# PROGRAMMING 632/732

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**Name and Surname:** ______________________________

**Student ITS No:** ______________________________

**Qualification:** ______________________ **Year of Study:** __________ **Semester:** __________

**Assignment due date:** ______________________ **Date submitted:** ______________________

| QUESTION | EXAMINER MARKS | MODERATOR MARKS | REMARKS |
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## ASSIGNMENT INSTRUCTIONS

***Please tick each box to confirm completion.***

Use Times New Roman font, size 12, with 1.5 line spacing throughout the document. Apply Harvard Referencing Style for all citations and references.

**For essay-style assignments, please include the following sections:**

Table of Contents

Introduction

Main Body (with relevant subheadings)

Conclusion

References

Submit the assignment in PDF format on Moodle.

Use the specified cover page provided.

Include a signed declaration of originality.

**DECLARATION OF ORIGINALITY:**

I hereby declare that this assignment is my own work and has not been copied from any other source except where due acknowledgment is made. I affirm that all sources used have been properly cited and that this submission complies with the institution's policies on academic integrity and plagiarism.

**Student Signature:**______________________________ **Date:**____________________

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## QUESTION ONE (40 MARKS)

You are tasked with developing a basic web-based "University Portal" to serve two primary user groups: students and faculty. Students should be able to view their personalized course schedules, while faculty members need the ability to update essential course information. This will be a multipage web application.

**Assignment Question:**

Design and implement a web application using Java Servlets for server-side logic and JDBC for database interaction. Your portal should manage course and student enrolment data and provide distinct functionalities for students and faculty.

**Key Requirements:**

1. **Database Integration (JDBC):**
   - ➢ Design a relational database (e.g., MySQL, PostgreSQL) with tables for Courses (e.g., course_id, course_code, course_name, instructor, schedule), (e.g., student_id, first_name, last_name, email), and a linking table Student Course to represent student enrollments.
   - ➢ Create Java Data Access Object (DAO) classes (e.g., *CourseDAO, StudentDAO)* to encapsulate all database operations (e.g., retrieving all courses, retrieving a student's courses, updating course details). Use PreparedStatement for all queries.

2. **Web Application Logic (Servlets):** o Implement multiple Servlets (e.g., CourseServlet, StudentServlet, FacultyServlet) to handle different parts of the application workflow.
   - ➢ **Student View:** A servlet should process requests to display all available courses. Another servlet should allow students to input their ID to view their specific course schedule.
   - ➢ **Faculty View:** A dedicated servlet should provide an interface for faculty to update course details (e.g., changing an instructor or schedule for a course). o

     Ensure proper request handling (GET/POST) and data validation.

3. **User Interface (JSP/HTML):**
   - Utilize JSP (JavaServer Pages) or HTML files for rendering the web interface. o Create JSPs for displaying all courses, a student's schedule, and a form for faculty to update course information.
   - Servlets should forward data to appropriate JSPs for dynamic content generation.

## QUESTION TWO (30 MARKS)

**Remote Temperature Monitor**

**Scenario:** Imagine a network of simple sensors (represented by your client applications) sending their current temperature readings to a central monitoring station (your server). The monitoring station should display these readings in real-time.

**Question:**

Create a Java application that consists of:

1. **Temperature Server (Simple Swing GUI Application):**

   A Swing GUI application that acts as a server.
   - It should contain a JTextArea or JList to display incoming temperature readings from various clients.
   - Use a ServerSocket to listen for client connections on a specific port. o When a client connects, the server should receive a single temperature reading (e.g., a float or String) and display it in its GUI, along with the client's IP address.
   - The server should be capable of handling multiple clients concurrently (e.g., using a thread for each client connection).

2. **Temperature Sensor Client (Simple Swing GUI Application):**

   A Swing GUI application that simulates a temperature sensor.

- It should have a JTextField for the user to input a temperature value.
- A "Send Temperature" button that, when clicked, establishes a Socket connection to the server, sends the entered temperature, and then closes the connection.
- Include input fields for the server's IP address and port.

## QUESTION THREE (30 MARKS)

**Number Sorter**

**Scenario:** Create a simple utility application that allows a user to input a series of numbers and then display them in sorted order.

**Question:** Develop a Swing GUI application named NumberSorterApp.

1. The application should have a JTextField for users to enter individual numbers.
2. Include an "Add Number" JButton to add the entered number.
3. Include a "Sort and Display" JButton.
4. Use an ArrayList<Integer> to store the numbers dynamically.
5. When "Add Number" is clicked, parse the input from the JTextField and add it to the ArrayList. Clear the JTextField after adding. Handle potential NumberFormatException.
6. When "Sort and Display" is clicked, sort the ArrayList using Collections.sort() and display the sorted numbers in a JTextArea or JList.
7. Design a user-friendly layout.