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**
	Software Development for Engineers
Academic Year	: 2017/18
Date	: 09th February 2019
Time	: 13:30-16:30hrs
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 **Question (1)** in **Part (A)** which is **compulsory**. **Answer 2** questions out of **3** given in **Part (B)**.

4. Question (1) carry 60 marks and other questions carries 20 marks.

4. Answer for each question should commence from a new page.

5. This is a Closed Book Test (CBT).

6. Answers should be in clear hand writing.

7. Do not use Red colour pen.

Part A - Compulsory question

Qestion 1

a). Write a C program with comments and indentation for the flow chart in figure 1. Use 'for' or 'while' loop control structure for writing the program. **[12 marks]**

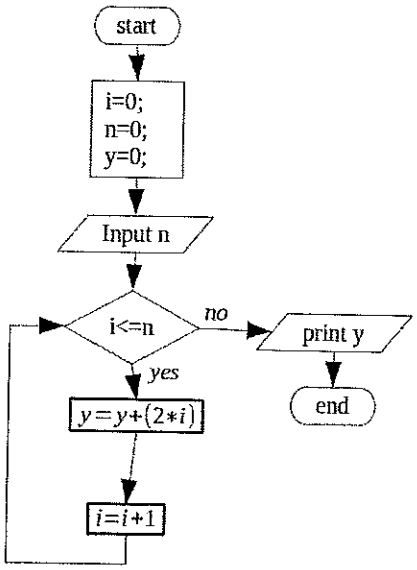

figure 1

b) Draw a suitable flow chart to find *maximum* between 2 numbers which should be given by the user. **[10 marks]**

c) This question is based on character strings in c programming. You should use character arrays, strcpy and strcat to answer following questions.

Write a complete C program to input *first name* and *last name* in two *character arrays* and copy to *third character array* with combining both first and last names with a space between first and last names. Length of both first name and last name character arrays is 100. **[12 marks]**

d) Following program is designed to input five characters and find the character with minimum ASCII value.

[10 marks]

```
#include<stdio.h>
#include <string.h>
int main()
{
        char a[5];
        int i=0;
        char minchar;
        printf("Enter characters->");
        scanf("%s",a);
        minchar=a[0];
        for(i=1;i<=4;i++)
        {

                if(minchar>=a[i])
                {
                        minchar=a[i];
                }
        }
        printf("Minimum character = %c\n",minchar);
}
```

Suppose, you entered characters "f, m, b, q, t". **Table 1** describes how values of *i*, *a[i]* and *minchar* change within the **for loop** in each step. First row of the table 1 is filled. Write the table in your question paper and fill the blank boxes of the Table 1 with suitable values.

steps	i	a	a[i]	minchar
1	0	fmbqt	f	f
2		fmbqt		
3		fmbqt		
4		fmbqt		
5		fmbqt		

Table 1

e) Consider figure 2 to answer this question.

i) Write the field name with the longest character length. **[01 mark]**

ii) Write field names which are used as primary keys with their data types and table name. **[06 marks]**

iii) Draw an Entity-Relationship (ER) diagram to illustrate the relationships between given 3 entities. **[09 marks]**

course

Column	Type	Null	Default	Links to
c_code (Primary)	varchar(7)	No		
c_title	varchar(40)	Yes	*NULL*	
c_credit	int(1)	Yes	*NULL*	
c_level	int(1)	Yes	*NULL*	

marks

Column	Type	Null	Default	Links to
st_reg_no (Primary)	int(4)	No		student -> st_reg_no
c_code (Primary)	varchar(7)	No		course -> c_code
reg_year (Primary)	date	No		
marks	int(3)	Yes	*NULL*	

student

Column	Type	Null	Default	Links to
st_reg_no (Primary)	int(4)	No		
st_name	varchar(45)	Yes	*NULL*	
st_dob	date	Yes	*NULL*	
st_gender	char(1)	Yes	*NULL*	
st_address	varchar(60)	Yes	*NULL*	
st_tele	int(10)	Yes	*NULL*	

figure 2

Part B – Answer only 2 questions

Question 2

a) Write a function to solve $y=4a^2+a$. Input parameter to the function is a . **[08 marks]**

b) Write a complete C program to input x value by the user and call the function with the x value. Print the returned y value of the function. **[12 marks]**

Question 3

a) Briefly describe 5 main software development life cycle. **[10 marks]**

b) Write the name, attributes and methods of the class in figure 3. **[03 marks]**

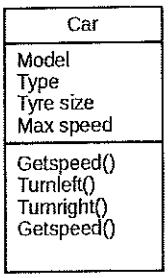

figure 3

c) Briefly describe the generalization relationship within classes. **[02 marks]**

d) Explain the difference between white box testing and black box testing. **[05 marks]**

Question 4

Following business rules applies for channeling a doctor in a hospital.

* Each **doctor** has a unique doctor id number (**D_ID**)
* Each **doctor** has a **name**, **specialty**, **contact no**

* Each **patient** has a unique number (**P_ID**), **name**, **gender**, **address**, **date of birth**

* Each **patient** may **channel** one or more **doctors** in different **dates** and **times**.

a) Draw the Entity Relationship Diagram (ERD) for the above description with necessary relationships. **[06 marks]**

b) Write 3rd normal form tables **[08 marks]**

c) Write primary keys and foreign keys for the above tables **[06 marks]**