Exam Title: **"WattWatch: Analyzing Urban Energy Consumption for Smarter Cities"**

Exam Type: Data-Driven Urban Analytics Case Study (SQL + Excel/Power BI)

Duration: 3 Hours

Dataset: A gigantic CSV dataset: **SmartCityEnergy.csv** (Generate from AI tool)

Project Brief

You're working with a municipal data team to assess energy usage across various zones of a **smart city**. Your role is to uncover trends in power consumption, identify energy wastage, and propose data-driven strategies for sustainability.

Instructions & Evaluation Criteria

Note: You **must** use SQL for data analysis and then use Excel **OR** Power BI to visualize key metrics. Present your insights through charts and tables.

Dataset File:

SmartCityEnergy.csv

Column Name	Description
MeterID	Unique identifier for each smart meter
Zone	City zone (e.g., North, South, Central)

ConsumerType	Residential / Commercial / Industrial
Date	Reading date
EnergyConsumed_kWh	Total kilowatt-hours consumed
PeakUsage_kWh	Max kWh drawn in a single hour
OutageMinutes	Power outage duration in minutes
MeterStatus	Active / Faulty
TariffRate	Price per kWh at the time of billing

□ PART 1 – SQL-Based Analysis

Write SQL queries to explore:

1. □ Total and average daily energy consumption by zone.
2. ⚡ Identify top 5 highest energy-consuming consumers by type.
3. □ Monthly trend of consumption across zones.
4. □ Calculate average cost per zone (EnergyConsumed × TariffRate).
5. □ List meters with highest number of faults or outages.
6. □ Determine zones with lowest energy efficiency (high usage + frequent outages).
7. □ Detect patterns of peak usage during weekdays vs weekends.

Export all results in a tabular form (CSV or Excel for dashboarding).

□ PART 2 – Excel or Power BI Dashboard

Using SQL results or the full dataset, design a **dashboard** with:

1. **Geo Heatmap** – Energy use by Zone
2. **Line Chart** – Monthly kWh trends
3. **Bar Graph** – Energy usage by ConsumerType

4. **KPI Cards** –
    - Total Consumption
    - Avg Peak Usage
    - Total Outage Minutes
    - Total Estimated Cost
5. **Slicers** – Zone, ConsumerType, Date Range

(Optional) Add **conditional formatting or tooltips** to show meter health status.

□ Submission Checklist

File	Description
SmartCity_SQL.sql	SQL queries and analysis results
WattWatchDashboard.xlsx or .pbix	Completed dashboard
EnergyFindings.txt	5–7 bullet points with actionable insights

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□ Insights Students Should Aim to Discover

- Which zones are energy hotspots or inefficient?
- What consumer type uses the most power?
- Are certain times/days correlated with high peak usage?
- Are there areas with unreliable power supply (frequent outages)?

Practical Exam

BUSINESS CASE STUDY

BRING ON YOUR CODING ATTITUDE