



UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 4 Examination in Engineering: February 2022

Module Number: EE4207

Module Name: GUI Programming

[Three Hours]

[Answer all questions, each question carries 10 marks]

The full forms of the abbreviations used in this paper are given in the last page.

Q1. (a) Object oriented programming is considered as a natural fit for GUI programming. Justify this statement with appropriate examples.

[2 Marks]

(b) Following XAML code is defined to create a user interface using WPF.

```
<Window x:Class="WpfApp1.MainWindow"
  xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"
  xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"
  Title="MainWindow" Height="200" Width="400">
  <Grid>
    <TextBox HorizontalAlignment="Center" Text="EE4207 - GUI
Programming" TextWrapping="Wrap" VerticalAlignment="Center" />
    <Button Content="Click Me!" HorizontalAlignment="Center"
VerticalAlignment="Bottom" Click="Button_Click"/>
  </Grid>
</Window>
```

(i) Draw the user interface generated by above XAML code.

(ii) Write the C# code attached to the above XAML code in WPF application.

[4 Marks]

(c) Draw the output generated by the following XAML code using WPF.

```
<Window x:Class="WpfApp.MainWindow"
  xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"
  xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"
  Title="MainWindow" Height="400" Width="400">
  <Canvas>
    <Line X1="0" Y1="200" X2="200" Y2="400" Stroke="Black"
StrokeThickness="5" />
  </Canvas>
</Window>
```

[1.5 Marks]

- (d) Following XAML code contains a layout in WPF. Assuming the code segment is placed inside a WPF window element, draw the output of the program.

```
<DockPanel LastChildFill="True">
    <Button Content="Section 1" DockPanel.Dock="Top"/>
    <Button Content="Section 2" DockPanel.Dock="Left"/>
    <Button Content="Section 3" DockPanel.Dock="Top"/>
    <Button Content="Section 4" DockPanel.Dock="Bottom"/>
    <Button Content="Section 5"/>
</DockPanel>
```

[2.5 Marks]

- Q2. (a) Describe the following concepts in the context of WPF.

- (i) One-way data binding
- (ii) Bubbling event

[2 Marks]

- (b) Following XAML code segment is placed inside a window element in a WPF application. Describe the output of the program.

```
<Border Background="red" Width="100" Height="100">
<Border.Style>
    <Style TargetType="Border">
        <Style.Triggers>
            <Trigger Property="IsMouseOver" Value="True">
                <Trigger.EnterActions>
                    <BeginStoryboard>
                        <Storyboard>
                            <DoubleAnimation To="200" Storyboard.TargetProperty="Height"/>
                            <DoubleAnimation To="200" Storyboard.TargetProperty="Width"/>
                        </Storyboard>
                    </BeginStoryboard>
                </Trigger.EnterActions>
            </Trigger>
        </Style.Triggers>
    </Style>
</Border.Style>
</Border>
```

[2 Marks]

- (c) What is Model-View-ViewModel architecture? Briefly describe the three main logical layers of MVVM architecture.

[2 Marks]

- (d) A student wants to create a WPF application with page navigation. The following C# code demonstrates the navigation functionality using a Hyperlink. The application should navigate to a page named "SecondPage" when the user clicks the Hyperlink in the page named "MainPage". Fill in the blanks to perform this task.

```
using System;
using System.Windows;
using System.Windows.Controls;
using System.Windows.Navigation;

namespace WPFApplication
{
    public partial class MainPage : _____
    {
        public MainPage ()
        {
            InitializeComponent();
        }

        void hyperlink_Click(object sender, RoutedEventArgs e)
        {
            Uri uri = new Uri("SecondPage.xaml", UriKind._____);
            this._____.Navigate(_____);
        }
    }
}
```

[2 Marks]

- (e) Draw the menu generated by the following XAML code in WPF. Assume it is placed inside a window element.

```
<Menu>
  <MenuItem Header = "Items">
    <MenuItem Header = "Item1"/>
    <MenuItem Header = "Item2" IsCheckable="True" IsChecked="True"/>
    <Separator/>
    <MenuItem Header = "Item3"/>
  </MenuItem>
</Menu>
```

[2 Marks]

Q3. (a) Describe the following concepts in the context of Entity Framework.

- (i) Entity
- (ii) Context class

[2 Marks]

(b) A programmer wants to create an Order Management System to an online supermarket where an order contains multiple items but has only one payment transaction.

(i) Write the following entity classes along with given scalar properties and appropriate navigation properties corresponding to associations.

- Order entity class with order id, description and delivery date
- Item entity class with item id, description and price
- Transaction entity class with transaction id, customer name, phone number and transaction amount

(ii) Write the database context class to link the Entity Framework with the Order Management System.

(iii) Write a C# program to add an order to the Order management system with description "Fruits" and delivery date of 2021/12/05. The order contains following items.

- Item 1 (Description: "Apple", Price: 100.5)
- Item 2 (Description: "Orange", Price of 60.0)

[8 Marks]

Q4. (a) Write a HTML5 program to display following information with the given formatting.

EE4207 - GUI Programming

This is a 2 credit module offered in **semester 4**. The module is offered by *Department of Electrical and Information Engineering*.

The module contains following topics.

- Desktop Application Development
- Web Application Development
- Mobile Application Development

[2.5 Marks]

(b) Consider the following HTML program

```
<!DOCTYPE html>
<html>
<head>
  <title>Page Title</title>
  <link rel="stylesheet" type="text/css">
</head>
<body>
  <span><p>Computer Programming</p></span>
  <div><p>Web Development</p></div>
</body>
</html>
```

(i) What is the difference between **div** and **span** tags?

(ii) Write **Style.css** file to make "Computer Programming" text blue color, right aligned with font size of 25 pixels.

[2.5 Marks]

(c) Mention **two** advantages of using JavaScript for web application development.

[1 Mark]

(d) Consider the following HTML program which uses jQuery. Change the above program to hide the text inside the paragraph when user clicks "Hide" button.

```
<!DOCTYPE html>
<html>
<head>
<script
src="https://ajax.googleapis.com/ajax/libs/jquery/3.5.1/jquery.min.js">
</script>
<script>
$(document).ready(function()
{
  // Your answer goes here

});
</script>
</head>
<body>
<p>If you click on the "Hide" button, I will disappear.</p>
<button id="hide">Hide</button>
</body>
</html>
```

[1.5 Marks]

- (e) Consider the following code segment obtained from a HTML program using Bootstrap.

```
<div class="container">
  <div class="row">
    <div class="col-lg-1 col-md-2 col-sm-3 col-xs-4 bg-warning">1</div>
    <div class="col-lg-1 col-md-2 col-sm-3 col-xs-4 bg-info">2</div>
    <div class="col-lg-1 col-md-2 col-sm-3 col-xs-4 bg-danger">3</div>
    <div class="col-lg-1 col-md-2 col-sm-3 col-xs-4 bg-success">4</div>
  </div>
</div>
```

- (i) Describe how the output of the above program will be displayed in different screen sizes.
- (ii) What happens when you change **container** class type to **container-fluid**?

[2.5 Marks]

Q5. (a) (i) What is "AndroidManifest.xml" file?

(ii) Mention **two** things included in "AndroidManifest.xml" file.

[1.5 Marks]

- (b) The following XML file is used to design the layout of an Android app activity.

```
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout
xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:paddingLeft="10dp"
    android:paddingRight="10dp">
    <Button
        android:id="@+id/btn1"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentTop="true"
        android:layout_alignParentStart="true"
        android:text="Button1" />
    <Button
        android:id="@+id/btn2"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentTop="true"
        android:layout_alignParentEnd="true"
        android:text="Button2" />
```

```

<Button
    android:id="@+id/btn3"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:layout_alignParentBottom="true"
    android:text="Button3" />
</RelativeLayout>

```

- (i) What is the layout type used in the XML file?
- (ii) Draw the design view of the activity generated by the above XML file.
- (iii) Write XML code for above layout to add a button named "Button4" to the center of the user interface.

[4.5 Marks]

- (c) What is an intent in Android? Briefly describe two types of intents you can use in Android applications.

[1.5 Marks]

- (d) Following is the Java code related to the activity described in Q5 b). The application should open Faculty of Engineering, University of Ruhuna website in the browser when the user clicks "Button3". Fill in the blanks of following code to perform this task.

```

public class MainActivity extends _____ {

    Button button;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        button = _____(R.id.btn3);

        _____.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View view) {
                Uri uri = Uri.parse("http://www.eng.ruh.ac.lk");
                Intent intent=new Intent(Intent._____, uri);
                _____(intent);
            }
        });
    }
}

```

[2.5 Marks]

List of Abbreviations

GUI – Graphical User Interface

XAML – Extensible Application Markup Language

WPF – Windows Presentation Foundation

MVVM – Model-View-ViewModel

HTML – Hypertext Markup Language

CSS – Cascading Style Sheets

XML – Extensible Markup Language