VU LEARNING HUB

CS306 Assignment 1 Solution

Fall 2026

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CS306: Programming Using Python

Assignment No. 1 — Fall 2026 | Total Marks: 20

Question 1 [Marks = 20]

Assignment Title: EcoWatt Smart Grid Auditor

Write a Python program organized into two modules that collects customer and daily meter details, then processes daily and cumulative charges, and finally prints an audit report.

Solution:

```
def display_system_banner():
    print("EcoWatt Smart Grid Auditor")
    print("Smart Grid Audit System")


def calculate_daily_tariff(units, is_peak_day):
    if units <= 0:
        daily_cost = 0.0
    elif units <= 10:
        daily_cost = units * 10.0
    elif units <= 25:
        daily_cost = units * 15.0
    else:
        daily_cost = (units * 20.0) + ((units - 25) * 5.0)
    if is_peak_day and units > 20:
        daily_cost *= 1.10
    return daily_cost
```

```
def compute_net_invoice(gross_cost, total_units, overload_days, has_solar):
    net_payable = gross_cost
    blocks = total_units // 50
    net_payable += blocks * 30.0
    if overload_days != 0:
        net_payable += 10.0 * (overload_days ** 2)
    if has_solar or not (overload_days > 0):
        net_payable -= net_payable * 0.10
    net_payable *= 1.05
    return net_payable


display_system_banner()

customer_name = input("Enter Customer Full Name: ")
meter_id = input("Enter Smart Meter ID: ")
solar_status = input("Solar Net-Metering Status (yes / no): ")


has_solar = solar_status.lower() == "yes"
num_days = int(input("Enter Audit Duration in Days: "))

total_units = 0.0
gross_bill = 0.0
overload_days = 0

for day in range(1, num_days + 1):
    daily_units = float(input(f"Enter units consumed on Day {day}: "))
    peak_input = input(f"Was Day {day} a Peak Grid-Demand Day (yes / no)? ")
    is_peak = peak_input.lower() == "yes"
    daily_cost = calculate_daily_tariff(daily_units, is_peak)
    print(f"Day {day}: Units = {daily_units:.2f} kWh, Daily Charge = Rs. {daily_cost:.2f}")
    total_units += daily_units
    gross_bill += daily_cost
    if daily_units > 25:
        overload_days += 1



average_usage = total_units / num_days
full_blocks = int(total_units // 50)
remainder_units = total_units % 50
net_payable = compute_net_invoice(gross_bill, total_units, overload_days, has_solar)

print("Final Smart Audit Invoice Report")
print(f"Customer Name: {customer_name}")
print(f"Smart Meter ID: {meter_id}")
print(f"Audit Duration: {num_days} days")
print(f"Total Units Consumed: {total_units:.2f} kWh")
print(f"Average Daily Usage: {average_usage:.2f} kWh")
print(f"Gross Bill: Rs. {gross_bill:.2f}")
print(f"Full 50-kWh Blocks: {full_blocks}")
print(f"Remainder Units: {remainder_units:.2f} kWh")
print(f"Overload Days: {overload_days}")
print(f"Net Payable Amount: Rs. {net_payable:.2f}")

print("Bi-Daily Smart Meter Inspection Schedule:")
```

```
for day in range(2, num_days + 1, 2):
    print(f"Inspection Day: Day {day}")

print("Thank you for using EcoWatt Smart Grid Auditor System")
```

Output:

```
EcoWatt Smart Grid Auditor
Smart Grid Audit System
Enter Customer Full Name: VU Learning Hub
Enter Smart Meter ID: SM-1001
Solar Net-Metering Status (yes / no): yes
Enter Audit Duration in Days: 3
Enter units consumed on Day 1: 8
Was Day 1 a Peak Grid-Demand Day (yes / no)? no
Day 1: Units = 8.00 kWh, Daily Charge = Rs. 80.00
Enter units consumed on Day 2: 22
Was Day 2 a Peak Grid-Demand Day (yes / no)? yes
Day 2: Units = 22.00 kWh, Daily Charge = Rs. 363.00
Enter units consumed on Day 3: 30
Was Day 3 a Peak Grid-Demand Day (yes / no)? yes
Day 3: Units = 30.00 kWh, Daily Charge = Rs. 687.50
Final Smart Audit Invoice Report
Customer Name: VU Learning Hub
Smart Meter ID: SM-1001
Audit Duration: 3 days
Total Units Consumed: 60.00 kWh
Average Daily Usage: 20.00 kWh
Gross Bill: Rs. 1130.50
Full 50-kWh Blocks: 1
Remainder Units: 10.00 kWh
Overload Days: 1
Net Payable Amount: Rs. 1106.12
Bi-Daily Smart Meter Inspection Schedule:
Inspection Day: Day 2
Thank you for using EcoWatt Smart Grid Auditor System
```