

# UNIVERSITY OF MAURITIUS

## FACULTY OF ENGINEERING



### SECOND SEMESTER EXAMINATIONS

MAY 2016

<b>PROGRAMME</b>	BSc (Hons) Computer Science BSc (Hons) Information Systems (Full-Time) BSc (Hons) Information Systems (Part-Time)		
<b>MODULE NAME</b>	Software Engineering (Special Paper)		
<b>DATE</b>	Monday 09 May 2016	<b>MODULE CODE</b>	CSE2142(3)
<b>TIME</b>	13.30 – 15.30 Hrs	<b>DURATION</b>	2 hours
<b>NO. OF QUESTIONS SET</b>	4	<b>NO. OF QUESTIONS TO BE ATTEMPTED</b>	4

#### INSTRUCTIONS TO CANDIDATES

This paper consists of **FOUR (4) Questions**.

Answer **ALL FOUR (4) Questions**.

**All Questions** carry equal marks.

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Answer ALL FOUR (4) Questions. All Questions carry equal marks.

**Question 1 [25 marks]**

**Triassic Park System (TPS)**

The system shall monitor the movements of all animals in the park, as well as the movements of the game warden in order to be able to prevent attacks.

Each animal will be fitted with a small radio transmitter, which will emit a signal at frequent intervals. The signals will be picked up by three receivers, which will relay to the central computer the direction from which each signal from each animal was received. The central computer shall analyse these signals in order to calculate the position of each animal. The position of the animals shall be computed within 0.1 seconds.

The pens enclosing each species will be surrounded by electric fences to prevent them from straying into one another's areas, or onto the road used by the tourist. The computer system shall detect any damage to any of these fences and raise an alarm when necessary. An alarm must be raised if any animal strays out of its enclosure.

The interface of the system shall be menu based so that it will be easy to use by the in the control center. It shall automatically send sms to the veterinary, if any animal is injured. The system shall be ready for the planned opening of the park next July, and shall not cost more than Rs 5 million.

- (a) Why should a number of stakeholders be consulted during the requirements engineering process for a computer-based system? List four stakeholders that might be a source of requirements for the TPS system.

**[4 marks]**

- (b) Identify three functional & three non-functional requirements for the Triassic Park system.

**[6 marks]**

- (c) Why do requirements change during development? Using one of the requirement that you have proposed above, suggest a change that might occur and explain why it plausible.

**[4 marks]**

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**Question 1 (Continued)**

- (d) After discovering requirements from various stakeholders, these requirements must be analysed and a number of checks made on them. Explain three types of checks that should be performed on requirements?

**[3 marks]**

- (e) Rewrite the following (vague) requirements so that they may be objectively validated.

- The system shall be operated with minimum training.
- The system shall be reliable.
- The system should be secure.

**[3 marks]**

- (f) There are several life cycle models to represent software development. With the help of a diagram briefly describe a development life-cycle model that will be more appropriate for the Triassic Park System. Give reasons which the life cycle model is appropriate for the TPS.

**[5 marks]**

**Question 2 [25 marks]**

- (a) (i) With the help of a diagram describe the CMM quality standard.

**[5 marks]**

- (ii) What is the difference between process metrics and project metrics. Give an example for each type of metrics.

**[3 marks]**

- (b) (i) What is Function point analysis and give two advantages of using it to estimate size of a software.

**[3 marks]**

- (ii) Describe the class of software estimation techniques known as
- Expert judgement.
  - Estimation by analogy.
  - Pricing to win.

**[3 marks]**

- (iii) Using the COCOMO method: if the number of delivered source code instructions is 125,000 and the value of the constraints a, b and c & d in the Basic COCOMO model are 3.0, 1.12, 2.5 and 0.35 respectively, what is the total effort in person months and the total development time?

**[3 marks]**

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**Question 2 (Continued)**

- (c) (i) Software maintenance activities can be classified as corrective (fixing errors), adaptive (responding to change) and perfective (improving the original software). Why is this distinction useful?

**[3 marks]**

- (ii) With the help of a diagram, briefly describe the maintenance process activities.

**[5 marks]**

**Question 3 [25 marks]**

- (a) (i) With the help of a diagram, explain the design phase.

**[5 marks]**

- (ii) Explain each of the following architectural models

- Client-Server Model
- Manager model
- Central Repository model

**[3 marks]**

- (b) (i) Cohesion is a natural extension of information hiding concept. Explain the difference between coincidental and procedural cohesion.

**[2 marks]**

- (ii) Briefly explain the difference between data coupling and stamp coupling.

**[2 marks]**

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**Question 3 (Continued)**

(c) Given the following c++ code.

```
cin>>a >>b >>c;
if (a > 10)
{
    cout<<"hello";
    if (b < a)
    {
        cout<<"part1";
        if (c > a)
            cout<<"part2";
    }
    else
        cout<<"part3";
}
cout<<"exiting";
```

(i) Draw a control flow graph for the above.

**[7 marks]**

(ii) Find the cyclomatic complexity.

**[2 marks]**

(iii) List down the different independent paths.

**[4 marks]**

**Question 4 [25 marks]**

(a) Briefly describe types of plan in addition to software project plan that a software project manager have to draw up.

**[4 marks]**

(b) Briefly explain why the process of project planning is iterative and why a plan must be continually reviewed during a software project.

**[3 marks]**

(c) Use the task durations and dependencies for a software project shown below to do the following:

(i) Illustrate the dependencies between the different tasks with an activity network diagram.

**[7 marks]**

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**Question 4 (Continued)**

- (ii) Explain what is a critical path. Highlight the critical path in (c)(i) above.

**[2 marks]**

Task	Duration(days)	Dependencies
T1	30	-
T2	14	T3,T6
T3	16	T4
T4	14	-
T5	10	T2,T7
T6	20	T4
T7	17	T1,T3
T8	30	T4
T9	9	T2,T8
T10	56	T9

- (d) (i) Briefly describe three categories of software risk.

**[3 marks]**

- (ii) Consider the software project risks shown below, identify a possible risk category based on (d)(i) above. Briefly describe possible risk management strategy for each risk.

- I. Changes to requirements, which require major design rework, are proposed.
- II. Software components which should be reused contain defects which limit their functionality.
- III. Time required to develop the software is underestimated.

**[3+3 marks]**

**END OF QUESTION PAPER**