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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	**: EEX3517 /ECX3217**
Academic Year	: 2019/2020
Date	: 27th September 2020
Time	: 0930-1230hrs
Duration	: **3 hours**

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **five (5)** questions in **five (5)** pages.
3. Answer the **first question** in **Part A** and **any three** questions from **Part B.**
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.

Part A – Compulsory Question

Question 01

a) Read the Pseudocode in Figure 01 and draw the relevant flow chart.

```
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 [10 marks]

b) Figure 02 shows an implementation of a simple neural network. You can input a value 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 addition is greater than 45 then out is 1 else out is 0.

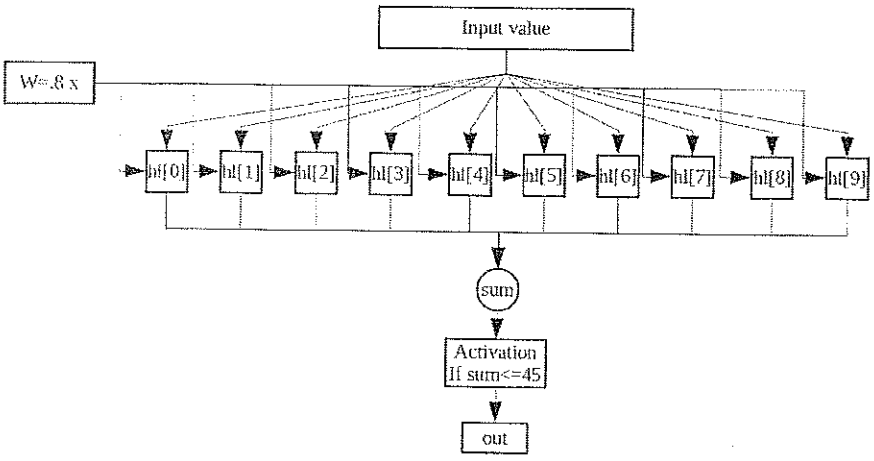

Figure 02 A simple neural network

Write a C program including main function, headers and comments. Use the instructions from i) to vi) to write the C program.

i) create an array called 'hl' with a size of 10

ii) enter a real number and assign input variable called 'ip'

iii) create a weight called 'w' which is a constant float.

iv) Within a 'for' loop, multiply 'ip' and '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 [15 marks]

Part B – Answer any three (3) questions

Question 02

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

b) Assume that you are developing a software application to automate the operational work of an accounting firm, which has approximately 10,000 employees worldwide. The system will include employee recruitment process and salary calculation. Briefly explain one functional requirement and one non-functional requirement with examples. [6 marks]

c) *"By spending more time on the Requirement Analysis phase to do a proper analysis will be beneficial to both developers and customers in the long run. It will save money in later phases."*

Is this statement correct? Justify your answer. [3 marks]

d) Why is prototyping useful when developing software applications? [2 marks]

e) Identify two objects in the above scenario *b)* for which you would need to design classes. [2marks]

f) Write the name, attributes and methods of the class in Figure 03. [3 marks]

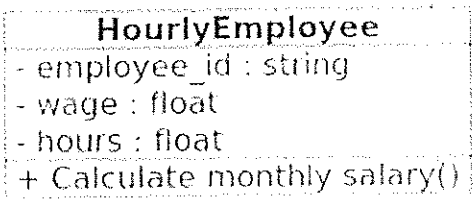

Figure 03: A Class Diagram

g) Briefly describe the inheritance relationship among classes. [2 marks]

h) Distinguish Software Update from Software Upgrade [2 marks]

Question 03

a) Write a C program to compare to character arrays and display whether the content of two arrays are the same or not. Use char arrays and strcmp to write the program

i) Create two character arrays with a length of 10
ii) Input data to two character arrays
iii) If two words are the same, then print 'same' else print 'not same'. [10 marks]

b) Write a C program to get the following tasks done.
i) Create integer pointer called p1
ii) Create integer variable called result
iii) Assign 6 to the variable result
iv) Address of the result is assigned to the pointer p1 [5 marks]

Answer the questions based on the code segment given below.

```
#include<stdio.h>

int addition (int no_of_bats, int no_of_balls);
void main ()
{
        int answer;
        answer = addition (5,15);
        printf( "The result is %d",answer);
}

int addition (int no_of_bats, int no_of_balls)
{
        int total;
        total= no_of_bats + no_of_balls;
        return total;
}
```

i) What is the return data type of the function addition?

ii) What are the input arguments to the function addition and their data types

iii) What is the output of this program

iv) What is the local variable in the function addition [10 marks]

Question 04

A database for ordering an item has 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.**

a) Identify entities and their attributes for the above description. [2 marks]

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

c) Briefly explain the necessity for normalization in database design. [3 marks]

d) What is the difference between the primary and foreign key? [2 marks]

e) Write 3rd normal form tables [4 marks]

f) Write primary keys and foreign keys for the above tables [6 marks]

Question 5

a) Explain the difference between white box testing and black box testing. [5 marks]

b) 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 a Continuous Assessment mark (CA) mark is equal to or greater than 40% (out of 100).

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

c) Explain what is meant by vulnerability [3 marks]

d) List 4 types of threats. [4 marks]

e) List commonly used 2 types of encryption methods [3 marks]

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