Major Assessment – I Title: Python Programming, NumPy, Pandas, and Exploratory Data Analysis

Duration: 2 Hours

Assessment Type: Individual, Open Editor (No AI Assistance)

Topics Covered

- Basic Python Programming
    - Star Patterns
    - String Reversal
    - User-defined Functions
- NumPy
- Pandas
- Exploratory Data Analysis (EDA)

Dataset Use the following Flipkart dataset from Kaggle: Flipkart Product Dataset: https://drive.google.com/file/d/1VphseU88M-KFzDWmcv8gz-RgZMmuBaWB/view?usp=drive_link This dataset contains product-level information such as category, price, ratings, and reviews, which aligns with the Pandas and EDA questions below.

General Instructions

1. This is an individual assessment. Discussion or sharing code is strictly prohibited.
2. Use Python (Jupyter Notebook or Google Colab) for implementation.
3. Write clean, readable, and well-commented code.
4. Follow the question order strictly.
5. Do not use advanced libraries beyond what was taught (NumPy, Pandas, Matplotlib/Seaborn).
6. Any form of plagiarism will result in disqualification.
7. Rename the notebook as: Major_Assessment_1_<YourName>.ipynb

Submission Details

- Submission Format: .ipynb file
- Submission Platform: LMS / Google Classroom (as applicable)
- Time Limit:
    - Assessment Duration: 2 hours
    - Upload Window: Additional 15 minutes after completion
- Late submissions will not be evaluated.

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Assessment Structure

Section A – Basic Python Programming

Q1. Star Pattern Write a Python program to print a square star pattern of size n × n using a loop. Example (n = 4):

Q2. Reverse a String Write a function that takes a string as input and returns the reversed string without using built-in reverse functions.

Q3. Function and Logic Create a user-defined function that:

- Accepts a number as input
- Returns whether the number is a Palindrome number or not

Section B – NumPy

Q4. NumPy Array Operations

- Create a NumPy array of integers from 1 to 20
- Reshape it into a 4 × 5 matrix
- Find:
    - Mean of each column
    - Maximum value of each row

Q5. Conditional Operations Using NumPy:

- Replace all values greater than 10 with -1
- Display the modified array

Section C – Pandas

Use the Flipkart dataset for all questions in this section.

Q6. Data Loading and Inspection

- Load the dataset using Pandas
- Display:
    - First 5 rows
    - Dataset shape
    - Column names

- Basic information using .info()

Q7. Data Cleaning Perform the following:

- Handle missing values appropriately
- Convert price and rating columns to numeric types
- Remove duplicate records (if any)

Q8. Data Analysis Answer the following using Pandas:

- Find the top 5 product categories by average rating
- Identify the 5 most expensive products

Section D – Exploratory Data Analysis

Q9. Visualization Create the following plots:

- Distribution of product prices
- Count plot of product categories

Q10. Insights: Write at least 3 meaningful insights derived from the dataset based on your analysis and visualizations.