**Data Science question Bank**

**1. Write a Python program to create a NumPy array of shape (3,4) filled with random integers between 1 and 100.**

A computer screen with white text

AI-generated content may be incorrect. A number on a black background

AI-generated content may be incorrect.

**2.Implement a Python program that performs the following NumPy operations:**

* **Joins two arrays**
* **Splits an array into three parts and Sorts an array in ascending order**

Ans – 1

A screen shot of a computer code

AI-generated content may be incorrect. 

Ans – 2

A screen shot of a computer code

AI-generated content may be incorrect. A screenshot of a computer

AI-generated content may be incorrect.

**3.Given two NumPy arrays, A = np.array([1, 2, 3]) and B = np.array([4, 5, 6]), perform the following operations:**

* **Element-wise addition**
* **Element-wise multiplication**
* **Dot product**

Ans –

A screen shot of a computer code

AI-generated content may be incorrect. A screenshot of a black screen

AI-generated content may be incorrect.

**4. Write a Pandas program that:**

* **Reads a dataset and Selects specific columns**
* **Filters rows based on a condition**
* **Sorts the DataFrame based on a column**

A screen shot of a computer program

AI-generated content may be incorrect.****

**5.Write a program to sort a NumPy array along both rows and columns.**

Ans –

A screen shot of a computer program

AI-generated content may be incorrect. A screenshot of a black screen

AI-generated content may be incorrect.

**6. Describe about array slicing and do the following: (1 mark)**

**a)Given the array arr = np.array([10, 20, 30, 40, 50, 60, 70, 80]), extract elements from index**

**2 to 5**

**b) Negative Slicing: extract elements from index -2 to -5**

**Ans –**

A computer screen shot of a program

AI-generated content may be incorrect. A black background with white text

AI-generated content may be incorrect.

**7.Create a Pandas Series with custom index labels ['A', 'B', 'C', 'D', 'E'] and values [10, 20, 30, 40, 50]. Retrieve the element at index "C".**

Ans –

A screen shot of a computer program

AI-generated content may be incorrect. A screen shot of a computer

AI-generated content may be incorrect.

**8. Illustrate on column operations in pandas data frame with an example**

Ans –

A screen shot of a computer program

AI-generated content may be incorrect. A screenshot of a computer

AI-generated content may be incorrect.

**9. Discuss in detail about stacking and its types. Justify how it is differentiated with an example**

**Ans -** Stacking is a process of reshaping a DataFrame by converting columns into rows or vice versa. It is mainly used for data transformation and is classified into two types:

Stacking (Row-wise Stacking)

Unstacking (Column-wise Stacking)

A screenshot of a computer

AI-generated content may be incorrect.

1. Stacking (Row-wise Stacking)

* Moves the columns into a hierarchical row index.
* Converts a wide DataFrame into a long format.
* Achieved using .stack().

2. Unstacking (Column-wise Stacking)

* Moves the row index into columns.
* Converts a long DataFrame into a wide format.
* Achieved using .unstack().

*Example –*

A screen shot of a computer program

AI-generated content may be incorrect.A screenshot of a computer screen

AI-generated content may be incorrect.A black screen with white text and pink letters

AI-generated content may be incorrect.

**10.Create a multi-index DataFrame where the first level of the index represents Departments (IT, HR, Finance) and the second level represents Employee IDs (101, 102, 103). Assign random salaries and display the DataFrame.**

**A computer screen shot of a code

AI-generated content may be incorrect.**

--Output

A screenshot of a computer screen

AI-generated content may be incorrect.

#### 11.(a) Create a DataFrame with the following data and display it. (2 Marks)

| **Name** | **Age** | **Score** |
| --- | --- | --- |
| **David** | **21** | **78** |
| **Emma** | **25** | **92** |
| **Frank** | **22** | **85** |

**A screen shot of a computer program

AI-generated content may be incorrect.A screenshot of a computer screen

AI-generated content may be incorrect.**

**(b) Select and display the "Score" column and retrieve the row where the Name is "Emma". (2 Marks)**

**A screenshot of a computer screen

AI-generated content may be incorrect.A screenshot of a computer

AI-generated content may be incorrect.A screen shot of a black background

AI-generated content may be incorrect.**

**(c) From the DataFrame, filter students who scored more than 80 and sort them by Age in descending order. (2 Marks)**

**A screen shot of a computer program

AI-generated content may be incorrect.A black screen with white text

AI-generated content may be incorrect.**

**(d) Assign performance levels based on the scores using the following criteria: (4 Marks)**

* **Score ≥ 90 → "Excellent"**
* **Score ≥ 80 and < 90 → "Good"**
* **Score < 80 → "Needs Improvement"**

**A screen shot of a black screen

AI-generated content may be incorrect.**

**12. What is the difference between vstack() and hstack()?**

**A screenshot of a computer

AI-generated content may be incorrect.**

**A screen shot of a computer program

AI-generated content may be incorrect.A black screen with white text

AI-generated content may be incorrect.**

**A screen shot of a computer

AI-generated content may be incorrect.A black background with white text

AI-generated content may be incorrect.**

**A screenshot of a computer

AI-generated content may be incorrect.**

**13. Given an array of shape (4,4), split it into two equal halves and then stack them back together.**

**A screen shot of a computer program

AI-generated content may be incorrect.A screenshot of a computer program

AI-generated content may be incorrect.**

**14. Explain about Stacking and Unstacking in DataFrames.**

Stacking and unstacking are two operations in pandas DataFrames that help reshape data by pivoting between wide and long formats. They’re particularly useful when dealing with multi-level indices or when you need to reorganize data for analysis or visualization. Let me break it down for you.

**Stacking**

Stacking takes a DataFrame and "compresses" columns into rows, effectively pivoting column labels into an additional index level. This transforms a wide DataFrame into a taller, narrower one. It’s like stacking the columns on top of each other.

For example, imagine you have a DataFrame like this:

A computer screen with text on it

AI-generated content may be incorrect.A group of white letters on a black background

AI-generated content may be incorrect.A black background with white text

AI-generated content may be incorrect.

The columns 'A' and 'B' became part of a MultiIndex along with the original index ('x' and 'y'), and the values got aligned accordingly. The result is a Series with two levels of indexing. You can think of it as "melting" the columns into rows.

**Unstacking**

Unstacking does the opposite—it takes a level of the index and "spreads" it back out into columns, turning a tall DataFrame (or Series) into a wider one. It’s like unstacking the rows back into a grid.

Using the stacked Series from above:

 A black background with white letters

AI-generated content may be incorrect.

Here, .unstack() took the innermost index level (the one with 'A' and 'B') and turned it back into columns, reconstructing the original DataFrame. You can also specify which level to unstack if you have a MultiIndex with more than two levels.

A screenshot of a computer program

AI-generated content may be incorrect.

** **