorded. Order by ResearcherName. - All animals currently marked as "Injured" were re-examined and are now "Recovering". Write an UPDATE statement to change their HealthStatus accordingly. - Find researchers who have recorded more observations than the average number of observations per researcher. (Use Subquery) - Show ResearcherName and ResearcherSpecialty for every researcher whose BaseCampLocation is 'Amazon Basin' or 'Southeast Asia'.	[Marks-10]	CLO-3 Level-3
4.	a)	Explain the four ACID properties of a database transaction. For each property, give a simple example from the <i>WildLife</i> system above.	[Marks-3]	CLO-5 Level-2
	b)	Consider the following real-life scenario in the <i>WildlifeTracking</i> system, where a researcher is recording a new observation in the jungle using a mobile device. The transaction performs these steps in order: Insert a new row into the <i>Observations</i> table with ObservationNote = "Elephant calf born – healthy". Answer the following: Explain the difference between Partially Committed and Fully Committed states using the above wildlife scenario.	[Marks-2]	5

Atomicity
Consistency
Isolation
Durability

c)

Self RAJ from Res
when Name like (ay.)
AND BCL = (ASia)