CAPSTONE PROJECT

GREEN CITY INNOVATORS

Objective

Design and develop a sustainable, eco-friendly city that integrates programming, web development, data analysis, and digital design tools. The project will focus on energy efficiency, environmental monitoring, and smart systems for a future city.

Session 1: Conceptualising the Eco-Friendly City

Activities

1. **Creating an Eco-Friendly Graphic Using Krita**

   ◇ Task

   - ✦ Students will use Krita to design a digital graphic, such as a promotional flyer for an eco-friendly city initiative (e.g., solar energy, waste reduction, or community gardens).

   ◇ Skills Practised

   - ✦ Creating a new project in Krita.
   - ✦ Understanding file resolution and canvas settings for different media (digital/web vs. print).
   - ✦ Designing visually engaging promotional content.

2. **Tracking Energy Consumption with Excel**

   ◇ Task

   - ✦ Students will set up a spreadsheet in Excel to track the city's energy usage, calculate potential savings from solar power integration, and visualise the data using charts. They will employ functions like SUM, AVERAGE, and IF.

   ◇ Skills Practised

   - ✦ Data management and formula application in Excel.
   - ✦ Creating charts to display energy consumption data.
   - ✦ Gaining insights into how renewable energy impacts sustainability.

Outcome for Session 1

◇ A digital graphic promoting sustainability.

◇ An Excel spreadsheet showing energy use and savings from renewable sources.

Session 2: System Design and Web Development

Activities

1. **Building a Smart City Monitoring Program in Python**

   ◇ **Task**

   ✦ Students will write a Python program that tracks and monitors environmental data, such as air quality, temperature, or waste levels, in real time. Based on input data, the system will trigger recommendations (e.g., "Switch to public transport if pollution exceeds 70").

   ◇ **Skills Practised**

   ✦ Writing Python code with conditional statements (if–else, if–elif–else).

   ✦ Collecting and analysing environmental data.

   ✦ Implementing logic for system actions based on data inputs.

2. **Creating a Web Portal to Showcase Smart City Features Using HTML5**

   ◇ **Task**

   ✦ Students will design a simple HTML5 webpage that displays real–time environmental data from the Python program (e.g., air quality, temperature, etc.), alongside information about eco–friendly city features (e.g., renewable energy options, public transport, etc.).

   ◇ **Skills Practised**

   ✦ Structuring content using HTML5 for a clean and informative webpage.

   ✦ Styling the webpage using CSS to improve user interface (UI).

   ✦ Displaying real–time data dynamically with Python integration.

Outcome for Session 2

◇ A Python script for monitoring environmental data and providing recommendations.

◇ A web page using HTML5 displaying key data and features of the smart city.

Session 3: Integration, Automation, and Final Presentation

Activities

1. **Integrating the Smart City Monitoring System with the Web Portal**

   ‹› Task

   - ✦ Students will connect their Python program with the HTML5 webpage. This will involve updating the webpage with real-time data (e.g., air quality, temperature) from the Python script. Students will also automate certain actions (e.g., adjusting the temperature on the page when it exceeds a specific threshold).

   ‹› Skills Practised

   - ✦ Combining Python with HTML5 for dynamic data display.
   - ✦ Implementing automation to control aspects of the smart city based on real-time input.
   - ✦ Building a cohesive, interactive system.

2. **Final Presentation and System Showcase**

   ‹› Task

   - ✦ Students will prepare a final presentation that demonstrates the functionality of their integrated smart city system. They will explain how the digital graphic promotes eco-conscious living, walk through the Excel energy tracking, discuss their Python monitoring system, and showcase how their HTML5 web portal presents real-time data and recommendations.

   ‹› Skills Practised

   - ✦ Designing and delivering a comprehensive project presentation.
   - ✦ Communicating technical concepts in a clear, accessible way.
   - ✦ Demonstrating how the system works to promote sustainability.

Outcome for Session 3

‹› A fully integrated system that combines Python, HTML5, and Excel.

‹› A final presentation that showcases the smart city system and its sustainability features.

Final Deliverables

Tick (✓) the box if submitted:

◆ Eco-friendly graphic created using Krita

◆ Energy Consumption Spreadsheet with Excel

◆ Smart City Web Portal with real-time data integration

◆ Environmental Monitoring Program in Python

◆ Final presentation showcasing the complete smart city system

Final presentation showcasing the complete system This project brings together multiple technologies and disciplines, from design and data analysis to programming and electronic systems, all working towards creating a more sustainable and environmentally friendly city.