SOUTH EASTERN UNIVERSITY OF SRI LANKA
FIRST EXAMINATION IN BACHELOR OF INFORMATION AND COMMUNICATION TECHNOLOGY - 2018/2019
SEMESTER – I, AUGUST 2021

CIS 11022 – DATABASE DESIGN

Answer all Questions **Time Allowed: 02 hours.**

1 a) Define the following terms in your own words:
   a. Data
   b. Information
   c. Meta data
   d. Database (20 Marks)

b) Explain followings with suitable examples:
   i. Data definition language
   ii. Data manipulation language (20 Marks)

c) What are the disadvantages of DBMS compare to file processing systems. Explain each in detail. Provide five (05) examples (30 Marks)

d) Explain the three tier architecture of DBMS with a clear illustration along with the mappings. (30 Marks)

[Total 100 Marks]

2 a) Explain the following with suitable examples:
   a. Total and partial participation
   b. Participation constraints. (20 Marks)

b) NANO Cargo is having up-to-date information on the ongoing and current location of each shipped item. NANO Cargo relies on a company-wide information system to accomplish this. Shipped items are the key of the NANO Cargo product tracking information system. The shipped items can be identified by item number (unique), weight, dimensions, insurance amount, destination, and final delivery date. Shipped items are received into the NANO Cargo system at a single retail center. Retail centers are characterized by their type, uniqueID, and address. Shipped items make their way to their destination via one or more standard NANO Cargo transportation events (i.e., flights, truck deliveries). These transportation events are characterized by a unique scheduleNumber, a type (e.g, flight, truck), and a deliveryRoute. Please create an Entity Relationship diagram that captures this information about the NANO Cargo system. Be certain to indicate identifiers and cardinality constraints. (80 Marks)

[Total 100 Marks]

3 a) Define the following terms:
   a. Relation schema
   b. Tuple
   c. Relation instance
   d. Relation cardinality (20 Marks)

b) What is Normalization in a Database? Why normalization of data is important? Explain with the suitable example. (25 Marks)

c) What is a foreign key constraint? What is referential integrity? Briefly explain with suitable arguments. (25 Marks)

d) Convert the Master Patient Table into 3rd normal form. The functional dependencies are given below. Draw the functional dependence diagram and demonstrate the outcome of each normalization step.

PatNo → PatAge, PatCity
ProvNo → ProvSpecialty
VisitNo → PatNo, VisitDate, PatAge, PatCity
VisitNo, ProvNo → Diagnosis

VisitNo	VisitDate	PatNo	PatAge	PatCity	ProvNo	ProvSpecialty	Diagnosis
V10020	1/13/2007	P1	35	DENVER	D1	INTERNIST	EAR INFECTION
V10020	1/13/2007	P1	35	DENVER	D2	NURSE PRACTIONER	INFLUENZA
V93030	1/20/2007	P3	17	ENGLEWOOD	D2	NURSE PRACTIONER	PREGNANCY
V82110	1/18/2007	P2	60	BOULDER	D3	CARDIOLOGIST	MURMUR

(30 Marks)

[Total 100 Marks]

4 a) Consider the following schema and answer the questions given below using relational algebraic notations.

passenger (pid, pname, pgender, pcity)
agency (aid, aname, acity)
flight (fid, fdate, time, source, destination)
booking (pid, aid, fid, fdate)

i. Get the complete details of all flights to Moscow
ii. Get the details about all flights from Colombo to London
iii. Find the passenger names for passengers who have bookings on at least one flight
iv. Find only the flight numbers for passenger with pid 678 for flights to Matala before 05/08/2021
v. Find the details of all male passengers who are associated with Jet agency (**Hint**: To get the link between passengers and agency, we need to join all three tables passengers, booking, and agency with necessary condition) (50 Marks)

b) Answer the following questions using SQL statements by referring the following relational schema. Note that the keys of the relations are underlined.

Student (Name, Student_No, Class, Major)
Course (Course_name, Course_No, Credits, Department)
Section (Section_ID, Course_number, Semester, Year, Instructor)
Grade_report (Student_Num, Section_ID, Grade)

i. Insert a new course
{'Discrete Mathematics', 'MAT4390', 3, 'MATH'} to the relation 'COURSE'
ii. Retrieve the names of all the students who are majoring in 'CS'
iii. Retrieve the total number of credits offered by each of the Department
iv. Retrieve the names of all the courses with their credits taught by the instructor 'Anderson' in the year 2017
v. Retrieve the Student_No and transcript of each of the student. A transcript includes course name, course number, credits, semester, year, and grade for each course completed by the student.

(50 Marks)

[Total 100 Marks]

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