The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Electrical and Computer Engineering

Study Programme	: Bachelor of Technology Honours in Engineering
Name of the Examination	: Final Examination
Course Code and Title	**: EEX3417**
Academic Year	: 2019/2020
Date	: 27th September 2020
Time	: 0930-1230hrs
Duration	: **3 hours**

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **four (4)** questions in **five (5)** pages.
3. Answer all **four** questions.
4. Answers for each question should commence from a new page.
6. This is a Closed Book Test **(CBT).**
7. Answers should be in clear handwriting.
8. Do not use red colour pens.

Question 01

Read the following Pseudocode in Figure 01 and draw a flowchart to represent the same logic defined in Pseudocode.

```
Begin the Process
Read moisture content from sensor
If the moisture content is less than 500
        Read temperature
        If temperature greater than or equal to 30
                Motor speed =2
        Else
                Motor speed =1
Else
        Motor speed =0
Delay 15 minutes
loop to the begin the process
```

Figure 01: Pseudocode [12 marks]

a) Figure 02 shows the implementation of a simple neural network. You can input a real number to the array hl and multiply with a weight called "w". Value of "w" is 0.8. Then add all the elements in the array. If the sum of the array is greater than 45, then out is 1 else out is 0.

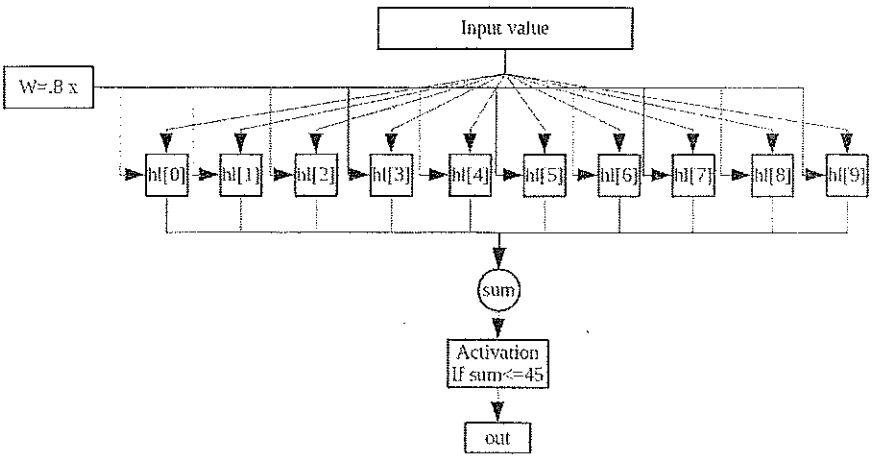


Figure 02: A simple neural network

Write a **C program** to implement the function of the simple neural network express above including main function, headers and comments. Use the following instructions from i) to vi) to write the C program.

i) Create an array called hl with a size of 10

ii) Assign input variable called ip and enter a real number

iii) Create a weight called w which is a constant float. Value of "w" is 0.8.

iv) Within a for loop, multiply ip with w and save each array element. Add all element values to a real variable called sum.

v) Create activation function by

if sum <=45 then out=1 else out=0

vi) Print the out as output

[13 marks]

Question 02

(a) The system given below (Figure 03) shows a use case diagram extracted from a goods order system. The use cases participate in relationships between themselves (A to E). These relationships can be as follows: extend, generalization, and include.

(i) Write the relationships corresponding to A to E (5 marks)

(ii) Draw the correct arrowheads for relationships A to E. (5 marks)

(b) Describe the use case diagram in Figure 03 in your own words explaining the relationships between the processes. (10 marks)

(c) What is the difference between an object and a class in Object Oriented Programming? (2 marks)

(d) When designing a User Interface you may make use of 'optical illusions', briefly explain 3 of them (3 marks)

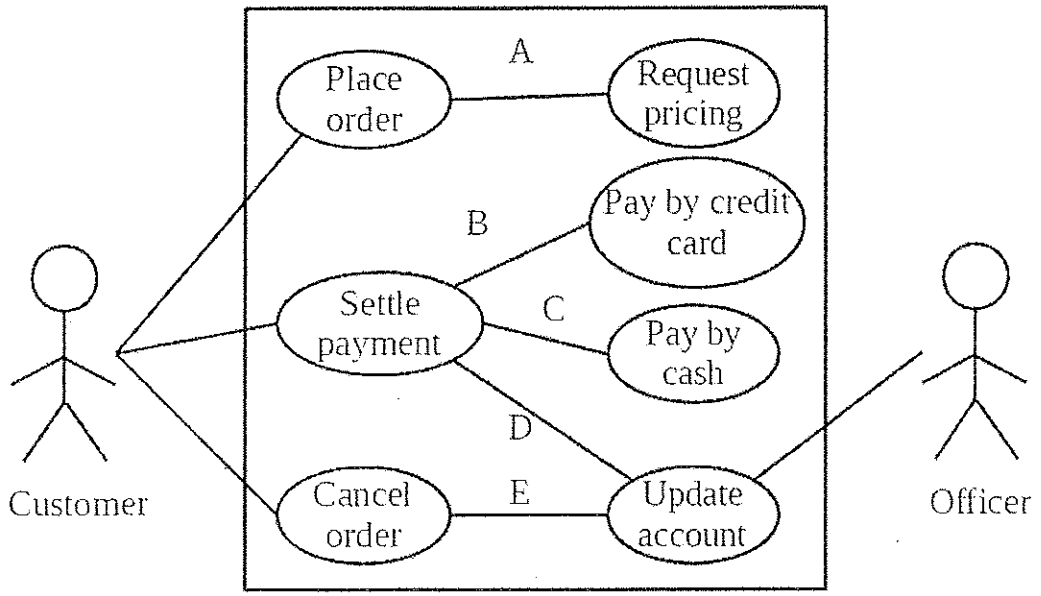


Figure 03: A goods order system

Question 03

a) Order database has the following business rules

An **order** must include one or more **order quantities** of **items**.
An **order** has an **order number** which is a unique code and an order **date**.
An **item** has an **item number** which is a unique code.
An **item** has an **item description**, **stock** and a **unit price**.

i) Draw the Entity Relationship Diagram (ERD) for the above description with necessary relationships. [8 marks]

ii) Write entities and their attributes for the above description. [2 marks]

iii) Write 3rd normal form tables [3 marks]

iv) Write primary keys and foreign keys for the above tables [2 marks]

b) Draw a UML class diagram for the following statements, including associations.

Employee has the following attributes.
Name, date of birth, gender and one or more addresses.
Attributes of address are address line1, address line 2, city, and corresponding (prefered address).

HourlyEmployee is an Employee whose attributes are employee_id, wage, and hour worked.
SalaryEmploye is an Employee whose attributes are employee_id, basic_salary and allowances.
Both HourlyEmployee and SalariedEmployee have methods called calculate monthly salary.

[10 marks]

Question 04

a) List phases of classic software life cycle [5 marks]

b) If you are asked to develop a software system to solve a particular problem, discuss the criteria that you would use to determine a suitable life-cycle model. [5 marks]

c) In the Open University, a course is passed if the final exam (FE) mark is equal to or greater than 40 (out of 100) and the Continuous Assessment mark (CA) mark is equal to or greater than 40 (out of 100).

Final exam mark is considered only if CA mark => 40.
If CA mark is less than 40 then the course is considered as 'repeat' if CA mark => 40 but the final exam mark is less than 40 then the course is considered as 're-sit'.
Write suitable test cases to validate this requirement. [10 marks]

d) Briefly explain what is meant by vulnerability [1 mark]

e) List 4 types of threats. [2 marks]

f) List commonly used 2 types of data encryption methods [2 marks]

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