Sri Lanka Institute of Information Technology

B.Sc. Special Honours Degree/ Diploma

in

Information Technology

Final Examination

Year 2, Semester I (2017)

IT220 - Software Engineering I

Duration - 3 hours

June 2017

Instructions to Candidates:

1. This paper contains **four** Essay Type Questions. **Answer All** Questions.
2. Total Marks: 100.
3. This paper contains 5 pages with Cover Page.

Question 1 (30 marks)

Analyze the scenario given below and answer the subsequent questions. **State any assumptions made.**

Collision Repair Center (CRC) is a full-service automotive repair center. CRC performs high quality, guaranteed service at a fair price. CRC has recruited you as a Business Analyst to analyze the requirements given below for their proposed automated online system.

CRC repairs all types of vehicles and is the best choice for any vehicle repair. The customers of CRC can request a repair service online. When the request is made, if the vehicle details are already stored in the system, system loads those information. Otherwise, the customer has to enter his vehicle details through the online system. If needed, Admin Assistant can make the repair request on behalf of the customer.

Once the customer makes the repair request, the system notifies the Admin Assistant to issue a ticket for the request. When issuing the ticket, the system will load the vehicle details and the repair request details. Then by analyzing the details of repair request, system categorizes the repair as a minor repair service, scheduled maintenance service or a major repair service. Then the system will issue a unique ticket number based on the vehicle details and the repair type.

The manager of the CRC is responsible for assigning technicians to each repair ticket. When assigning a technician, first the system will load the repair ticket details. After analyzing the repair ticket details, system will determine whether the repair needs a specialized technician or a general technician. Then the system checks the availability of the technicians depending on their work schedules. Based on the availability, system selects the most suitable technician for the job.

If the technicians are not available for the repair, the system will send the repair request details to one of their closest branches. As the branch systems are linked with each other, the Branch Repair System will notify the CRC system about the possibility of carrying out the repair. If the repair service can be done at the branch, the manager arranges the vehicle to be sent to the branch.

a) Given the above requirements, identify **two** most important nonfunctional requirements for CRC System. **Justify your choice**.

(6 marks)

b) Analyzing the requirements given above, draw the use case diagram.

(24 marks)

Question 2 (30 marks)

"VCare" is a full service hospital pharmacy, which handles all the services related to pharmaceuticals. You are being hired to design a system for "VCare". Analyze the given requirements and answer the following questions. **State any assumptions made.**

VCare provides its services to both OPD patients and admitted patients. In the case of OPD patients, once the doctor prescribes the medication, the patient can upload the prescription together with his lab reports to the VCare system online if he has a valid patient account. Otherwise, the patient should create an account online before uploading the documents. Medical prescriptions for the admitted patients are written by doctors and sent to the pharmacy.

A pharmacy technician reviews the prescriptions and sends them to the appropriate pharmacy station. Prescriptions of OPD patients are sent to the OPD station. For admitted patients, prescriptions for drugs that must be formulated are sent to lab station, prescription for off-the-shelf medicine are sent to shelving station and prescription for narcotics are sent to secure station.

At each station a pharmacist creates the order, checks the patient file to determine the appropriateness of the prescriptions, and fills the order accordingly. For OPD patients, the order will be sent to the Billing Department (BD) together with OPD patient and bill information. For admitted patients, admission number, the drug type, amount dispensed and the cost are sent to the BD.

The BD will then send the bill to the OPD patient for payment. Once the patient pays online, the BD approves the shipment and the medications will be shipped to the patient. An invoice will be generated on the details of the admitted patient, and the medication invoice will be added to their total bill to be paid at the time of discharge.

a) Draw a Context Level Data Flow Diagram for the above scenario. (05 marks)

b) Draw a level-balanced DFD (Level 1) for part a). (12 marks)

c) Write **3 entries** to be included in the Data Dictionary for the above DFDs. (03 marks)

d) Convert your level balanced DFD to a Structure Chart. (10 marks)

Question 3 (20 marks)

Answer the following questions considering the activities shown below

Task	Duration (days)	Predecessors
A	6	
B	4	
C	7	A,B
D	8	B
E	5	F
F	5	C,D
G	7	F
H	8	G

a) Draw a CPM graph for the above project and mark the **critical path** on the graph.

(7 marks)

b) Determine the project duration

(1 mark)

c) Find the **Earliest Start Time, Latest Start Time** and **Latest Finish Time** for the following activities.

Activity	ES	LS	LF
B			
D			
F			

(6 marks)

d) As the project manager of this project, explain what steps you would take in order to deliver the project on the given deadline.

(2 marks)

e) Compare **three** features of the following scheduling techniques.

Work Breakdown Structures, Task Networks, Gantt Charts and PERT Charts.

(4 marks)

Question 4 (20 marks)

a)

i. *"Non-functional requirements lead software engineering to have trade-offs between alternatives."* Do you agree with this statement? Justify your answer with an example.

(3 marks)

ii. Write an advantage and a disadvantage of using "Prototype Model" over "Classical Waterfall Model" in system development.

(3 marks)

b) Briefly describe **two** testing artifacts we use in testing software systems.

(4 marks)

c) Contrast Top-Down Integration Approach to Bottom-Up Integration Approach in Integration Testing.

(4 marks)

d) Read the description below and write down **two** user stories for the system.

"K-Super" is a Supermarket which is in need of providing an e-supermarket. They are going to implement this system using Agile – SCRUM methodology. In the first sprint they are going to automate the following processes.

- The online user can choose whether the order is a delivery or a pickup.
- The user wants all previous orders stored in the system as he can repeat the previous orders.
- The system will offer 50% discount for orders done for specific items during the weekend.
- The user will get his loyalty points when he shops online.

(6 marks)

********** **End of Exam Paper** **********