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THE OPEN UNIVERSITY OF SRI LANKA
BACHELOR OF TECHNOLOGY – LEVEL 03
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
ECX3217- SOFTWARE DEVELOPMENT FOR ENGINEERS

FINAL EXAMINATION – 2016/2017

Date: 26th November 2017	Time: 09.30 to 12.30 hrs.

<INSTRUCTIONS>
Answer **Question 1** in **Part A**, which is compulsory.
Answer **3 questions** out of 4 given in **Part B**.
This is **closed book exam** and no reference book and materials are allowed.

Part A

1) Use the c program in figure 1 to give answers for **a), b), c), d) and e)**

```
#include <stdio.h>
void main()
{
        // declare variables
        int i=0;
        int a[10];
        int sum=0;
        int N=9;
        float average=0;
        while(i<=N)
        {

                printf("Enter %d integer number ",i);
                scanf("%d",&a[i]);
                i=i+1;
        }
        i=N;
        while(i>=0)
        {
                printf("%d\n",a[i]);
                sum=sum+a[i];
                i=i-1;
        }
        average=sum/(float)N;
        printf("Average = %.2f\n",average);
}
```

Figure 1

a) If you want to enter only five numbers to get the output what changes should you do to the program? [4 marks]

b) What will be the output if you enter numbers of multiple of 2, starting from number 2 to the running program? [5 marks]

c) If you want to enter data with decimal points what changes should you do to the program? [5 marks]

d) Draw a suitable flow chart for the program given in figure 1. [12 marks]

e) Rewrite the program to calculate the average if the input value is greater than or equal to 2. [14 marks]

Part B

2) An algorithm to enter marks for five (5) students is shown in figure 2.

```
For 5 students
    If the mark is greater than or equal to forty (40) then print "grade is P"
    If the mark is less than forty (40) then print "grade is F"
```

Figure 2

a) Draw a flow chart for the above algorithm using begin, end, inputs, iterations and conditional control structures. [7 marks]

b) Write a C program for the flow chart including header files, main function, inputs, outputs, iterations and conditional control structures. Write the program with the fewest number of lines in the program. [13 marks]

3) "Order" database has following business rules

A **purchase order** must include one or more **order items**.
An **item** includes one or more **order items**.

A **purchase order** has a **purchase order no** which is unique code.
A **purchase order** has **customer name**, **customer address** and **date**.

An ***item*** has an ***item no*** which is a unique code.
An **item** has ***item description***, ***stock*** and a **unit price**.

An **order item** has an **item no** and an **order no**.
An **order item** has a **quantity**.

a) Draw the Entity Relationship Diagram (ERD) for the above description with necessary relationships. [10 marks]

b) Write entities and their attributes for the above description. [5 marks]

c) Normalize the table for 3rd normal form [3 marks]

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

4)

a) Write different phases of traditional waterfall life cycle model. [10 marks]

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

c) Considering the class diagram shown in figure 3, explain name, attributes and methods of the class. [3 marks]

Book
Author ISBN number
Re-order() giveDiscount() getAvailableQuantity()

Figure 3

d) Briefly describe the generalization relationship within classes. [2 marks]

5) Use figure 4 to answer **b),c)** and **d).**

Table name	**Student**		
Field name	**Data type**	**size**	**Null/not null**
st_reg_no	int	4	Not null+primay key
st_name	varchar	40	Null
st_dob	date		Null
st_gender	char		Null
st_address	varchar	60	Null
st_tele	varchar	10,0	Null

Figure 4

a) Write the SQL statement to create the database called "**studentinfo**". [5 marks]

b) Write the SQL command to create the **student** table. [5 marks]

c) Write the SQL command to insert the following record to the student table. [5 marks]

st_reg_no	st_name	st_dob	st_gender	st_address	st_tele
1113	Amal	02-02-1990	M	Nawala	0110000000

d) Write the SQL statement to select all the records of the table "student". [5 marks]