United International University
Department of Computer Science and Engineering
CSE 3421: Software Engineering   Final: Summer 2024

Total Marks: 50   Time: 2 hours

Any examinee found adopting unfair means will be expelled from
the trimester / program as per UIU disciplinary rules.

Answer all the questions. Numbers to the right of the questions denote their marks.

1. (a) TumTum Doughnuts is a leading doughnut chain that sells different varieties of doughnuts. You can (6)
buy two basic doughnuts - the **disc-shaped doughnut** and the **ball doughnut**. You can add different
kinds of **icing** on the doughnut such as **chocolate, strawberry and white-chocolate**. You can also
add **fillings** to the doughnuts such as **custard, mousse and cheese**. TumTum has recently introduced
new **toppings** that can be added such as **chocolate-shavings and cherry-fruit**. A customer can
order a plain doughnut, and if they want they can pick/not pick any one type of icing, filling and
topping. Draw an **UML Diagram** using an appropriate **Design Pattern** for the scenario above.

   (b) **Explain** the **differences** between the following **Design Patterns**: (4)
   - **Factory and Abstract Factory**
   - **Adapter and Decorator**

2. (a) John is visiting his school's website to register for a few courses. The webpage layout on his mobile (6)
and laptop looks very different. At first, he fills out a form with his personal information. Then he
selects his desired courses but mistakenly selects an undesired one too. He can't undo that and is forced
to proceed to the next step. The next step requires him to enter the total credit hours that he took
but he's unable to remember the credit hours for the extra course. **Briefly explain Schneiderman's
8 Golden Rules** first and then point out the rules that were **violated** in the above scenario with
proper justification. Also **give suggestions** for **features** that can **overcome these violations** of
the Golden Rules.

   (b) **Describe** the following terms (4)
   - **SDK**
   - **REST**
   - **JSON**
   - **API**

3. (a) John is creating an e-commerce site, which isn't using any domain name right now. He has given the (6)
address to a few of his friends and relatives and is expecting them to give him a report detailing the
issues they might be facing while using the site. Approximately, 20 users will visit the site concurrently
for the next few weeks. John tested the site with a synthetic load of 20 users. Later, John also tested
the site with 1 million artificial users. **Identify** the **types of software testing** that were involved in
the above scenario and **justify** your answer.

   (b) **Write** down the **differences** between **Docker and Virtual Machine**. (4)

4. (a) John is an engineer at an educational platform, which provides education through the internet. Re- (6)
cently, the site has seen a surge of users, prompting John to work overtime. The company doesn't
allow the employees to form unions, nor does it pay for overtime. The video contents, which are the
company's primary services, are increasingly becoming worse in quality to meet the demand. Moreover,
the company is accused of accepting bribes from some educators to boost their videos.
Which of the **principles of ethics** are **violated** here? **Justify** your answer.

   (b) **Write** down the **differences** between the **Microservice** architecture and the **Microkernel** architec- (4)
ture. **Provide** an **example scenario** for each architecture.

5. (a) Find the **Earliest Start, Earliest Finish, Latest Start, Latest Finish, Project Deadline, and** (10)
Critical Path using the **Critical Path Method** for the following tasks:

Tasks	Duration	Precedents
A	10	-
B	5	A
C	20	B
D	10	C,E,G
E	15	A
F	5	D
G	15	-
H	25	G
I	10	D
J	15	I
K	20	I