B.Sc. in SWE 6th Semester 7th April 2022

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

SEMESTER FINAL EXAMINATION **SUMMER SEMESTER, 2020-2021**
DURATION: 3 HOURS **FULL MARKS: 150**

SWE 4637: Web and Mobile Application Development

Programmable calculators are not allowed. Do not write anything on the question paper.
Answer **all 6 (six)** questions. Marks of each question and corresponding CO and PO are written in the right margin with brackets.

1. a) What are the advantages of building Single-Page Applications (SPA)? 6 (CO1) (PO1)

   b) Explain the concept of Asynchronous JavaScript used in AJAX or AsyncStorage. 5 (CO2) (PO1)

   c) What are transpilers? Give an example. 4 (CO1) (PO1)

   d) Consider the webpage shown in Figure 1: 10 (CO1) (PO2)

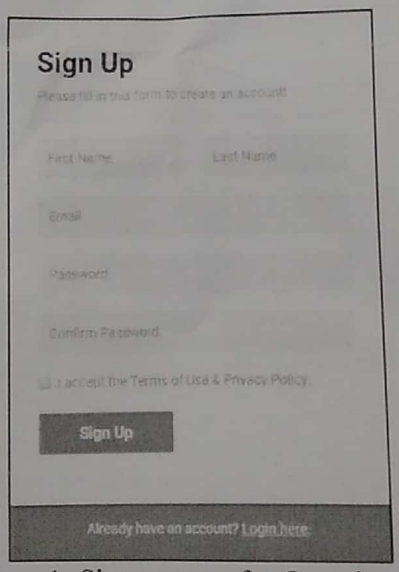

Figure 1: Sign up page for Question 1.d)

Write a script (JavaScript/TypeScript) to do form validation of the sign up page given in Figure 1 as per the following rules:

- None of the form element value should be empty.
- First Name and Last Name can only contain alphabetic characters.
- Password and Confirm Password values should be exactly the same and have a minimum length of 8.
- The Email should be in a standard format.

2. a) What are the differences between SQL and NoSQL databases? 6 (CO1) (PO1)

b) What are the differences between using *FlatList* and using *Map* function for rendering a list of items in React Native? 7 (CO1) (PO1)

c) Write short notes on the following: 3x4 (CO1) (PO1)
   i. useRef
   ii. React Routing
   iii. useState
   iv. Context API

3. Consider the Blog-Post application shown in Figure 2. This application consist of 3(three) screens: LoginScreen, SignUpScreen, and HomeScreen.

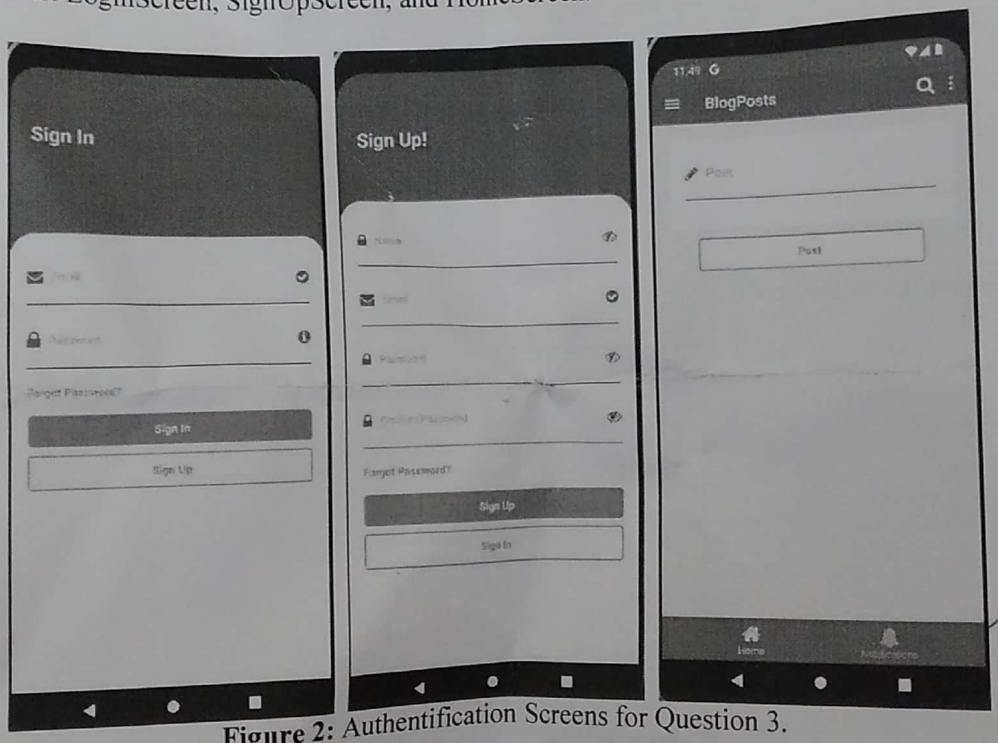

Figure 2: Authentification Screens for Question 3.

Based on the Blog-Post application, answer the following questions:

a) What type of navigation should be used to achieve the best performance for this application? Explain your reasoning. 4 (CO2) (PO1)

b) Write the implementation code of the app navigation using *stack navigation.* 5 (CO3) (PO2)

c) Write the implementation code for the LoginScreen and SignUpScreen using AsyncStorage for authentification and authorization. 16 (CO1, CO4) (PO2, PO3)

4. Assume that you are asked to develop a mobile app for IUT programming contest competition. The mobile app will show the list of teams participating in the contest along with the points that they have. You are given the IUT CONTEST API, https://www.iut-programming.edu/contest/2022/, which will return the updated information about teams participating in the contest. An example of the JSON response from the API is shown in Figure 3.

```
{
    "results": [
        {
            "teamName": "NewTeam",
            "teamID": "101",
            "members":
              { "name": "Member 1", "Dept": "CSE", "Student_ID": 180042101 }
              ...
            ,
            "solved": "7",
            "totalPoints": "1542",
            "teamLogo": "https://images-contest/teams/team101/team101.png"
        },
        {
            "teamName": "IUT_CG",
            "teamID": "102",
            "teamMembers":
              { "name": "Member 3", "Dept": "CSE", "Student_ID": 180041101 }
              ...
            ,
            "solved": "6",
            "totalPoints": "1208",
            "teamLogo": "https://images-contest/teams/team102/team102.png"
        }
    ]
}
```

Figure 3: Example of JSON response from IUT CONTEST API.

a) Write the necessary code to fetch the teams' information from the API provided. 6 (CO2) (PO2)

b) Using *FlatList* component, write the code to display the teams' logo, names and total points they currently have in descending order of total points. 15 (CO3) (PO1)

c) Add a pull to refresh functionality to the *FlatList* component where the information displayed will be updated if the *FlatList* is pulled down. 4 (CO4) (PO1)

5. a) What is SEO? What is the difference between Page Rank (PR) and Search Engine Result Page (SERP)? 2+4 (CO2) (PO1)

b) Consider the Blog-Post application given in question 3. Write the code for the HomeScreen functional or class component with the following requirements: 15 (CO3) (PO2)

- The Blog-Post application is for people interested in literature to share their thoughts on various topics related to literature.
- The app will use Firebase as Backend as a service.
- In the dashboard, users will be able to see posts from other users.
- Users will be able to create a post.
- When the user clicks on the post button, his message should be posted, so that other users can see it.

You do not need to write the code for authentication. You can assume the structure of the different collections and documents in firebase.

c) Differentiate between class-based components and functional components. 4 (CO3) (PO1)

6. a) Write the output that will be shown if the *Index.html* in Figure 4 below is run in a browser. Replace "**YOUR_STUDENT_ID**" in test.js with your IUT student ID. You do not need to show the step-by-step procedure. The final output is sufficient. 10 (CO2) (PO2)

Index.html

```
<!DOCTYPE html>
<head>
  <meta charset="UTF-8">
  <title>Test</title>
</head>
<body>
  <div id="para"></div>
  <script src="test.js"/>
</body>
</html>
```

test.js

```
const sid = YOUR_STUDENT_ID % 5;
                18004212 4 % 5
const Display = (number) => {
  let c;
  let val = 1;
  let output = "";
  for(c=0; c < number; c++){
     val += val;
     output += "<p>" + val + "</p>";
  }
  (1==="1")?
    (c=val+20+"$px") : (c=val+7+"$qx")
    output += "<h1>"+ c +"</h1>";
    return output;
}

let value = Display(sid);
        para.innerHTML = value;
```

Figure 4: Code snippet for Question 6.a)

b) Use the flexbox CSS property to create the layout given in Figure 5 below. 10 (CO5) (PO2)

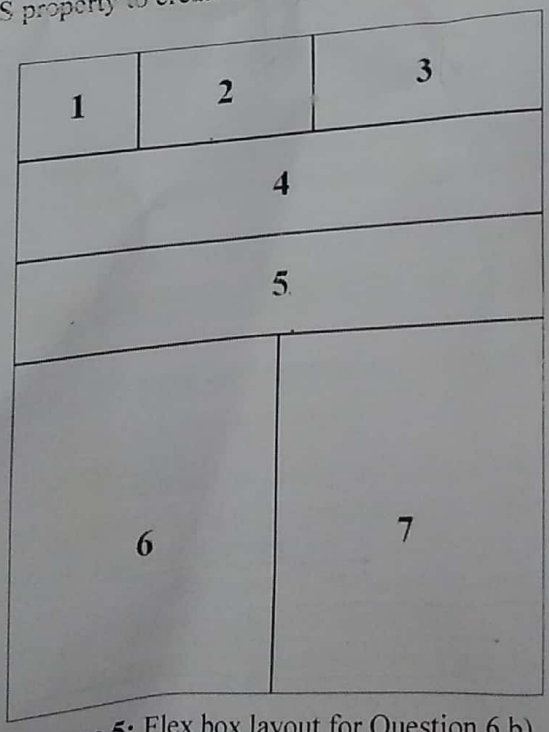

Figure 5: Flex box layout for Question 6.b)

c) Describe the different types of navigation used in cross-platform mobile application development. 5 (CO3) (PO1)