King Saud University

College of Computer and Information Sciences
Computer Science Department

Course Code:	**CSC 343**
Course Title:	**System Analysis and Design**
Semester:	**Fall 2022**
Exercises Cover Sheet:	**Midterm Exam** **1:30 h**

Student Name:	**Solution of Midterm**
Student ID:	………………………………………………….
Department Name:	………………………………………………….

CLOs		Question No. Relevant Is Hyperlinked	Covering %	Full Mark	Student Mark
1	**Knowledge and Understanding**				
1.1-K1	Apply key elements and common methods for elicitation and analysis to produce a set of software requirements.				
1.2-K2	Use necessary tools for analysis and design activities (process model, diagrams, …..).				
2	**Skills :**				
2.1-S1	Choose an appropriate method to design the software using a software requirement specification, an accepted design methodology (e.g., structured or object-oriented), and appropriate design notation.				
2.2-S1	Use a software testing strategy.	---			
2.3-S3	Work on team and Write project reports.	---			
3	**Values:**				
3.1-V1	Make ethical professional decisions and practice ethical professional behavior.				
Total			**100%**	**30**	

This exam comprises 4 exercises. Make sure you read each exercise carefully before attempting an answer.
Be sure to clearly indicate your final answer for each exercise. Also, be sure to state any assumptions that you are making in your answers.
Good luck!

Exercise 1: *(5 points)*

Hassan works in a Software Company. The company assigned the task to develop a Gun Fighting game to Hassan. The management explained the complexity of the task and informed Hassan that the task needs to be finished within a month otherwise there is big chance of Project Failure. While working on the project, Hassan came to know that the game has some user actions and scenes that can create arrogance and intolerance in kids that will play the game. Instead of informing to the higher management, he kept quiet and continued his work.

*Read the above situation carefully and answer if there is a violation of the Software Engineering Code of Ethics and Professional Practice? Give the Software Engineering **Code of Ethics** to justify your answer **along with the reason**. **Choose violation(s) from the following list to solve exercise.***

  a. Provide service in their areas of competence, being honest and forthright about any limitations of their experience and education.
  b. Not knowingly use software that is obtained or retained either illegally or unethically.
  c. Use the property of a client or employer only in ways properly authorized, and with the client's or employer's knowledge and consent.
  d. Disclose to appropriate persons or authorities any actual or potential danger to the user, the public, or the environment, that they reasonably believe to be associated with software or related documents.
  e. Accept no outside work detrimental to the work they perform for their primary employer.

Answer:

d: Because Hassan came to know that the game has some user actions and scenes that can create arrogance and intolerance in kids that will play the game. Instead of informing to the higher management, he kept quiet and continued his work (2 point for choice + 3 points for reason).

Exercise 2: *(8 points)*

Suppose a large project related to "University Education System" has to be developed. After analyzing the requirements, the system has three major subsystems A, B and C. For the subsystem A, the reusable components are available in the market. These components can be purchased and integrated to develop this subsystem. For subsystem B, requirements are well known. For subsystem C, requirements are not well known and something working is required to show the customer to explore the requirements. All subsystems can be developed in parallel. After developing and integrating the subsystems, the full system can be delivered to customer.

Suggest the most appropriate software process model(s) that might be used as a basis for managing the development of the system. Give reasons for your choice based on the type of system being developed.

Answer:

(2 points for each, 1 for Process Model and 1 point for the reason.)

For A: Reused Oriented Model is suitable because the components are available in the market and these components can be purchased and integrated to develop the subsystem

For B: Waterfall is suitable because the requirements are well Known

For C: Evolutionary (Prototyping) Model is suitable because something working is required to show the customer to explore the requirements

For the whole system:

Incremental Model is required because once a subsystem is developed, it will be handed over to the customer for use.

Exercise 3: *(9 points)*

A Software Company gets a client who wants a software solution for his Grocery Store. A software engineer is assigned the task to interact with the client to collect, analyze and finalize the requirements. After interacting with the customer, the software engineer comes to know that the client needs a system that should permit the Grocery Store staff to add, update, delete and search products' information in the system. The Grocery Store staff should also be able to print the available quantity of any product in the store. The Grocery Store manager should be able to add a new staff member, update and delete an existing staff in the system. The staff should be able to generate the invoice for any order given by the customer in the Grocery Store.

The Software should be available online to all branches of the Grocery Store from 7:00 AM to 10:00 PM from Saturday to Thursday, every week. The client clearly informs the software engineer that the Grocery Store has a licensed version of Windows 10 on every machine and the software must run on Windows 10. Every invoice generated from the system must include 15% Value added Tax (VAT) as a Government Policy.

Identify at least three functional and three non-functional requirements in the situation given below. In case of non-functional requirement, also mention the type of the requirement (Product, Organizational or External).

Answer:

Functional Requirements:

1. System allows to Grocery Store staff to add, update, delete and search products' information in the system 1.5 points
2. System allows to Grocery Store staff to print the available quantity of any product in the store 1.5 points
3. System allows to Grocery Store manager should be able to add a new staff member, update and delete an existing staff in the system. 1.5 points

Non Functional Requirements:

1. Software should be available online to all branches of the Grocery Store from 7:00 AM to 10:00 PM from Saturday to Thursday, every week 0.75 points (Product requirement 0.75 points)
2. Grocery Store has a licensed version of Windows 10 on every machine and the software must run on Windows 10. 0.75 points (Organizational requirement 0.75 point)
3. Every invoice generated from the system must include 15% Value added Tax (VAT) as a Government Policy 0.75 points (External requirement 0.75 point)

Exercise 4: *(8 points)*

Consider a project with the following activities. Times are given in weeks.

Activity	Preceding	Time (week)
C	--	6
B	--	4
P	--	3
A	B, C, P	7
U	P	4
T	A	2
R	A	3
N	U	9
F	T, R, N	1

1. Draw the network activity diagram and find the earliest and the latest start/finish time for each activity? 2.25 points
2. Identify critical path(s). 2 points
3. What is the slack on activity T. 1 point

4. What is the impact to the project if activity B takes three weeks longer than planned? 1.5 point
5. What is the impact to the project if activity R takes two weeks longer than planned? 1.25 point

Answer:

1.
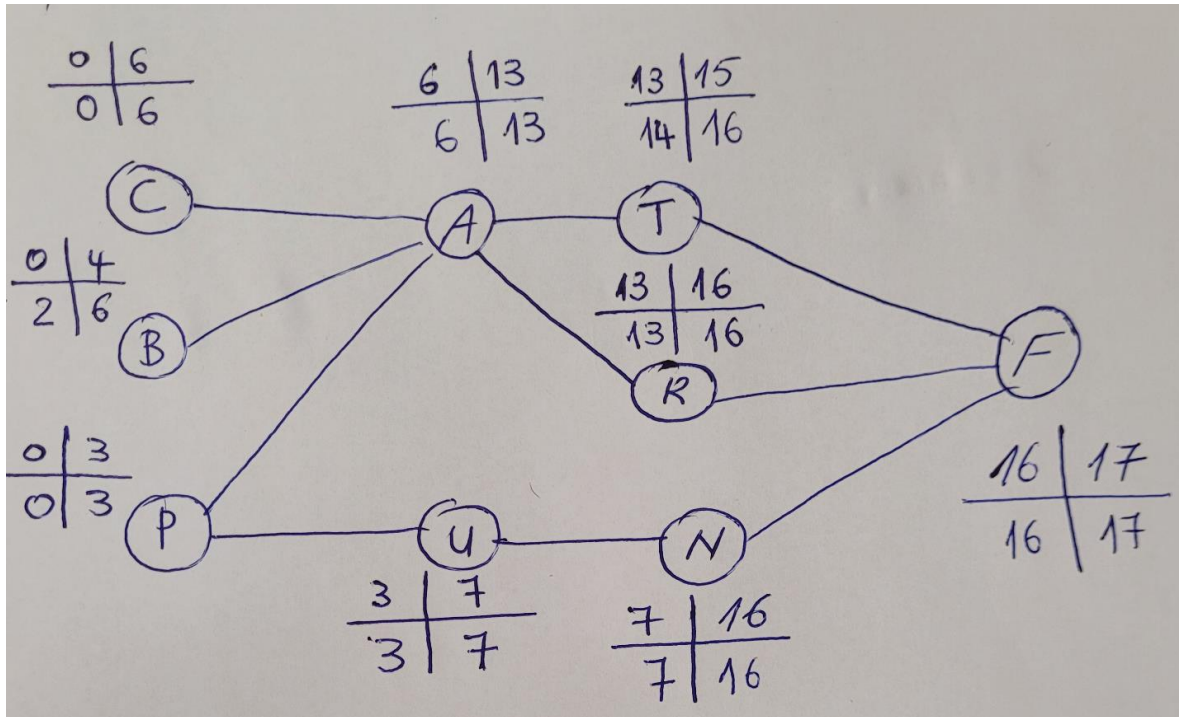
2. Critical paths:
   - CARF
   - PUNF
   - PARF

3. Slack of T = 1.

4. If activity B takes three weeks longer than planned, the latest finish of it will be at week 7 (delayed by 1 week). This is will affect the critical task A (will be delayed by 1 week) and the final project be delayed by 1 week.

5. In this case the task R (critical task) will be delayed by 2 weeks and the final project be delayed by 2 weeks.