B.Sc. Engg. / HD CSE 4th Semester (64)

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ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

SEMESTER FINAL EXAMINATION — **SUMMER SEMESTER, 2015-2016**

DURATION: 3 Hours — **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.

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1. a) What is Structure Chart (SC) diagram? Create a hierarchical structure chart for the following code. 8

```
Begin sampleScript
SET someNumber AS Number
SET message AS String
IF checkStuff(someNumber)THEN
              sendMessage(message)
              ELSE
              WHILE someNumber = getNewNumber()
              END WHILE
END IF
```

Figure 1: Sample code

   b) What are top down and bottom up design? Describe with examples and diagrams. 7

   c) What is Six Sigma? Describe Six Sigma with appropriate diagram and examples. 10

2. a) Create an activity diagram based on the following scenario. The purchasing department handles purchase requests from other departments in a company. People in the company who initiate the original purchase request are the "customers" of the purchasing department. A case worker within the purchasing department receives that request and monitors it until it is ordered and received. Case workers process the requests for purchasing products under $1,500, write a purchase order, and then send it to the approved vendor. Purchase requests over $1,500 must first be sent out for a bid from the vendor that supplies the product. When the bids return, the case worker selects one bid. Then, the case worker writes a purchase order and sends it to the approved vendor. 10

   b) Describe the four categories into which Unified Modeling Language (UML) classes fall. Describe the uses of swimlanes on activity diagrams. 9

   c) Consider a file system with a graphical user interface, such as Macintosh's Finder, Microsoft's Windows Explorer, or Linux's KDE. The following objects were identified from a use case describing how to copy a file from a floppy disk to a hard disk: File, Icon, TrashCan, Folder, Disk, Pointer. Specify which are the entity objects, which are the boundary objects, and which are the control objects? 6

3. a) What are tangible and intangible costs and benefits? Explain with examples. 7

   b) Assume that a project team will work following a standard working week (5 working days in 1 week). All tasks will start as soon as possible. 4+2+4

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Table 1: Project Schedule

Description	Task	Must Follow	Time (days)
Draw data flow	A	None	20
Draw decision tree	B	A	20
Revise tree	C	B	50
Write up project	D	C, I	20
Organize data dictionary	E	A	35
Do output prototype	F	None	10
Revise output design	G	F	45
Write use cases	H	None	50
Design database	I	H, E, G	40

Do the followings according to the information given in Table 1.

i. Determine the critical path of the project.
ii. Calculate the planned duration of the project in weeks.
iii. Identify the non-critical tasks and the float (free slack) on each.

c) Alamo Foods of San Antonio wants to introduce a new computer system for its perishable products warehouse. The costs and benefits are given in Table 2. 5+3

Table 2: Costs and Benefits of Alamo Foods

Year	Costs	Benefits
1	$33,000	$21,000
2	$34,600	$26,200
3	$36,300	$32,700
4	$38,100	$40,800
5	$40,000	$51,000
6	$42,000	$63,700

i. Calculate the Net Present Value (NPV) of the project using a discount factor of 8%.
ii. Calculate the projected payback time for the project to the nearest month. What is your recommendation for Alamo Foods?

4. a) Differentiate between aggregation and composition with proper examples and diagrams. 7

b) Design a simulation of a basketball conference. Each conference has 10 teams. Each team has 12 players. Each player has a specific height, speed, and accuracy. Players know which team they belong to. Some players are scholarship players. Scholarship players need to record their current grade-point average. Players may be transferred between teams. Teams play basketball games against other teams in the conference. The result of each game is determined using a function based on the height, strength, speed, and accuracy of the players on each team. 8+10

Do the followings:

i. Perform a Class Responsibility Collaboration (CRC) analysis based on the given information and make a card for each class.
ii. Draw a class diagram fort the given information and be sure to label all the associations with appropriate multiplicities.

5. a) Describe Martin's Pioneering approach for the Rapid Application Development (RAD) with diagram. 10

b) What are the four key principles of Agile software development? Describe an agile method with diagram. 10

c) What is folklore? What information is collected by folklore? 5

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a) What is prototyping? Give a brief explanation of different types of prototypes. 10

b) What are the standard testing processes of software? Suppose, you have designed a new template for CSE department, IUT and during the development it showed no errors. But after attaching it to IUT's official website whenever someone visit CSE's section from other department user gets an error message. Also, the "faculty info edit" and "notice update" method is not well appreciated. Identify which of these shortcomings will be determined by which testing process? Who are the personnel involved in the process? 5

c) During the examination, an instructor first notifies the students about the exam date and the material to be covered. She then prepares the exam paper (with sample solutions), gets it copied to produce enough copies for the class, and hands it to students on the designated time and location. The students write their answers of the exam questions and submit their papers to the instructor. The instructor then gives the exam papers to the TAs, along with sample solutions to each question, and allows them to give marks on it. The instructor then records all marks and returns the papers to the students. 10

Draw a sequence diagram that represents this process. Make sure to show when each actor is participating in the process. Also, show the operation that is carried out during each interaction, including arguments.

7. a) What are the different types of standard user interfaces? Describe them with example scenarios. 10

b) If V, E and A represents Values, Entities and Attributes respectively, then give the query notations for the following queries: 9

i. What did the employee number 23715 make in the year 2015?
ii. List all the years for which earnings exceeded $50,000 for all employees in the company.
iii. List all the employees whose earnings exceeded $50,000 in any of the years available.
iv. What employee(s) earned more than $50,000 in 2015?
v. In which years did the employee number 22855 make over $50,000?
vi. List all the details found in the earnings history file for the employee number 22777.

c) What are the standard ways of soliciting feedback from E-commerce website? 6

8. a) Consider the following scenario: 10

Catherine's Catering is a small business that caters meals, receptions, and banquets for business and social occasions such as birthdays, weddings etc. At first it was a small company. Catherine talked to the customers over the phone to determine the number of people, the type of meals, and other information necessary to cater an event. Catherine was able to manage the business using spreadsheets and word processing but found difficulty in keeping up with endless phone calls about what types of meals were available, changes to the number of guests attending the event, scheduling part time employees etc.

Create a formal problem definition from the above scenario. The problem definition should contain Problem statement, Issues with proper weights, Objectives in accordance with issues, Requirements and finally Constraints.

b) After the requirement analysis phase the system analyst and software developers have found the following possible configuration of Data Flow Diagram (DFD) for a simple "Order Processing System". The words written in bold and italic letters can mean a process, data store, entity or information name. 10

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i. A ***CUSTOMER*** submits an ***ORDER***. Depending on the processing logic, the ***FILL ORDER*** process either sends an ***ORDER REJECT NOTICE*** back to the customer or sends a ***PICKING LIST*** to the ***WAREHOUSE***.

ii. A ***COMPLETED ORDER*** from the ***WAREHOUSE*** is input to the ***CREATE INVOICE*** process, which outputs an ***INVOICE*** to both the ***CUSTOMER*** and the ***ACCOUNTS RECEIVABLE*** data store.

iii. A ***CUSTOMER*** makes a ***PAYMENT*** that is processed by ***APPLY PAYMENT***. ***APPLY PAYMENT*** requires ***INVOICE DETAIL*** input from the ***ACCOUNTS RECEIVABLE*** data store along with the ***PAYMENT***. ***APPLY PAYMENT*** also outputs ***PAYMENT DETAIL*** back to the ***ACCOUNTS RECEIVABLE*** data store and outputs ***COMMISSION*** to the ***SALES DEPT***, ***BANK DEPOSIT*** to the ***BANK***, and ***CASH RECEIPTS ENTRY*** to ***ACCOUNTING***.

Based on the given information draw the logical Context Diagram and Diagram 0 with their titles.

c) What is Joint Application Development (JAD)? Describe the conditions of using JAD. 5

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