UNIVERSITY OF MAURITIUS

FACULTY OF ENGINEERING

SECOND SEMESTER EXAMINATIONS

MAY 2015

PROGRAMME	**BSc (Hons) Software Engineering (Full-Time)- Mixed Mode**		
MODULE NAME	**Software Engineering and Computing**		
DATE	**Tuesday 12 May 2015**	**MODULE CODE**	**CSE1009Y(1)**
TIME	**09.30 – 12.30**	**DURATION**	**3 hours**
NO. OF QUESTIONS SET	**4**	**NO. OF QUESTIONS TO BE ATTEMPTED**	**4**

INSTRUCTIONS TO CANDIDATES

There are TWO **Sections in this paper: Section A and Section B.**

Answer ALL **questions from both Sections.**

Use SEPARATE **answer books for each Section.**

All questions carry equal marks.

SECTION A

Answer ALL questions from this Section
Use separate answer books for each Section

Question 1

(a) A computer system is one that is able to take a set of inputs, process them and create a set of outputs. This is done by a combination of hardware (devices) and software. You are required to classify the following devices as either an input, output or a storage device.

(i) blu-ray disc
(ii) microphone
(iii) 3D printer
(iv) scanner
(v) wireless mouse
(vi) speaker

[6 x 0.5 marks]

(b) A computer system consists of both a hardware component and a software component. Computer hardware is the collection of physical parts of a computer system. This includes the computer case, monitor, keyboard, and mouse. Computer software are the set of instructions that tells the hardware how to perform useful work. There are three types of software. Classify the following software as either an operating system, an applications software or a utility.

(i) Ubuntu
(ii) Image editing software
(iii) Anti-virus program
(iv) Computer game
(v) Browser
(vi) Write (Open Office)

[6*0.5 marks]

(c) An operating system is the main software on a computer that controls all hardware and all other software in the computer. An operation system performs important functions like file management, I/O management, security management, CPU management and memory management. Define the following computer terms as used in the context of operating systems:

(Continue next page)

(Question 1 continued)

(i) virtual memory
(ii) API

[2 x 2 marks]

(d) (i) What is an End User License Agreement (EULA)?

(ii) List four items of information that should generally form part of the EULA.

[2 +4 marks]

(e) Image processing is the analysis and manipulation of digitised images, especially in order to improve its quality. Image processing techniques are being used heavily in such modern fields such as medical image, remote sensing and cinematography. List eight image processing operations that can be usually be performed using image editing software.

[8 x 0.5 marks]

(f) Cloud computing is the practice of using a network of remote servers hosted on the Internet to store, manage, and process data, rather than a local server or a personal computer. Cloud computing is becoming more popular, and many users are working from the cloud and not even realising it.

(i) Explain why cloud-based services have become very popular over the last decade.

(ii) List three disadvantages that a cloud-based environment might present.

[2 + 3 marks]
(Total 25 Marks)

Question 2

Mr. John has to set up a network for his company. Since he is not well versed with Information Technology's terms, you have been consulted to advise him on network issues.

(i) Apart from distance, state four other criteria that can be used to classify computer networks.

[4 marks]
(Continue next page)

(Question 2 continued)

(ii) Internet and Extranet are two common terms that are used when setting networks. Describe TWO similarities and TWO differences between an intranet and an extranet.

[4 marks]

(iii) Describe four precautions that you would advise Mr. John to take to secure wireless networks.

[4 marks]

(iv) Explain the following terms, in the context of computer networks:

(i) piggybacking,

(ii) Virtual Private Network.

[2 x 2 marks]

(v) Mr. John informs you that he has recently heard staff talking about web 1.0 and web 2.0. Differentiate between Web 1.0 and Web 2.0 websites so that Mr. John can become familiar with these terms.

[4 marks]

(vi) In today' world, cybercrimes are becoming more and more common. Suggest five ways which which people can combat cybercrimes.

[5 marks]
(Total 25 Marks)

SECTION B

Answer ALL questions from this Section
Use separate answer books for each Section

Question 3

Read the Case Study below and answer **ALL** the following questions:

Part of an Airline Reservation System

A new user (Passenger) would either have to register him with the system by providing personal information or log into the system as a guest. A guest can only check the availability of tickets and cannot block or buy tickets. But a registered user can also act as a guest if he only wants to check the availability of tickets. 'Availability of tickets' always refers to viewing the flight schedule for given days, the price of tickets and any discount offers. The system shall present the user with an option to exit from the system at any time.

The system shall require a user to register, in order to carry out any transactions with it except for checking the availability of tickets. It will ask the user for the following information at the least – a user id, a password, first name, last name, address, phone number, email address, sex, age, preferred credit card number. The system will automatically create a 'sky miles' field and initialize it to zero in the user's profile. The user interface has to be friendly to encourage passengers to use the system.

After logging in, the system would request the user to enter origin city and destination city. The system will then refer to the flight schedule database, to check if origin or destination cities are listed or not. The system would ask user to enter details like class, one-way or round trip, departure date & the number of adult passengers, children and senior citizens. The system will then access the flight schedule database & queries, using the input provided by the user. The system queries the reservation database to check which of the flights on the schedule have seats available & displays flight number, departure time in origin city, arrival time in destination city, the duration of the flight & the number of seats available on that flight for each flight number.

The system will then display the price of the ticket for the trip & also list any rules regarding the cancellation of tickets along with refunded details. The system will be available 24 hours.

(Continue next page)

(Question 3 continued)

(a) To develop the above **Airline Reservation system**, the developers have decided to use the Agile Model. Evaluate the use of the Agile Model.

[6 marks]

(b) Write down THREE functional and THREE non- functional requirements from the above case study.

[6 marks]

(c) Eliciting requirement may yield some problems stemming from the use of natural language.

(i) Suggest what problems may be encountered.

(ii) List the alternatives that are available for requirements specification.

[2 + 2 marks]

(d) Suppose that you are in the design team for the above system.

(i) You have been asked by your team leader to make a presentation on cohesion and coupling. Highlight the difference between cohesion and coupling.

[4 marks]

(ii) For designing the above system, a layering method can be adopted. Evaluate the use of layering.

[5 marks]

(Total 25 Marks)

Question 4

(a) Discuss the possible drawbacks of using lines of code (LOC) as software metric to measure size.

[2 marks]

(b) Using the details provided below compute the function points.

Factors	Weights		
	Simple	Average	Complex
Number of user inputs	2	3	5
Number of user outputs	3	4	6
Number of user inquiries	2	3	5
Number of files	6	9	14
Number of external interfaces	4	6	9

A system being developed has the following characteristics:

Number of user inputs	10 (simple)
Number of user outputs	7 (simple)
Number of user inquiries	3 (average)
Number of files	6 (average)
Number of external interfaces	1 (complex)

Assume that $\sum(F_i)$ is 35.

[4 marks]

(c) A project work must be broken down into discrete tasks that can then be estimated and allocated appropriate resources. The following table outlines the necessary tasks that must be performed for the NASA Spacecraft Launching Software Project.

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(Question 4 continued)

TASK	DESCRIPTION	DURATION (DAYS)	DEPENDENCIES
T1	Concept document	10	None
T2	Project Plan	15	T1
T3	Project Schedule	10	T1,T2
T4	Requirements Analysis	20	None
T5	Requirements Definition	10	None
T6	System Specification	15	T3, T4
T7	Requirements Validation	20	T3
T8	Architectural Design	35	T7
T9	Interface Design	15	T6
T10	Detailed Design	5	T5, T9
T11	Coding	10	T9
T12	Unit Testing	20	T10
T13	Integration Testing	35	T3, T4
T14	System Testing	10	T8,T9
T15	Acceptance Testing	20	T12, T14
T16	User Manual	10	T15

(i) Draw the activity network diagram for the software project as per the task dependency table listed above.

[3 marks]

(ii) Identify the critical path and show your calculations.

[3 marks]

(d) **Capability Maturity Model Integration** (CMMI) is a process improvement approach consisting of five maturity levels (*using the staged representation*) that helps organizations to improve their performance.

(i) Briefly describe the different levels of the CMMI model.

[5 marks]

(Continue next page)

(Question 4 continued)

(ii) Discuss whether quality standards such as CMMI improve the development process.

[3 marks]

(e) One of the functionalities of the Airline Reservation System is to allow a customer to check the flight schedule. Given that the customer has to logon to access any services and that flight schedule can be viewed by typing in a country's name, the basic flow and possible alternative flows are as follows:

Basic flow:
Enter user credential
Enter country's name
Flight schedules are displayed

Alternate flows:
A1: Wrong password
A2: User ID does not exist
A3: No flight schedule for that country
A4: Logout

The scenario matrix is represented below:

Scenario ID	***Starting flow***	***First alternate***	***Second alternate***
1. Login ok with existing flight schedules for that country	*Basic Flow*		
2. Incorrect password	*Basic Flow*	*A1*	
3. Login ok but no existing flight schedules for that country and logout	*Basic Flow*	*A3*	*A4*

(Continue next page)

(Question 4 continued)

Given that the data elements and conditions required to execute the above scenarios are userid, password, country and logout, construct a test case matrix for the above three scenarios. You are required to use the table header below to populate your matrix.

Test case ID	*Scenario/condition*	*Userid*	*Password*	*Country*	*Logout*	*Expected result*

[5 marks]
(Total 25 Marks)

END OF QUESTION PAPER