ourdiu.com | Shared by Shafiur Rahman Shafim (242)

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, P), CP(D, O), KRA(F, I, J), SS(G), KMH(H), MMS(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. ***WildlifeTracking***

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	TD00, TD008	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*
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]	
c)	**Describe** the concepts of full functional dependency and partial dependency, including how they lead to different normalization issues.	[Marks-4]	
d)	**Define** the exact rule(s) that a relation must satisfy to be in 1NF, 2NF, 3NF, and BCNF.	[Marks-4]	

ourdiu.com | Shared by Shafiur Rahman Shafim (242)

2	a)	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:* **a)** List all researchers whose name contains "a" and whose BaseCampLocation contains "Asia". **b)** Display ResearcherName, ExpeditionID, and ExpeditionDate for all expeditions. Order the result by ExpeditionDate descending. **c)** Find all expeditions that took place between '2023-01-01' and '2024-06-30' (inclusive). Show ExpeditionID, ExpeditionDate, and HabitatType. **d)** Count how many animals of each species are in the Animals table. Order by count descending. **e)** List every HabitatType that appears in at least 2 expeditions. Show HabitatType and the number of expeditions. **f)** List all animals (AnimalID, Species) along with their HealthStatus from the Tracking table. **g)** Show ResearcherName, Species, and ObservationNote for every observation recorded. Order by ResearcherName. **h)** All animals currently marked as "Injured" were re-examined and are now "Recovering". Write an UPDATE statement to change their HealthStatus accordingly. **i)** Find researchers who have recorded more observations than the average number of observations per researcher. (Use Subquery) **j)** 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 *WildLife* system above.	[Marks-3]	CLO-5 *Level-2*
	b)	Consider the following real-life scenario in the *WildlifeTracking* system, where a researcher is recording a new observation in the jungle using a mobile device. The transaction performs these steps in order: 1. Insert a new row into the *Observations* 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]	

Atomicity consistency Isolation Durability

a) Select RAN from Res where Name like 'a%' AND BCL = (Asia)