EASTERN UNIVERSITY, SRI LANKA

FACULTY OF SCIENCE

Third Year Second Semester Examination in Science – 2020/2021

(July/August, 2024)

CS 3072 - Advance Database Management Systems (Theory)

Time: One h

1. Designing databases efficiently benefits from a diverse toolkit of tools and techniques.

   (a) *Simple attribute*, *composite attribute*, *multi-valued attribute* and *derived attribute* are s types of attribute that used in database modelling. Give brief description for *two* of above given attribute types with suitable examples. [20 ma

   (b) Briefly describe the differences between *specialisation* and *generalisation* in an Enhan Entity Relationship (EER) diagram with suitable examples. [20 ma

   (c) Consider a database system for a BASEBALL organisation. The data requirements summarised as follows:

   The personnel involved in the league include players, coaches, managers, and umpires. E person is identified by a unique personnel id. They are also described by their first last names along with the date and place of birth. Players are further described by ot attributes such as their batting orientation (left, right, or switch) and have a lifetime batt average. Within the players group is a subset of players called pitchers. Pitchers hav lifetime ERA (earned run average) associated with them. Teams are uniquely identified their names. Teams are also described by the city in which they are located and the divis and league in which they play. Teams have one manager, a number of coaches, and a num of players. Games are played between two teams, with one designated as the home te and the other the visiting team on a particular date. The score (runs, hits, and errors recorded for each team. The team with the most runs is declared the winner of the ga With each finished game, a winning pitcher and a losing pitcher are recorded. In case th is a save awarded, the save pitcher is also recorded. With each finished game, the num of hits (singles, doubles, triples, and home runs) obtained by each player is also recorde Draw an EER diagram for the BASEBALL database. If you need to make any assumpti include them in your answer. [60 ma

2. Organisations now rely on the database as the cornerstone of their information systems, bringing about fundamental changes in their operational methodologies.

(a) Define what are *fourth* and *fifth* normal forms. [20 marks]

(b) Answer the following questions based on the following table:

SUBJECT	LECTURER	SEMESTER
Computer	Anshika	Semester 1
Computer	John	Semester 1
Math	John	Semester 1
Math	Akash	Semester 2
Chemistry	Praveen	Semester 1

i. The above table is not in *fifth normal form*. Explain briefly, why? [15 marks]

ii. Normalise the above table into *fifth normal form* relations. [15 marks]

(c) State what is meant by the *concurrent execution* of database transactions in a multi-user system. Discuss why concurrency control is needed. [15 marks]

(d) A transaction passes through several states during its execution. List and describe all possible states of a transaction. [15 marks]

(e) Define the *ACID* properties in the context of database transactions. Explain why these properties are important for maintaining data integrity and consistency. [20 marks]