University of Kelaniya – Faculty of Social Sciences

Academic Year 2016/2017

Bachelor of Arts Honors Degree Second Year

Second Semester Examination- January/February 2019

Social Statistics

SOST 32434 – Information Systems and Database Management

Answer four (04) questions only.

No. of Questions: 07 **Time: 03 hours**

1. (a) Describe the potential benefits of implementing an Information System in an organization. (5 marks)

(b) What are the types of Information Systems? Briefly explain them. (5 marks)

(c) Suppose you are appointed as the new system analyst in an organization. Explain the activities that should be followed to develop the existing information system in the organization. (10 marks)

2. (a) Codd's 1970 paper introduced the Relational Model of data to address the difficulties of building database applications using the technology that was available at the time. What problems were encountered by database developers before Codd introduced the Relational Model. (8 marks)

(b) What are the basic functions of Database Management System (DBMS)?

(5 marks)

(c) Describe the main characteristics of a database. (5 marks)

(b) Explain the disadvantages of a database. (2 marks)

3. (a) Describe the basic elements of the Entity Relationship (ER) model and explain the methodology of creating the model. (4 marks)

(b) Define the following terms using appropriate examples.

i. Composite attributes

ii. Multivalued attributes

iii. Derived attributes (2x3 marks)

(c) A company rents cars to local and foreign tourists. The registration number of the car identifies the model, operating type (hybrid, non_hybrid, electric), and the colour. The company stores the customer identification number, name and address. Every rental has a number. A car is rented from a certain date and time to a certain date and time. Charges vary according to the model of the car and the customer must deposit a fixed amount before the car is rented out.

Draw an Entity Relationship diagram that represents the above information.

(10 marks)

4. (a) Data normalization is often an important component in database design. Discuss why this is so. (5 marks)

(b) Various normal forms are important in relational schema design. Define First (1NF), second (2NF) and Third (3NF) normal forms. (5 marks)

(c) Normalize the following schema up to third normal form and discuss every step with proper explanation.

(stu_no, s_name, gender, degree, date_of_birth, course_Reg,

Course_ Instructor_ code, Course_ Instructor_name, email, city, grade)

(10 marks)

5. (a) Define the core operators of the Relational Algebra. (10 marks)

(b) Explain and contrast the differences and similarities between data administrator and database administrator. (10 marks)

6. (a) State the importance of flowcharts in program designing. (2 marks)

(b) A small company has 15 workers. The workers are paid by hourly basis and the salaries are given at the end of the week. The working days per week is 5. Each employee gets an equal rate of pay for an hour. Suggesting the relevant variables that you should apply to calculate the amount of pay for a worker, draw a flowchart to determine the total amount for a week that the company should pay for all employees. (10 marks)

(c) Write Python codes (or Visual Basic codes) for the above flowchart.

(8 marks)

7. The following relational schema represents a part of a database implemented by a police station to maintain accidents information.

PERSON (personid, name, house_no, street, city, accident_type)
VEHICLE (regno, regyear, model)
OWNER (personid, regno)
ACCIDENT_REPORT (accident_reg_no, date, value_damage, description, regno)

PERSON: details of the person who involved in the accident
VEHICLE: details of the vehicle associated with the accident
OWNER: the relationship between person and vehicle
ACCIDENT_REPORT: details of the accident

i. Create the "PERSON" relation. (2 marks)

Write SQL statements to retrieve the following information.

ii. List details of persons who involved in at least one accident. (3 marks)

iii. What is the value of damage related to the accident registration number '11001"? (3 marks)

iv. How many accidents were there with 'Piyadasa'? (4 marks)

v. Find the number of vehicles involved in accidents reported on 01-01- 2019. (3 marks)

vi. Which accident reported the maximum damage? (2 marks)

vii. Retrieve all information of persons who drove "Prado" registered after 1-1-2018. (3 marks)