RAJARATA UNIVERSITY OF SRI LANKA

FACULTY OF APPLIED SCIENCES

B.Sc. (General) Degree

Second Year - Semester II Examination - March/April 2014

COM 2401 SYSTEM ANALYSIS AND DESIGN

Timer Allowed: 3 hours

Answer ALL questions in Section A and ANY THREE (03) questions from Section B.

Section A

1 (a) (i) Briefly describe four (04) ways in which a System Analyst might gather requirements from a client organization.

[4]

        (ii) Note down two (02) reasons for using CASE tools and list down four (04) commercial or free CASE tool products available.

[4]

   (b) (i) Draw a diagram which shows the modified Waterfall Model with labels to indicate each step/stage.

[4]

        (ii) Briefly describe two (02) situations where pure Waterfall Model may be applicable.

[2]

       (iii) Briefly describe two (02) situations where Spiral Model may be applicable.

[2]

       (iv) Briefly describe two (02) situations where Extreme Programming (XP) may be applicable.

[2]

       (v) Briefly describe what do you understand by the term "Iterative Process" in software engineering.

[2]

2 (a) (i) Briefly describe the two (02) types of measurement scales used in information gathering.

(ii) Briefly describe the three (03) types of problems that can be present in measurement scales used in information gathering. [4]

(iii) Briefly describe why sampling is used in information gathering instead of using the whole set. [3]

(b) (i) Briefly describe two (02) human factors that should be considered in user interface design. [2]

(ii) Briefly describe two (02) user interface design principles. [3]

(c) (i) Briefly describe what "Milestones" and "Deliverables" are in a project. [3]

(ii) Note down two management activities of a software project manager. [2]

(iii) Briefly describe what a "risk" is in a software project. [1]

[2]

Section B

3 (a) The **Ministry of Defense** is hoping to build a country wide criminal information system which would carry information about crimes and criminals. This system will store the details of the crimes in digital form including photographs, videos, fingerprint records, police reports, DNA evidence, etc. Also it should carry information about criminals such as their past crimes, past and ongoing court cases, their fingerprint and DNA information, photographs, bio data etc. This should also carry information about various stolen or missing property such as vehicles, phones, firearms, etc.

- This system should be protected from all forms of external and internal threats.
- Changes made to the data should be logged properly.
- The data should be accessible to the law enforcement authorities through the internet and mobile connections.
- Client applications are part of the project.
- System should allow large number of simultaneous connections.
- System should be developed within 24 months.
- The contactor should train necessary system administrators and system engineers.
- The initial maintenance contract is 10 years (after deployment).
- This may be extended up to additional 15 years.

The following are software process models.
- Waterfall Model
- Spiral Model
- Agile Model
- Component Based Development

- Cowboy Coding

Choose a process model from the above list that is **best** applicable for the above system giving reasons why it is the best solution. Give reason for rejecting other process models.

[2x5]

(b) (i) Following are architectural styles widely used in system design.
- Repository Model
- Client Server Mode
- Layered Model

Choose a style from the above list that is **best** applicable for the above system giving reasons why it is the best solution. Give reason for rejecting other styles.

[2x3]

(ii) Briefly describe four (04) risks that may arise after the deployment of the above system.

[4]

4 (a) **Applied Intelligence Laboratory (AIL)** is a research and development laboratory specializing in advanced software solutions that uses a wide range of latest technologies. AIL has been contracted to develop a crime pattern prediction system which uses Artificial Intelligence (AI) and various pattern recognition algorithms. Contract period is 12 months

The following are software process models.
- Waterfall Model
- Spiral Model
- Agile Model
- Extreme Programming (XP)
- Cowboy Coding

Choose a process model from the above list that is **best** applicable for the above system giving reasons why it is the best solution. Give reason for rejecting other process models.

[2x5]

(b) (i) Briefly describe four (05) risks that may arise during the development of the above system.

[5]

(ii) Briefly describe four (05) risks that may arise after the deployment of the above system.

[5]

5 (a) **Northern Electronics (NE)** is a large Bio medical engineering company which is developing a Surgical Robot (a human controlled robot which performs surgeries) which is capable of performing heart surgeries. NE is calling for partners to develop the embedded software for this robot. The robot is expected perform heart surgeries in faster, more accurate manner minimizing the risk to the patients and lower the time taken.

The system should directly manipulate the robot while communicating with

outside computers/monitors. Expected development time is 24 months.

(i) The following are known as "Architecture and System Characteristics" in System Design. Describe which of the following are most critical in the development of the above system.
- Performance
- Security
- Safety
- Availability
- Maintainability

[8]

(ii) Briefly describe four (05) risks that may arise after the deployment of the above system.

[5]

(b) (i) In the above system, warning to the medical staff is indicated through changing the color of specific GUI components. What is your opinion about this method?

[2]

(ii) "Above system should be tested using Formal Methods".
What is your opinion about this statement?

[5]

6 (a) **NRGI Group** is a major healthcare provider in the country that manages a number of hospitals, medial labs and medical centers. It has been using a central information system from 1995. However with the company has changed significantly from the inception of the system and the system itself been modified extensively. Due to this the quality of the system has degraded. However the system still plays an essential role in the NRGI Groups business process.

(i) What do you think the future options for the above system would be?

[6]

(ii) The quality of the above system has degraded due to modifications. Explain how this happens.

[3]

(iii) Why do maintenance costs increase with time?

[2]

(iv) Briefly describe three (03) factors that affect the maintenance cost (also known as maintenance cost factors).

[6]

(v) Documentation is usually produced during software development process. Describe the importance of having documentation of the software development.

[3]