PAPER: E-COMMERCE TECHNOLOGY

EXAM PAPER: CASE STUDY

CREDIT VALUE: **16** DURATION: **6 HOURS** NATURE OF EXAM: **WRITTEN**

SECTION A: ANALYSIS (30 MARKS)

- 1) Which layer of the TCP/IP model provides a route to forward messages through an internetwork? (1 mrks)
- 2) Which type of server relies on record types such as A, NS, AAAA, and MX in order to provide services? (2mrks)
- 3) Differentiate between LAN, MAN and WAN (3 marks)
- 4) What is a VPN ?(1 marks)
- 5) What are the layers of the OSI reference model?(3 marks)

SECTION B: Database development and administration (25 marks)

A private university is interested in designing a database that will track its teachers, students and courses. Information of interest includes teacher's names, matricule, telephone, gender, grade, student names, student telephone, student matricule, student gender, student address, student age, course title, course code, course ID and course credit. Each student enrolls in one or many courses of his choice and a teacher is teaching one or many courses. When a student enrolls to a course at the end, he had a mark.

Problems to solve:

1-	What is an Entity?	(1 mark)
2-	List all the possible entities.	(1.5 marks)
3-	What is an attribute?	(1 mark)
4-	On each entity listed in question 2, list its attributes.	(1.5 marks)
5-	What is an E-R Diagram? List all the components of an E-R diagram	(3 marks)
6-	Draw the equivalent E-R diagram of that private University using the	crow's notation
	or Chen notation.	(3 marks)
7-	Convert the diagram to a relational model	(3 marks)
8-	Using SQL language answer the following questions:	
	a. Create the tables of your database	(3 marks)
	b. Create the database of the university called "UNIV"	(1 mark)

- c. Insert a student your database (1 mark)
- d. Retrieve the marks of all students in a particular subject (1 mark)

<u>SECTION C</u>: Algorithm and programming (40 marks)

Algorithm (15 marks)

- 1. For each algorithm listed below,
 - Give a recurrence that describes its worst-case running time, and
 - Give its worst-case running time using big *O* notation. You need not justify your answers.
- i. Binary Search
- ii. Insertion Sort
- iii. Merge Sort

Procedural programming (15 marks)

1. Write a C program which will compute the area of a square $(area = side^2)$ or a triangle (area = (base * height)/2) after prompting the user to type the first character of the figure name (t or s).

In order to implement this.

- a. Write two function prototype each for each function that will compute the area of triangle and that of the square.
- b. Declare variables for the base, height and side. Call appropriate functions by passing parameters by value in order to return the expected area.
- c. Write two distinct value returning functions for the computations of the area of the square and that of the triangle
- 2. There are n students in computer software engineering and they are all to seat for an exams which comprises of m subjects. Two of such subjects are coefficient 3 subjects and the rest are coefficient 2. Each student must offer between 5 and 10 subjects. Write a c program that permits the user to enter the number of subjects written, marks on twenty and the coefficient of each of the subjects written.

The program will print out the total marks of the student, his average and his remark $(0 \le average \le 6: very poor, 6 \le average \le 9: poor, 9 \le average \le 10: below average, average = 10: average, average > 10 : good).$

Object Oriented Programming (10 marks)

- Define the following as seen in object oriented programming (3marks) Object, Classes, Methods
- 2. What are the four major principles that make a language to be object oriented?

(2marks)

- 3. What are the differences between private and public class members? (1marks)
- 4. What are the differences between data hiding and encapsulation? (1marks)
- 5. Design a class called Cube that has the following data member side of data type double. Supply the following methods: a constructor with one argument, a getter and setter method for the side of the cube, the volume equals to side raised to the power three.
- 6. Implement the class Cube and write a test class CubeTest in C++ or Java to verify the functionalities of the class Cube (3marks)

SECTION D: networking (10mks)

QUESTION 1:

- I. What is an IP address ?1 mark.
- II. Briefly explain the two methods in which a host can obtain an IP address.4 marks.
- III. State 4 differences between IPV4 and IPV6 adresses.4 marks.
- IV. State classes of IPV4 address, the uses of each class, the range of Ip address in each class, the number of networks and usable host addresses in each network for each class. Do it in a tabular form. (5 marks).