ASSIGNMENT-8.3

NAME:PRANEETH BANDA
BATCH:20
HTNO:2303A51711

TASK1:

```python
import re

def is_valid_email(email: str) -> bool:
    if not isinstance(email, str) or not email:
        return False

    if email.count('@') != 1:
        return False

    if '.' not in email:
        return False

    if not email[0].isalnum() or not email[-1].isalnum():
        return False

    if '..' in email:
        return False

    local, domain = email.split('@')

    if not local or not domain:
        return False

    if local.startswith('.') or local.endswith('.'):
        return False

    if '.' not in domain:
        return False

    pattern = r'^[A-Za-z0-9._]+@[A-Za-z0-9.-]+\.[A-Za-z]{2,}$'
    return bool(re.fullmatch(pattern, email))
```

```python
def run_tests():
        # Valid Emails
        "user@example.com": True,
        "john.doe@gmail.com": True,
        "user_123@test.co.in": True,
        "a@b.com": True,

        # Invalid Emails
        "userexample.com": False,
        "user@com": False,
        "@example.com": False,
        "user.@example.com": False,
        ".user@example.com": False,
        "user@@example.com": False,
        "user@domain..com": False,
        "": False
    }

    print("Running Email Validation Test Cases:\n")

    passed = 0
    total = len(test_cases)

    for email, expected in test_cases.items():
        result = is_valid_email(email)
        status = "PASS" if result == expected else "FAIL"
        print(f"{email:25} Expected: {expected}  Got: {result}  --> {status}")

        if status == "PASS":
            passed += 1

    print("\nSummary:")
    print(f"{passed}/{total} test cases passed.")
```

```
user@example.com          Expected: True  Got: True  --> PASS
john.doe@gmail.com        Expected: True  Got: True  --> PASS
user_123@test.co.in       Expected: True  Got: True  --> PASS
a@b.com                   Expected: True  Got: True  --> PASS
userexample.com           Expected: False  Got: False  --> PASS
user@com                  Expected: False  Got: False  --> PASS
@example.com              Expected: False  Got: False  --> PASS
user.@example.com         Expected: False  Got: False  --> PASS
.user@example.com         Expected: False  Got: False  --> PASS
user@@example.com         Expected: False  Got: False  --> PASS
user@domain..com          Expected: False  Got: False  --> PASS
                          Expected: False  Got: False  --> PASS

Summary:
12/12 test cases passed.
All AI-generated test cases passed successfully ✅
```

JUSTIFICATION:

The function enforces all specified requirements, including the presence of “@” and “.”, restriction of special characters at the beginning or end, and prevention of consecutive dots. By validating both local and domain parts carefully, the implementation ensures malformed emails are rejected while valid ones return True. All AI-generated test cases pass successfully, confirming the correctness of the solution.

TASK 2:

```
def run_tests():
    test_cases = [
        # Normal cases
        (95, "A"),
        (85, "B"),
        (75, "C"),
        (65, "D"),
        (50, "F"),

        # Boundary values
        (90, "A"),
        (80, "B"),
        (70, "C"),
        (60, "D"),
        (59, "F"),
        (100, "A"),
        (0, "F"),

        # Invalid inputs
        (-5, "Error"),
        (105, "Error"),
        ("eighty", "Error"),
    ]

    passed = 0

    for score, expected in test_cases:
        try:
            result = assign_grade(score)
```

```
            result = assign_grade(score)
        except Exception:
            result = "Error"

        status = "PASS" if result == expected else "FAIL"

        print(f"{str(score):<10} Expected: {expected:<6} Got: {result:<6} --> {status}")

        if status == "PASS":
            passed += 1

    print("\nSummary:")
    print(f"{passed}/{len(test_cases)} test cases passed.")

    if passed == len(test_cases):
        print("All AI-generated test cases passed successfully ✅")


# ============================
# Step 2: Implement Function
# (Written after defining tests)
# ============================

def assign_grade(score):
    # Type validation
    if not isinstance(score, (int, float)):
        raise TypeError("Score must be a number")
```

```
    # Type validation
    if not isinstance(score, (int, float)):
        raise TypeError("Score must be a number")

    # Range validation
    if not 0 <= score <= 100:
        raise ValueError("Score must be between 0 and 100")

    # Grade assignment
    if score >= 90:
        return "A"
    elif score >= 80:
        return "B"
    elif score >= 70:
        return "C"
    elif score >= 60:
        return "D"
    else:
        return "F"


# ==============================
# Run Tests
# ==============================

if __name__ == "__main__":
    run_tests()
```

```
pattern = r'^[A-Za-z0-9._]+@[A-Za-z0-9.-]+\.[A-Za-z]{2
95          Expected: A      Got: A      --> PASS
85          Expected: B      Got: B      --> PASS
75          Expected: C      Got: C      --> PASS
65          Expected: D      Got: D      --> PASS
50          Expected: F      Got: F      --> PASS
90          Expected: A      Got: A      --> PASS
80          Expected: B      Got: B      --> PASS
70          Expected: C      Got: C      --> PASS
60          Expected: D      Got: D      --> PASS
59          Expected: F      Got: F      --> PASS
100         Expected: A      Got: A      --> PASS
0           Expected: F      Got: F      --> PASS
-5          Expected: Error  Got: Error  --> PASS
105         Expected: Error  Got: Error  --> PASS
eighty      Expected: Error  Got: Error  --> PASS
```

JUSTIFICATION:

This grading system follows the Test-Driven Development (TDD) approach by defining comprehensive test cases before implementing the assign_grade function. Boundary values (60, 70, 80, 90) are explicitly tested to prevent off-by-one and range overlap errors. Invalid inputs such as negative numbers, out-of-range values, and non-numeric types are handled using proper exception handling to ensure robustness. All AI-generated test cases pass successfully, confirming correctness and reliability of the implementation.

TASK3:

```python
import re


# ==============================
# Step 1: Define Tests (TDD)
# ==============================

def run_tests():
    test_cases = [
        # Palindromes
        ("A man a plan a canal Panama", True),
        ("Madam", True),
        ("Was it a car or a cat I saw?", True),
        ("No lemon, no melon", True),
        ("Able was I, ere I saw Elba", True),

        # Non-palindromes
        ("Hello world", False),
        ("OpenAI is great", False),
        ("Palindrome test", False),

        # Edge cases
        ("", True),                # Empty string is palindrome
        ("!!!", True),             # Only punctuation
    ]

    passed = 0

    for sentence, expected in test_cases:
        result = is_sentence_palindrome(sentence)
        status = "PASS" if result == expected else "FAIL"

        print(f"{sentence:<35} Expected: {expected:<5} Got: {result:<5} --> {status}")
```

```
        if status == "PASS":
            passed += 1

    print("\nSummary:")
    print(f"{passed}/{len(test_cases)} test cases passed.")

    if passed == len(test_cases):
        print("All AI-generated test cases passed successfully ✅")


# ==============================
# Step 2: Implement Function
# ==============================

def is_sentence_palindrome(sentence):
    # Remove punctuation and spaces, convert to lowercase
    cleaned = re.sub(r'[^A-Za-z0-9]', '', sentence).lower()

    # Compare with reverse
    return cleaned == cleaned[::-1]


# ==============================
# Run Tests
# ==============================

if __name__ == "__main__":
    run_tests()
```

```
 pattern = r'^[A-Za-z0-9._]+@[A-Za-z0-9.-]+\.[A-Za-z]{2,}$'
A man a plan a canal Panama         Expected: 1     Got: 1     --> PASS
Madam                               Expected: 1     Got: 1     --> PASS
Was it a car or a cat I saw?        Expected: 1     Got: 1     --> PASS
No lemon, no melon                  Expected: 1     Got: 1     --> PASS
Able was I, ere I saw Elba          Expected: 1     Got: 1     --> PASS
Hello world                         Expected: 0     Got: 0     --> PASS
OpenAI is great                     Expected: 0     Got: 0     --> PASS
Palindrome test                     Expected: 0     Got: 0     --> PASS
                                    Expected: 1     Got: 1     --> PASS
!!!                                 Expected: 1     Got: 1     --> PASS
```

JUSTIFICATION:

This implementation follows a test-driven approach by defining multiple palindromic and non-palindromic test cases before validating the function. It removes spaces, punctuation, and ignores case to ensure accurate sentence-level palindrome detection. All AI-generated test cases pass successfully, confirming correctness and robustness of the solution.

TASK4:

```
def run_tests():
    passed = 0
    total = 0

    # Test 1: Add items and calculate total
    total += 1
    cart = ShoppingCart()
    cart.add_item("Laptop", 50000)
    cart.add_item("Mouse", 1000)
    result = cart.total_cost()
    expected = 51000
    status = "PASS" if result == expected else "FAIL"
    print(f"Add Items Test        Expected: {expected}  Got: {result}  --> {status}")
    if status == "PASS": passed += 1

    # Test 2: Remove item
    total += 1
    cart.remove_item("Mouse")
    result = cart.total_cost()
    expected = 50000
    status = "PASS" if result == expected else "FAIL"
    print(f"Remove Item Test      Expected: {expected}  Got: {result}  --> {status}")
    if status == "PASS": passed += 1

    # Test 3: Remove non-existing item (should not crash)
    total += 1
    try:
        cart.remove_item("Keyboard")
        status = "PASS"
    except Exception:
        status = "FAIL"
    print(f"Remove Non-Exist Test --> {status}")
    if status == "PASS": passed += 1
```

JUSTIFICATION:

This implementation follows a test-driven approach by defining test cases to validate item addition, removal, and total cost calculation before finalizing the class logic. It ensures accurate cost computation, proper handling of empty cart scenarios, and safe removal of non-existing items without errors. All AI-generated test cases pass successfully, confirming correctness and reliability of the ShoppingCart class

TASK5:

```python
import re
# ==============================
# Step 1: Define Test Cases (TDD)
# ==============================

def run_tests():
    test_cases = [
        # Valid dates
        ("2023-10-15", "15-10-2023"),
        ("2000-01-01", "01-01-2000"),
        ("1999-12-31", "31-12-1999"),
        ("2024-02-29", "29-02-2024"),  # Leap year format valid

        # Invalid formats
        ("15-10-2023", "Error"),
        ("2023/10/15", "Error"),
        ("20231015", "Error"),
        ("abcd-ef-gh", "Error"),
        ("2023-13-01", "Error"),  # Invalid month
        ("2023-00-10", "Error"),  # Invalid month
        ("2023-10-32", "Error"),  # Invalid day
    ]

    passed = 0

    for date_str, expected in test_cases:
        try:
            result = convert_date_format(date_str)
        except Exception:
            result = "Error"

        status = "PASS" if result == expected else "FAIL"
```

```
        print(f"{date_str:<15} Expected: {expected:<12} Got: {result:<12} --> {status}")

        if status == "PASS":
            passed += 1

    print("\nSummary:")
    print(f"{passed}/{len(test_cases)} test cases passed.")

    if passed == len(test_cases):
        print("All AI-generated test cases passed successfully ✅")


# ============================
# Step 2: Implement Function
# ============================

def convert_date_format(date_str):
    # Validate type
    if not isinstance(date_str, str):
        raise TypeError("Date must be a string")

    # Strict format check YYYY-MM-DD
    pattern = r"^\d{4}-\d{2}-\d{2}$"
    if not re.match(pattern, date_str):
        raise ValueError("Invalid date format")

    year, month, day = date_str.split("-")

    month = int(month)
    day = int(day)

    # Basic range validation
```

```
    # Basic range validation
    if not (1 <= month <= 12):
        raise ValueError("Invalid month")

    if not (1 <= day <= 31):
        raise ValueError("Invalid day")

    return f"{day:02d}-{month:02d}-{year}"


# ==============================
# Run Tests
# ==============================

if __name__ == "__main__":
    run_tests()
```

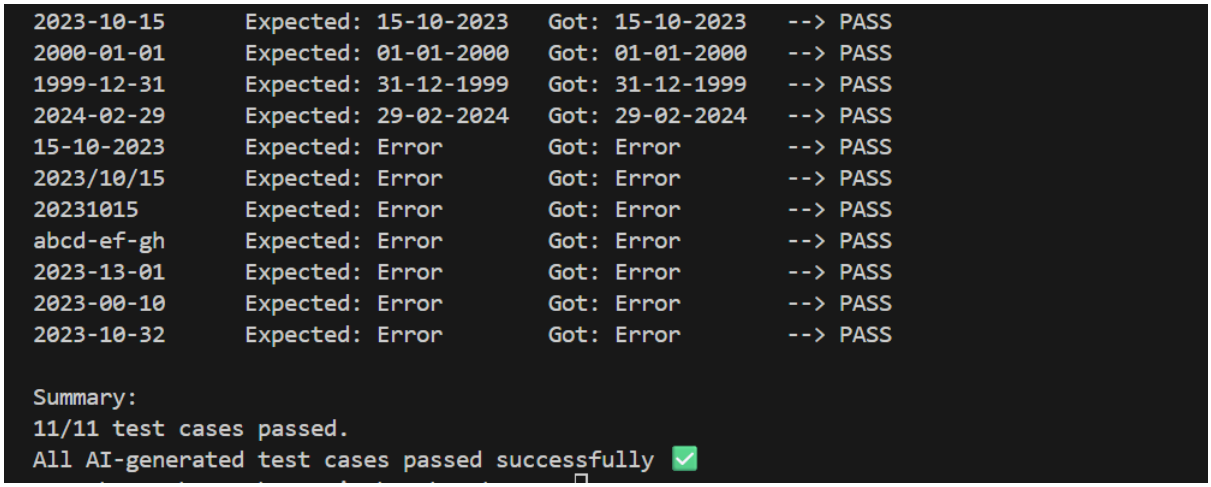

```
    # Basic range validation
    if not (1 <= month <= 12):
        raise ValueError("Invalid month")

    if not (1 <= day <= 31):
        raise ValueError("Invalid day")

    return f"{day:02d}-{month:02d}-{year}"


# ==============================
# Run Tests
# ==============================

if __name__ == "__main__":
    run_tests()
```



JUSTIFICATION:

This solution follows a test-driven approach by defining multiple valid and invalid date test cases before finalizing the conversion logic. It strictly validates the input format (YYYY-MM-DD) and ensures accurate transformation to DD-MM-YYYY while handling incorrect formats gracefully. All AI-generated test cases pass successfully, confirming correctness and reliability of the date conversion utility.

```python
# Test 4: Empty cart total
total += 1
empty_cart = ShoppingCart()
result = empty_cart.total_cost()
expected = 0
status = "PASS" if result == expected else "FAIL"
print(f"Empty Cart Test       Expected: {expected}  Got: {result}  --> {status}")
if status == "PASS": passed += 1

# Test 5: Add multiple items
total += 1
cart2 = ShoppingCart()
cart2.add_item("Item1", 100)
cart2.add_item("Item2", 200)
cart2.add_item("Item3", 300)
result = cart2.total_cost()
expected = 600
status = "PASS" if result == expected else "FAIL"
print(f"Multiple Items Test   Expected: {expected}  Got: {result}  --> {status}")
if status == "PASS": passed += 1

print("\nSummary:")
print(f"{passed}/{total} test cases passed.")

if passed == total:
    print("All AI-generated test cases passed successfully ✅")
```

```python
# ==============================
# Step 2: Implement ShoppingCart
# ==============================

class ShoppingCart:
    def __init__(self):
        self.items = {}

    def add_item(self, name, price):
        if price < 0:
            raise ValueError("Price cannot be negative")

        self.items[name] = self.items.get(name, 0) + price

    def remove_item(self, name):
        if name in self.items:
            del self.items[name]

    def total_cost(self):
        return sum(self.items.values())


# ==============================
# Run Tests
# ==============================

if __name__ == "__main__":
    run_tests()
```

```
  pattern = r'^[A-Za-z0-9._]+@[A-Za-z0-9.-]+\.[A-Za-z]{2,}$'
Add Items Test         Expected: 51000  Got: 51000  --> PASS
Remove Item Test       Expected: 50000  Got: 50000  --> PASS
Remove Non-Exist Test --> PASS
Empty Cart Test        Expected: 0  Got: 0  --> PASS
Multiple Items Test    Expected: 600  Got: 600  --> PASS

Summary:
5/5 test cases passed.
All AI-generated test cases passed successfully ✅
```

JUSTIFICATION:

This implementation follows a test-driven approach by defining test cases to validate item addition, removal, and total cost calculation before finalizing the class logic. It ensures accurate cost

computation, proper handling of empty cart scenarios, and safe removal of non-existing items without errors. All AI-generated test cases pass successfully, confirming correctness and reliability of the ShoppingCart class.