

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)

Department of Computer Science and Engineering (CSE)

SEMESTER FINAL EXAMINATION
DURATION: 3 HOURS

SUMMER SEMESTER, 2016-2017

FULL MARKS: 150

CSE 4407: System Analysis and Design

Programmable calculators are not allowed. Do not write anything on the question paper.
There are 8 (eight) questions. Answer any 6 (six) of them.
Figures in the right margin indicate marks.

- a) A major penal centre has been built outside the town of Queenston for keeping prisoners convicted of only one offense or of white collar crimes. The prison facility has a constant flow of prisoners into and out of the prison. They are also moving prisoners within the prison based on their good behaviour. On a day to day basis, approximately 136 prisoner changes take place. The changes are processed in the prison control centre office by Miss Keepkey. Each day, the new prisoner processing division receives the new prisoners, conducts a physical examination, assigns the prisoners to living quarters and sends the information file on the new prisoners to Miss Keepkey's office. Miss Keepkey adds information on the new prisoner to a prisoner information database kept on her PC. She also updates her prisoner locator log which keeps records of where each prisoner resides. Finally, she files the actual folder away in an enormous storehouse of file cabinets which contains information on all prisoners who have ever stayed at Queenston. If a new prisoner is found to have been a previous occupant of Queenston, she consolidates both files. As prisoners stay at Queenston, the officials review their behaviour record. Good behaviour or closeness to release time warrant an upgrade in accommodations, usually to minimum security housing. Movement of prisoners to new quarters is done on a weekly basis. Orders are issued to move the prisoners and the move information is sent to Miss Keepkey. She makes these changes in her prisoner locator log and her prisoner information database. She also pulls the prisoners long term file and notes good behaviour commendations. A release review and parole board reviews prisoner records on a daily basis and generates a set of prisoners to be released either into the custody of a parole officer or without any restrictions. They notify the prisoner and send an update of the release to Miss Keepkey's office. She removes the prisoner from her prisoner information database and prisoner locator log and updates the long-term file of the prisoner to reflect the release.

10

Draw the following diagrams based on the above mentioned system.

- Context Diagram
- Diagram 0

NB: If any process in diagram 0 requires further breakdown into some other child process then draw the corresponding Diagram N (N is the parent process Number.)

- Explain how fit among the HCI elements of the human, the computer, and the tasks to be performed leads to performance and well-being.
- What are the differences between an interface and an abstract class? Explain a practical scenario for each of the two where you need them.

8

7

2. a) Stefan Lano needs displays that will show the musical instrument inventory in his chain of music stores that caters to musicians playing in world-class symphony orchestras in Basel, Switzerland; Buenos Aires, Argentina; Philadelphia, USA; and New York. Design a form-based interface for the inventory control of musical instruments in all four stores that could be used on a PC display screen. Assume that English will be the interface language.
- b) Briefly discuss about the following topics:
- Six sigma
 - Structured walkthrough
 - Fishbone diagram
 - Auditing
- c) Is it important to consider human sensory capabilities and limitations while designing an interface? Justify your answer with appropriate examples. Discuss the drawbacks of natural language interface.

3. a) Your systems analysis team is close to completing a system for Meecham Feeds. Roger is quite confident that the programs that he has written for Meecham's inventory system will perform as necessary, because they are similar to programs he has done before. Your team has been very busy and would ideally like to begin full systems testing as soon as possible. Two of your junior team members have proposed the following:

- Skip desk checking of the programs (as similar programs were checked in other installations; Roger has agreed).
- Do link testing with large amounts of data to prove that the system will work.
- Do full systems testing with large amounts of live data to show that the system is working.

Respond to each of the three steps separately in their proposed test schedule. Use a paragraph to explain your response.

- b) Draw PERT diagram for the following activities and find out the critical path. Draw the Gantt chart as well. For drawing Gantt chart assume you are in week 8 and you may have valid parallel activity in your diagram.

Activity	Predecessor	Duration (week)
A	B, C	6
B	None	4
C	A, B	8
D	A, B, C	7
E	A, B	2
F	D	6
G	E, F, D	11
H	G, F	5
I	None	5
J	I	12
K	A, H, E	3
L	J	9

- c) What is JAD? Who are involved here? Discuss the pros and cons of JAD.
4. a) Which documentation technique gathers information that is often shared among users but is seldom written down? Explain elaborately and draw comparison with other available techniques. What are the factors an analyst should consider while choosing a particular technique?

- b) One of the main objectives of HCI design is to provide the best possible user experience. Give a guideline which will minimize the user's interaction with the system. Discuss about the standard operation and consistency as well. 4+4
- c) Woody's Supermarket, a small chain of grocery stores, is building a Web site to allow customers to place orders for groceries and other items they sell. The customer places a Web order, the customer master is updated, and an order record is created. The order prints at a local store, and the goods are picked from the shelves by the store employees. Customers are sent an email notification that their order is ready. When they pick up the order, frozen goods, chilled products, and other items are assembled. Draw an activity diagram showing the customer using the Web site to place an order, verification of the order, order confirmation, order details sent to the local store, and a customer email sent to the customer. 6
5. a) Musixscore.com is an online service providing sheet music to customers. On the "browse music" Web page, customers select a genre of music from a drop-down list. The Web page uses Ajax to obtain a list of performers, musicians, or groups that match the genre, which is formatted as a dropdown list. When a selection is made from the performer's drop-down list, the Web page uses Ajax to display a third drop-down list displaying all the CDs or other works of the performer. When a CD is selected, the Web page uses Ajax to obtain all the songs on the CD in a fourth drop-down list. The viewer may make multiple selections. When the Add to Shopping Cart image is clicked, the songs are added to the shopping cart. The viewer may change any of the drop-down lists to select additional sheet music, and the process is repeated. 4x4
- Write a use case description for the Browse Music Score use case, representing this activity.
 - Draw a sequence diagram using boundary, control, and entity classes for the Musixscore Web page.
 - Write a list of the messages, names, and the parameters, along with the data types, that would be passed to the classes and the values (with data types) that are included with the return message. Make any assumptions you need about the data.
 - Create a class diagram for the entity classes used in the sequence diagram.
- b) Would you describe a use case model as a logical or physical model of the system? Defend your answer. 4
- c) Which class is used to break up a many-to-many relation between classes? Explain with proper example. 5
6. a) Cab Wheeler is a newly hired systems analyst with your group. Cab has always felt that questionnaires are a waste. Now that you will be doing a systems project for MegaTrucks, Inc., a national trucking firm with branches and employees in 130 cities, you want to use a questionnaire to elicit some opinions and information about the current and proposed systems as well as the market condition. 4x3
- Based on what you know about Cab and MegaTrucks, give three persuasive reasons why he should use a survey for this study.
 - Given your careful arguments, Cab has agreed to use a questionnaire but strongly urges that all questions be open-ended so as not to constrain the respondents. In a paragraph, persuade Cab that closed questions are useful as well. Be sure to point out trade-offs involved with each question type.
 - Prepare a set of closed and open ended question which should be asked to MegaTrucks assuming Cab is convinced.
 - If you fail to convince him, what should be your last option for information elicitation?

- b) Rex Tillerson is the System analyst of a newly formed fourth generation automobile company named Esla Inc. Esla Inc. is going to undertake a project where their ultimate objective is to produce Carbon neutral cars fueled by non-combustible materials. The onus is on Rex and he is flabbergasted about which type of prototyping to use. What are the advantage and disadvantage of prototyping? According to your understanding, suggest Rex one type of prototyping with proper justification.
- c) Compare RAD to SDLC

7. a) List the guidelines for evaluating software.

b) Write short notes on the following:

- i. Payback
- ii. Cash-flow analysis
- iii. Present value analysis

c) Delicato, Inc., a manufacturer of precise measuring instruments for scientific purposes, has presented you with a list of attributes that its managers think are probably important in selecting a vendor for computer hardware and software. The criteria are not listed in order of importance.

- Low price.
- Precisely written software for engineering applications.
- Vendor performs routine maintenance on hardware.
- Training for Delicato employees.

Now answer the followings:

i. Critique the list of attributes in a paragraph.

ii. Using its initial input, help Delicato, Inc., draw up a more suitable list of criteria for selecting computer hardware and software vendors.

8. a) You began drawing E-R diagrams soon after your entry into the health maintenance organization for which you're designing a system. Your team member is skeptical about using E-R diagrams before the design of the database is begun.

In a paragraph, persuade your team member that early use of E-R diagrams is worthwhile.

b) How can you prevent project failure? Explain elaborately.

c) Assume current railway ticketing system in Bangladesh is completely manual with everything done in papers. You are assigned to make this entire process an automated one. As an initial step, draw the E-R diagram of your proposed system with as much details as possible.