THE OPEN UNIVERSITY OF SRI LANKA
BACHELOR OF TECHNOLOGY – LEVEL 03
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
ECX 3217 – SOFTWARE DEVELOPMENT FOR ENGINEERS

FINAL EXAMINATION – 2014 / 2015

Date: 2th September 2015 **Time: 0930-1230 hrs**

<INSTRUCTIONS>

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

PART A (Compulsory question)

1) Read the following description and answer the question given below.

Consider an algorithm to count ***even parity*** bit in ASCII characters. An ASCII character has 7 bits and a parity bit. Parity bit is calculated by addition of one (1) or zero (0) to the end of the 7 bits. If the total addition of first 7 bits is even, then add a zero (0) to the 8th position otherwise add one (1) to the 8th position.

Following description of the algorithm is given.
Input one (1) or zero (0) values from 1st bit value to 7th bit value through a loop. Increment ***bit count if the bit is one*** (1). After all 7 bits are input, ***divide the total by 2*** and if the remainder is not equal to 0 print the parity bit as 1 and if the remainder is equal to 0 ***print*** the parity bit as 0.

a) Draw a flow chart indicating begin, end, inputs, outputs, iteration and conditional control structures. [15 marks]

b) Write a C program to implement program given in the flow chart including header files, main function, inputs, outputs, iteration and conditional structures.
Include comments where necessary. Give meaningful names to variables. [25 marks]
Note: % operator can be used to find the remainder of a division in C.

PART B (Answer 3 questions only)

2) You have to identify the zero crossing detection of a FM signal. In order to do that following steps need to be followed.

The data has to be input as one number at a time from right hand to left hand.
0 2 3 3 4 5 4 3 2 1 0 1 2 1 0 1 2 3 2 1 0 1 2 3 4 5 6 7 6 5 4 3 2 1 0

example : first input 0
second input 1
third input 2 etc.

Count the numbers between zeros. For example, first count between zeros is 13.
As the output, print the reciprocal of the count. Example: 1/13=0.076923
Input data one by one through a loop.
This process should be continued until '-1' is entered as the input.

a) Draw a flow chart indicating begin, end, inputs, outputs, iteration and conditional control structures. [8 marks]

b) Write a C program for the flow chart including header files, main function, inputs, outputs, iteration and conditional structures. [12 marks]

3) Following business rules applies for set of football teams, players and matches they play.
* A **team** has a unique id called **team_id**.
* A **team** has a **team name**, **main stadium**, and a **city**.
* Each **player** belongs to one **team**.
* A **player** has unique id called **player_id**.
* A **player** has **player name**, **date of birth**, **start year**, **shirt number**.
* Each **Team plays** zero or more **matches**.
* Each **match** has a unique id called **match_id**.
* A **match** has a **date of match**.
* Each **team** can have a **playing status** as either guest or host.
* Each **playing** team has a **result**.

a) Draw entity relationship diagram for the above description. [10 marks]

b) Define 3 rd normalized tables with necessary fields and data types. [7 marks]

c) Write all primary keys and foreign keys [3 marks]

4) A library wishes to create a book database for its borrowers.

Business rules in this library are as follows
* A **book** has a unique id called **book id**.
* Each **book** has a **title**, **author**, **isbn no**, **edition** and **year of published**.
* A **borrower** may *request* for **borrowing** books.
* Each **borrower** has a unique id called **borrower id**.
* Each **borrower** has a **name**, **address** and **DOB**, **sex**, **telephone no** and **registered date**.
* A **borrowing** has **borrowing id**, **borrower id**, **date borrowed** and **returned date**.
* One or more **books** *issue* for a **borrowing**.

a) Draw the entity relationship diagram (ERD) for the above description with necessary relationships. [10 marks]

b) write entities for the above description. [2 marks]

c) Write attributes for each entity. [3 marks]

d) write 3 rd normal form tables. [5 marks]

5) The following table shows the details of the support provide by Microsoft for their operating systems. End of support refers to the date when Microsoft no longer provides automatic fixes, updates, or online technical assistance.

Client operating systems	Latest update or service pack	End of mainstream support
Windows XP	Service Pack 3	14-Apr-09
Windows Vista	Service Pack 2	10-Apr-12
Windows 7 *	Service Pack 1	13-Jan-15
Windows 8	Windows 8.1	9-Jan-18
Windows 10, released in July 2015 **	N/A	13-Oct-20

* Support for Windows 7 RTM without service packs ended on April 9, 2013. Be sure to install Windows 7 Service Pack 1 today to continue to receive support and updates.

** Updates are cumulative, with each update built upon all of the updates that preceded it.
Extracted from "Windows lifecycle fact sheet - Windows Help," windows.microsoft.com. [Online].

Available: http://windows.microsoft.com/en-us/windows/lifecycle. [Accessed: 29-Jul-2015].

a)Why do we need to have updates for software? [2 marks]

b) What is included in a software update? [3 marks]

c) Briefly describe the meaning of the statement "*Support for Windows 7 RTM without service packs ended on April 9, 2013*". [5 marks]

d) Draw a diagram to depict the "Software Release Life Cycle" and explain the use of RTM. [5 marks]

e) It is stated that "*Updates are cumulative, with each update built upon all of the updates that preceded it*". In order to achieve this, what is the suitable SDLC need to be followed from waterfall model and agile methodology? Justify your answer. [5 marks]