UNIVERSITY OF MAURITIUS

FACULTY OF ENGINEERING

SPECIAL RETAKE EXAMINATIONS

AUGUST 2016

PROGRAMME	**BSc(Hons) Information Systems (F/T)** **BSc(Hons) Information Systems (P/T)**		
MODULE NAME	**Software Engineering - (Special Paper)**		
DATE	**Saturday** **03 September 2016**	**MODULE CODE**	**CSE 2142(3)**
TIME	**09:30 – 11:30 Hours**	**DURATION**	**2 hrs**
NO. OF QUESTIONS SET	**4**	**NO. OF QUESTIONS TO BE ATTEMPTED**	**4**

INSTRUCTIONS TO CANDIDATES

Answer all questions

All questions carry equal marks.

Answer all questions

Question 1 - (Total 25 Marks)

Read the Case Study below and answer ALL the following questions.

Part of an Airline Reservation System

Many travel agents are now opting for a system that could automate their processes to make reservations. 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.

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(Question 1 continued)

(a) Before developing the Airline Reservation System , explain why it is important to consult all the stakeholders.

[4 marks]

(b) During the eliciting requirement phase, the use of natural language may yield some problems.

(i) Describe THREE problems that may be encountered. **[3 Marks]**

(ii) List the alternatives that are available for requirements specification over the use of natural language.

[3 Marks]

(c) System requirement specification (SRS) are used by several stakeholders and the requirements should be written properly. As a system analyst, explain TWO characteristics of a good requirement. **[4 Marks]**

(d) As a team lead, you have been requested to mentor the junior analysts so that the requirement gathering process is carried out properly. You have to explain to them that requirements should state what a system should do, without stating how it should do it. Elaborate on why this distinction is very important?

[5 marks]

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

[6 marks]

Question 2 - (Total 25 Marks)

Morro Hotel Reservation System (MHRS)

You work as a developer in a software development company and implement software according to the specifications of clients. You have been assigned the **Morro Hotel Reservation System (MHRS)**. The proposed software system will be used to manage the front-desk activities of a hotel. The progress of the work will be on weekly basis, where the development team will do presentations and interact with the client. It will be able to accept reservations, to record information about the hotel guests, to verify room availability, and to allocate rooms to guests. The goal of this project is to create a system to manage the front-desk activities of the "Interface Rapids Hotel". The system will be used to enter reservations as well as to check people in and out of the hotel. When a hotel guest wishes to make a reservation, the hotel clerk asks him or her which nights he or she wants to stay and the type of room he or she wants. The system must verify if room(s) are available on those nights before allowing a reservation to be made. The hotel needs to record basic information about each guest, such as his/her name, address, telephone number, credit card etc. A reservation can be cancelled at any time. When a guest checks in, a room is allocated to him or her until he/she checks out. The system must keep track of the guest's account, and print his/her bill. At first, the MHRS will be a simple application to be run from a single computer. The second part should be a client/server system where the client component is used to manage the reservations and the server centralizes the corresponding data. Another part is also envisaged where guests will be able to make their reservations from the Internet. Each version has to be developed in around 1 month.

(a) Given the above scenario, recommend a life-cycle that you would adopt for the new system. Justify your answer by explaining why you have chosen this life-cycle; ensure that you provide clear evidence for your choice of the life-cycle.
[7 marks]

(b) 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) During the design process, the architectural design and the data structure design of the system are being planned. Describe these two types of design. **[4 marks]**

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(Question 2 continued)

(iii) For designing the above system, a layering architecture can be adopted. Evaluate the use of layering. **[5 marks]**

(c) A software development team has developed a prototype for an online banking system for a client. After presentation of the prototype the client suggests that he is very happy with it and suggests that there is no need to develop the system. The client wants the prototype as final version for an excellent price. Deduce and assess whether it is advisable to give the prototype to the customer instead of a full version of the system. **[5 marks]**

Question 3 - (Total 25 Marks)

(a) Differentiate between direct and indirect measures. Use examples to elaborate your answer. **[2+2 marks]**

(b) Lines of code (LOC) is a common software metric used to measure size in software development. Discuss TWO possible drawbacks when using this type of metric. **[2 marks]**

(c) 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.

[5 marks]

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(Question 3 continued)

(d) Software is the most expensive element of all computer-based system. A large cost estimation error can make the difference between profit and loss.

i) Explain why software cost estimation is difficult.

[2 marks]

ii) List and briefly describe three techniques for estimating software cost.

[3 marks]

iii) Compare and contrast each of the estimation techniques you mentioned above.

[3 marks]

(e) A project team, in the process of creating a risk table, listed the following risk.

- Delivery deadline will be tightened
- Less reuse than planned
- Staff inexperienced
- Customer will change requirement
- Size estimates may be significantly- low
- End user resist system

For each of them, identify the category of the risk to which each one of them belongs. Justify for each of them, your reason for including it in the specific category.

[6 marks]

Question 4 - (Total 25 Marks)

(a) 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.

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 above software project as per the task dependency table listed above.

[6 marks]

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

[3 marks]

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(Question 4 continued)

(b) **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. Briefly describe the different levels of the CMMI model.

[5 marks]

(c) One of the functionalities of an 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 given 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*

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(Question 4 continued)

i) 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*

[6 marks]

ii) Given that the only userid and password available for testing are '1234' and '4321' respectively and flight schedules exist for Singapore only. Generate the values for the above test case matrix.

[5 marks]

END OF QUESTION PAPER

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