

## ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)

## ORGANISATION OF ISLAMIC COOPERATION (OIC)

**Department of Computer Science and Engineering (CSE)**

<b>MID SEMESTER EXAMINATION</b>	<b>SUMMER SEMESTER, 2020-2021</b>
<b>DURATION: 1 HOUR 30 MINUTES</b>	<b>FULL MARKS: 75</b>

**SWE 4201: Object Oriented Concepts I**

**Programmable calculators are not allowed. Do not write anything on the question paper.**

Answer **all 3 (three)** questions. Marks of each question and corresponding CO and PO are written in the right margin with brackets.

1.	a)	Explain the different modules of .NET framework architecture with their distinct responsibilities. Use figures if necessary.	7 (CO2) (PO2)
	b)	What is MSIL? How can you pass an instance of a primitive data type to a method by reference using C#? Explain with necessary examples.	3+3 (CO2) (PO2)
	c)	Explain the following terms with necessary examples. i. <i>Sealed</i> class and method ii. <i>Abstract</i> class and method iii. <i>Partial</i> class and method	3x3 (CO2) (PO2)
	d)	What is the difference between <i>protected</i> and <i>internal protected</i> access modifiers?	3 (CO2) (PO2)
2.	a)	Write necessary codes for a class named ' <i>Fraction</i> ' which will contain two integer attributes. One of them is the <i>numerator</i> and the other one is the <i>denominator</i> . i. Make sure that if the <i>denominator</i> is zero, no instance will be created and an <i>exception</i> will occur. ii. Write necessary get and set methods for the attributes.	7 (CO1, CO2) (PO1, PO2)
	b)	Overload the following operators of the <i>Fraction</i> class. i. Unary + ii. Unary - iii. Binary + iv. Binary - v. Binary * vi. Binary / In case of the '/' (division) operator, your code should throw an <i>exception</i> if the <i>denominator</i> of the resultant fraction number becomes zero.  <u>Example Output/Behavior of the instances of <i>Fraction</i> class:</u> <b>Fraction</b> a = new <b>Fraction</b> (5, 4); <b>Fraction</b> b = new <b>Fraction</b> (1, 2); <b>Console.WriteLine</b> (-a); // output: -5 / 4 <b>Console.WriteLine</b> (a + b); // output: 14 / 8 <b>Console.WriteLine</b> (a - b); // output: 6 / 8	12 (CO1, CO2, CO3) (PO1, PO3)

		<b>Console.WriteLine(a * b); // output: 5 / 8</b> <b>Console.WriteLine(a / b); // output: 10 / 4</b>	
	c)	What are <i>upcasting</i> and <i>downcasting</i> of user-defined types? Explain with a scenario where you might need <i>upcasting</i> and <i>downcasting</i> .	6 (CO1) (PO1)
3.	<p>Hermès is one of the most prominent luxury brands in the world and they sell two types of items through their online store - clothing, and jewelry. To buy products from their online portal, at first, you will have to create an account and provide the necessary personal and billing information. Besides regular items Hermès sells limited edition luxury items as well e.g., Hermès edition Apple Watch Series 7, Chiron habillé par Hermès - Bugatti, etc. To buy a limited edition item, your account has to be verified.</p> <p>While buying an item, you can add as many items as you can afford to your shopping cart. It is also possible to add multiple quantities of the same item if that item is available in stock. After checking out, you can pay for the items you have selected and the respective amount will be deducted from your user account and will be added to the Hermès central account. Also, you can discard/destroy your shopping cart before paying and start shopping again.</p> <p>All types of items will have auto-incrementing <i>ID</i>, <i>item_name</i>, <i>price</i>, <i>quantity</i>, <i>manufactured_date</i>, <i>item_type</i> (regular/limited), etc. Clothing items will include <i>size</i>, <i>color</i>, and <i>fabric</i> properties along with the previously mentioned attributes of an item. Jewelry items will include <i>material_type</i> and <i>carat</i> (integer) along with the basic item attributes.</p> <p>Hermès keeps a <i>list</i> of <i>SSNs</i> (Social Security Number). If your <i>SSN</i> is in that list and you request to get verified, your account will be verified.</p> <p>Your <i>Item</i> class should contain a function to add that product to the cart and another function to sell that item. These two might be different for clothing and jewelry types. Every user should have a function to check his/her current balance and the items s/he has bought.</p> <p>Define the classes necessary for implementing the above-mentioned scenario. You can add as many classes, attributes, and methods as you need.</p> <p><u>Requirements:</u></p> <ul style="list-style-type: none"> <li>• Your solution should include the concept of polymorphism and inheritance.</li> <li>• There should be at least one abstract class and method.</li> <li>• There should be at least one sealed class.</li> <li>• There should be at least one static attribute/method.</li> </ul>		25 (CO1) (PO1, PO2, PO3, PO4)