

**AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**Department of Computer Science and Engineering**  
**Program: B.Sc. in Computer Science and Engineering**  
**Semester Final Examination, Fall-2019**

**Part A**

**Year: 3<sup>rd</sup>**

**Course No: CSE3223**

**Semester: 2<sup>nd</sup>**

**Course Name: Information System &  
Software Design**  
**Full marks: 40**

**Time: 2 (Two) hours**

**Use Single answer script**

<b>Instructions:</b>	i)	Answer script should be hand written and should be written in A4 white paper. You must submit the hard copy of this answer script to the Department when the university reopens.
	ii)	Write down Student ID, Course number, and put your signature on top of every single page of the answer script
	iii)	Write down page number at the bottom of every page of the answer script.
	iv)	Upload the scan copy of your answer script in PDF format at the respective site of the course at <b>google classroom</b> using institutional email within the allocated time. Uploading clear and readable scan copy is your responsibility and must be covered the full page of your answer script.
	v)	You must avoid <b>plagiarism</b> , maintain <b>academic integrity</b> , and <b>ethics</b> . You are not allowed to take any help from another individual and if taken so can result in stern disciplinary actions from the university authority

## Part A

<b>Instructions:</b>	i)	Before uploading rename the PDF file as <b>CourseNo_StudentID_PartNo</b> e.g.Math2207_180107001_partA.pdf
	ii)	There are <b>5 (Five) Questions, Answer any 4 (Four) including Question 5</b>
	iii)	Marks allotted are indicated in the <b>right margin</b>
	iv)	Necessary <b>charts/tables</b> are attached at the end of the question paper
	v)	Assume any reasonable data if needed
	vi)	Symbols and characters have their usual meaning

### Question 1. [Marks: 10]

- a) An IT company has recently developed new software for which development cost is BDT 625,000. Senior system analyst reports that maintenance costs for the first year is BDT 15625, and will increase by 20% in each following year. According to the report, expected cash inflows are given below: [5]

Year	1	2	3	4	5	6	7
Cash inflows	BDT 20,000	BDT 50,000	BDT 120,000	BDT 250,000	BDT 380,000	BDT 450,000	BDT 500,000

Now, considering an inflation rate of 12% calculate the payback period for this project. Also, report ROI for these 7 years.

- b) Write any twelve functional requirements for a two-player online Chess game. [5]

### Question 2. [Marks: 10]

- a) Explain the scrum process with a proper diagram. [4]

- b) What do you mean by dependencies, duplication, and triangulation in the context of Test Driven Development? How are they resolved? Explain with two examples. [6]

### Question 3. [Marks: 10]

- a) What is Bottom-Up integration testing? How many ways can it be implemented? Explain a scenario where Bottom-Up integration testing performs better than Top-Down integration testing. [4]

b)

A rookie UI/UX designer designs the following cover page for an online exam. All required fields are given on the page and also labels of each field have their usual meaning. Now draw a paper prototype of the cover page using Schneiderman's 8 golden rules and UI/UX design principles.

**Term Final**

Name  First name  Last name

Middle Name  STUDENT ID  Student TYPE

Exam Type ☐ Lab Final ☐ Term Final ☐ Clearance ☐ Improvement

Subject Title  Course ID

Level  Term

Exam Date

[done](#)

**Exam Marks**

Question 1  Question 4

Question 2  Question 5

Question 3

Total Marks  Signature  Grade

[6]

Question 4. [Marks: 10]

a)

Answer the following questions.

i) "Incremental model is staggered between increments" - explain with an example.

ii) "Incremental model can be designed using a modified waterfall model" - explain briefly.

iii) "Unified process model is data-driven" - explain briefly.

iv) "A perfect agile cost curve does not exist" - explain briefly.

[4]

b)

The following table contains a number of tasks of a project, their duration, and dependencies. Use any suitable diagram to find out the required weeks to complete the project. Report all sequences of tasks that can be performed without any delay from start to end.

Task	Duration (weeks)	Dependencies
$T_1$	5	-

[6]

$T_2$	5	-
$T_3$	2	$T_1, T_2$
$T_4$	5	$T_3$
$T_5$	6	$T_3$
$T_6$	5	$T_4, T_5$
$T_7$	10	$T_2$
$T_8$	11	$T_4$
$T_9$	8	$T_5, T_7$
$T_{10}$	4	$T_6$
$T_{11}$	4	$T_6$
$T_{12}$	7	$T_8, T_{10}$
$T_{13}$	9	$T_{10}, T_{11}$
$T_{14}$	4	$T_9, T_{11}$
$T_{15}$	5	$T_{14}$

**Question 5. [Marks: 10]**

<p>The following code takes two inputs, shape and radius from user and creates the specified shape (“Circle” or “Sphere”) in each iteration. Then it shows the area and volume if input shape is “Sphere” otherwise, it shows area and perimeter. It also throws errors if user inputs are invalid.</p> <p>Now refactor the code following MVC pattern and SOLID design principles.</p>	<b>[10]</b>
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```

import java.util.Scanner;
class Shape{
    private String shape;
    private int radius;
    Shape(String shape,int radius)
    {
        this.shape=shape;
        this.radius=radius;
    }
    void surfaceArea(){
        if(shape.matches("Sphere"))
            System.out.println("Surface Area: "+4*3.1416*Math.pow(radius,2));
        else if(shape.matches("Circle"))
            System.out.println("Area: "+3.1416*Math.pow(radius,2));
    }
    void perimeter(){
        if(shape.matches("Circle"))
            System.out.println("Perimeter: "+2*3.1416*radius);
    }
    void volume(){
        if(shape.matches("Sphere"))
            System.out.println("Volume: "+3.1416*Math.pow(radius,3)*4/3);
    }
}
class Sphere extends Shape{
    Sphere(int radius){
        super("Sphere",radius);
    }
}
class Circle extends Shape{
    Circle(int radius)
    {
        super("Circle",radius);
    }
}
public class MVC {
    public static void main(String[] args){
        while(true){
            System.out.println("Please enter shape tag and radius(e.g. Circle 2) :");
            Scanner scanner = new Scanner(System.in);
            String tag=scanner.next();
            if(!tag.equals("Circle") && !tag.equals("Sphere"))
            {
                System.out.println("Wrong shape type.");
                continue;
            }
            try{
                int radius=scanner.nextInt();
                if(tag.equals("Circle"))
                {
                    Circle circle=new Circle(radius);
                    circle.perimeter();
                    circle.surfaceArea();
                }
                else{
                    Sphere sphere=new Sphere(radius);
                    sphere.surfaceArea();
                    sphere.volume();
                }
            } catch (Exception e){
                System.out.println("Radius must be integer.");
            }
        }
    }
}

```

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Department of Computer Science and Engineering  
 Program: B.Sc. in Computer Science and Engineering  
 Semester Final Examination, Fall-2019

## Part-B (Open book exam)

Year: 3<sup>rd</sup>

Course No: CSE3223

Semester: 2<sup>nd</sup>

Course Name: Information System &  
 Software Design  
 Full marks: 20

Submission deadline: Next day 6.30 pm

### Use Single answer script

<b>Instructions :</b>	i) Before uploading rename the PDF file as <b>CourseNo_StudentID_PartNo</b> e.g.Math2207_180107001_partB.pdf
	ii) <b>Answer all the Questions</b>
	iii) Marks allotted are indicated in the <b>right margin</b>
	iv) Necessary <b>charts/tables</b> are attached at the end of the question paper
	v) Assume any reasonable data if needed
	vi) Symbols and characters have their usual meaning

### Question 1. [Marks: 10]

	<p>Bale, an undergrad CSE student has recently learned design patterns. He has a class test next week on a syllabus of singleton, factory, adapter, composite design patterns. He wants to practice some code on design patterns. Now, he is searching for some design pattern assignments. Most of the assignments he found so far require framework knowledge, deep programming knowledge and huge time. He wants some small scale assignment which can be completed within a day using simple java language without integration of any graphical user interface(GUI) or any advanced packages or any other APIs.</p> <p>Now, describe a simple design pattern assignment that satisfies his requirement. Also, provide a possible paper solution(without coding) showing that the assignment satisfies all requirements. Do not write any code.</p>	<b>[10]</b>

**Question 2. [Marks: 10]**

Bangladesh is running forward and its economy is rising day by day. In recent years there are plenty of success stories in our archive. Besides this, we have some failures too. One of them is poverty. Even after 49 years of our freedom, around 21% of the total population lives below the poverty line. Most of them are either labor class or workless. In recent times, coronavirus extends its unbearable miseries. Where the upper and middle-class people are fighting against the virus, lower-middle and lower class are trading death between the virus and poverty. Job scarcity and lack of an income source are driving them either into committing crimes or starving with families. Although many private organizations and voluntary groups are coming forward along with some government projects, they do not have sufficient funding or resources to feed these vast populations. At the start, many people contribute to the fund but as time progresses, contribution rates are declining. The declining rate is probably not unexpected as these days people think more about the future, families, and other luxuries. He/she may contribute once and twice sporadically in a month but not in a regular manner. Other possible reasons might be a lack of focus, proper donation method, availability. Facebook is hugely connected to social media and an easy medium for the broadcasting of any messages. Besides this, open-source media can be used for negative purposes too. That's why a person verifies it more often from any close friend or acquaintances before donation. Sometimes payment methods intricacy or unavailability halt or delay the donation for example fundraisers have bKash and Rocket account but a donor wants to donate from Okwallet. An easy user-friendly payment method and adaptation of all other existing payment system integration might increase donation numbers as well as amounts. A proper acknowledgment might find the donor's interest. Of course, it should be the donor's choice as many prefer to stay behind the screen. Another point, everybody loves an alive and transparent system. So transparency in the system could draw more people's attention as well as personnel's agility, integrity, and etc. Apart from donating cash, there are many alternatives one might donate. The first thing that probably knocks in our mind is clothes. These days people often donate unused clothes to poor and needy people, especially during the winter. In addition to these clothes and money, people also donate books, unused goods. Besides this, one major item we probably missed is food. Although many recent reports show around 20-30% of produced food is being wasted and most of the foods are thrown into the trash can, we barely donate our homemade food. There are multiple factors that are stopping us from donating food.

A group of social workers wants to make an app where people can donate anything described above. There are no software engineers or experts in this group. They are seeking some help from you. Now, make proper requirement analysis and draw a use case diagram. Also, draw a collaboration diagram for the most important use-case.

**[10]**