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Course: Data Analysis using python

1) Explain programming and python in detail

Definition and purpose of programming

Def: Programming is the process of developing & writing a set of instructions using a programming language, so that a computer can perform specific tasks.

Purpose:-

→ To solve problems using Computers

→ To perform tasks automatically

→ To develop applications, Software, websites & Systems

→ To process data & make decisions.

characteristics and applications of python

Python has several important characteristics that make it popular and Easy to use

→ Simple and Easy to learn

→ High level language

→ Interpreted language

→ Object - Oriented language

→ platform independent

→ Dynamically typed

→ Open Source and free

→ Large Standard library

Applications :-

① websites :- used to make web applications.

② Data Analysis :- used to study & understand large amounts of data.

③ Machine learning & AI :- used to make Smart Systems like face recognition etc.

④ Automation :- used to do repeated tasks automatically.

⑤ Cyber Security :- used to make Software and robots for Computers.

- Types of Comments in python

→ Single-line Comment

→ Multi-line Comment

→ In line Comment

Importance of python in modern Software development

Python is very important in todays software world because of its Simplicity, power and wide usage.

→ Easy to learn

→ saves time quickly

→ used in modern Technologies

→ works on All platforms

2) Describe Data Types and Operators in python with Suitable Examples.

Built-in data Types in python [Numeric, Sequence, Set, Mapping, Boolean]

Data Types:- A data type tells what kind of value is stored in a variable, such as numbers, text, true/false.

Python has different data types:-

→ Numerical data types

① int

② float

③ Complex numbers with imaginary part

→ Sequence data types

① String

② List

③ Tuple

→ Set Data Types

→ Mapping data Types

→ Boolean data Types

Type Identification using type()

In python, you can identify the type of variable or value using the built-in type() function. it tells you what kind of Objects it is (like int, str, list, etc)

Ex:- Numeric types

*.

string type
Boolean type
list, tuple, set, Dictionary
my_dict = {"a":1, "b":2}
print (type(my_list))
Print (type (my_tuple))
print (type (my_set))
Print (type (my_dict))

Note :- you can also use "isinstance()" if you want to check if a variable belongs to a certain type

Various python Operators

[Arithematic, Assignment, Comparision, Logical, membership, Identity]

① Arithematic Operators :-

Operator	Meaning
+	Addition
-	Subtraction
*	Multiplication
/	Division
//	Floor division
%	Modulus
**	Exponent (power)

→ Membership Operator

in

not in

→ Identity Operators

is

is not

Real-world usage of Operators

1) Arithematic Operator

2) Logical Operator

3) Membership Operator

4) identity Operator

5) assigment Operator

6) Comparision Operator

3) Explain python Input and Output Operators in detail.

→ Input() function:- Input() function are used to take input from the user

→ Default data Type :- Data taken using input() is always stored as str (string type)

Type Conversion

Convert to integer:

```
num = int(input("Enter a number"))
```

→ Assignment Operators

Operator	Meaning
=	Assign
+=	add assign
-=	Subtract assign
*=	Multiply assign
/=	divide assign
//=	floor assign
%=	Modulus assign
**=	Power Assign

→ Comparision Operator

Operator	Meaning
==	Equal to
!=	Not Equal
>	Greater than
<	less than
>=	Greater or equal
<=	less or equal

→ logical Operator

Operator	Meaning
and	True if both true
or	True if atleast one
not	Reverse the condition

→ users enter values in one line
→ Default type is string

Type Conversion with split():

If we need integer values:

```
a, b = map(int, input().split())
```

If we need float values:

```
x, y = map(float, input().split())
```

Formatted Output using print(), separators and format specifiers.

⇒ print() is used to display Output

⇒ Sep changes the separator between values

Example: print(1, 2, 3, sep="=") # 1=2=3

⇒ "end" changes the ending of the line

⇒ Format is used to insert values in a formatted way

⇒ f-string are used for modern formatting

Example: f"Name: {name}"

⇒ format Specifiers

%d → integer, %f → float, %s → string,

%.2f → 2 decimal places.

4) Discuss Control statements and Decision-Making Statements in python.

• Meaning and importance of Control statements

Meaning:- Control statements are special instructions in a programming language that Con-

→ Convert to float

```
Price = float(input("Enter price:"))
```

→ Convert to Boolean

```
x = input("Enter anything:")
```

Keypoints:-

- Input() function pauses program & waits for user input
- useful for Interactive programs
- Requires type Conversion for mathematical Operation

Type Conversion while taking input

→ input() always takes that data as string(str) by detail

→ Common Conversion

int()

float()

→ with out conversion

x = input("5") → "5" (str)

y = input("3") → "3" (strg)

x+y = "53" (string Concatenation)

→ with Conversion

```
x = int(input("5"))
y = float(input)(5.8))
```

Taking Multiple inputs

Sometimes we need more than One input from the user.

method 1:- a,b = input().split()

→ if-else statement

```
if condition:
    statements
else:
    statements
```

→ if-elif-else statement

```
if condition1:
    statements
elif condition2:
    statements
elif condition3:
    statements
else:
    statements
```

5) write an essay on python programming fundamentals.

Role of programming in problem solving.

Programming plays an important role in solving problems because it helps us tell the computer what do in a clear and step-by-step, so it becomes simpler to solve.

⇒ Breaking problems into steps
⇒ Doing tasks automatically
⇒ Giving fast and correct results
⇒ Handling big amounts of information
⇒ Improving logical thinking

Control flow of Execution of a program

Importance of Control statements

1) Decision Making
2) Repetion of tasks
3) Better program flow & control
4) Reduce code length
5) Improve flexibility
6) Enhances program logic

Types of Control statements

In python control statements are mainly three types they are

→ Conditional [Decision-making statements]
→ Looping [Repetition] statements
→ Jump statements
→ break
→ Continue
→ Return

Decision-making statements

1) if statement
2) if-else statement
3) if-elif-else statement

Syntax flow and Execution control with Examples

→ if Statement

```
if condition:
        statements
```

Flow & Execution control

Python Syntax Simplicity and readability

Python is known for having a Simple and clean Syntax. This means the Way we write python code is

Syntax is

Easy to understand

close to normal English language

Easy to Write

Simplicity in Syntax:- python focuses on writing less code With clear meaning. it avoids Complicated symbols and unnecessary rules.

For Example:- In python we don't need ':' or '{}' for basic structure.

Adentation

Readability

Devoloper can find Errors Easily.

teams Can work together better

Programs are Easier to maintain

This reads like a Simple English Sentence.

why Comments are Useful

→ Comments help others understand purpose of code.

→ They describe logic in Simple words, which improves readability.

→ Helps in debugging

→ Team collaboration

Data types, Operators and input/output Operations

Data types define the type of data variable can hold. They help the computer understood how to store and use the data.

int, float, str, bool, list, tuple, dict

Operators:- Operators are Symbols that perform Operations on Variables or data

1) Arithematic Operators
2) Comparision Operators
3) Logical Operators
4) Assignment Operators

→ Input/Output Operations

input() function is used to take data from user

Output ⊗ print() function is used to display output

Why Decision-making is Needed:

Because program often need to Make choices, compare values, Respond differently based on Conditions.

Decision-making statements in python:

if statement: Executes a block Only when the Condition is true.

if-else statement: Executes a block ~~Only~~ if Condition is True. Executes another block of else if condition is false.

if-elif-else statement: used when there are multiple Conditions, conditions are checked from top to bottom.

1) program on Movie Ticket pricing

```
age = int(input("Enter your age :"))
is3D = int(input("Enter 1 if you are watching a 3D mov-
       ie else enter 0:"))
if is3D == 1:
    if age < 13:
        Print("your ticket prize is ₹200")
    elif age >= 13 and age <= 59:
        Print("your ticket prize is ₹300")
    else:
        Print("your ticket prize is ₹150")
    elif age < 130 and age <= 59:
        Print("your ticket prize is ₹250")
    else:
        Print("your ticket prize is ₹200")
```

Output :-

```
Enter your age :11
Enter 1 if you are watching a 3D movie else
enter 0: 1
your ticket prize is ₹200
```

2) program on College Attendance Rule.

```
attper = int(input("Enter your attendance percentage:"
medcer = int(input("Enter 1 if you have medical certi-
             ficate else 0:"))
if attper >= 75 or (attper >= 60 and medcer == 1):
print("your allowed to write Exam")
else:
    print("your not allowed to write exam")
```

Output:

Enter your attendance percentage : 20
Enter 1 if you have medical certificate else 0 : 1
your not allowed to write exam.

3) Program on E-Commerce Discount

```
bilamo = int(input("Enter your bill amount :"))
is prime = int(input("Enter 1 if you are prime
        member else 0;"))
if is prime == 1:
    if bilamo >= 5000:
      dis = 0.25 * bilamo
    elif 2000 <= bilamo <= 4999:
       dis = 0.15 * bilamo
      else:
         dis = 0
      else;
         if bilamo >= 5000:
            dis = 0.20 * bilamo
         elif 2000 <= bilamo <= 4999:
            dis = 0.10 * bilamo
          else:
            dis = 0
       amo = bilamo - dis
       Print("Final amount to be paid is", amo)
```

Output:

Enter your bill amount : 4500
Enter 1 if you are prime member else 0 : 0
final Amount to be paid is 4050.0

4) Program On Smartphone Battery waring.

```
batper = int(input("Enter your battery percentage"))
ischar = int(input("Enter 1 if phone is charging else 0"))
if is char == 0:
    if batper <= 20:
        Print("Low battery")
    elif 21 <= batper <= 80:
        Print("Normal")
    else:
        print("full")
    elif is char == 1:
        Print("charging")
    else:
        Print("Enter 0 or 1")
```

Output:-

```
Enter your battery percentage : 87
Enter 1 if phone is charging else 0:1
charging.
```

5) program on Driving License check

```
age = int(input("Enter your Age:")
testpassed = int(input("Enter 1 if you passed the
        test else 0;"))
if(age>=18 and testpassed == 1) or age >= 60:
    Print("Eligible")
else:
    Print("Not Eligible")
```

Output:-

```
Enter your Age: 60
Enter 1 if you passed the test else 0:1
Eligible.
```

6) program on Online food delivery.

```
Amount = int(input("Enter Order amount:"))
isGold = int(input("Enter 1 if you are a Gold member else 0:"))
dis = int(input("Enter distance in km:"))
if (amount >= 500 and dis<10) or (isGold == 1 and dis<10):
  Print("Free delivery")
  else:
    Print("delivery is never free")
```

Output:-

```
Enter Order Amount: 700
Enter 1 if you are a Gold member else 0: 1
Enter distance in km: 11
delivery is never free
```

7) program on Bank Loan Approval.

```
Sal = int(input("Enter your salary:"))
Cresco = int(input("Enter your Credit score:"))
 if (sal >= 30000 and (cresco >= 700) or sal>50000:
    Print("Loan Approved")
    else:
        Print("Loan Rejected")
```

Output:-

```
Enter your Salary: 70000
Enter your Credit score: 800
Loan Approved.
```

8) Program on Electricity Bill

```
Units = int(input("Enter number of units consumed:"))
if units <= 100:
    bill = units * 2
elif units <= 200:
    bill = 100 * 2 + (units - 100) * 3
else:
    bill = 100 * 2 + 100 * 3 + (units - 200) * 5
Print("final bill amount : ₹", bill)
```

Output:-

```
Enter number of units consumed : 250
Final bill amount : ₹ 750
```

9) Program on Student Scholarship

```
marks = int(input("Enter your marks:"))
faminc = int(input("Enter family income:"))
issinpar = int(input("Enter 1 if you have Single parent
        else 0:"))
if issinpar = 1 and marks >= 85:
    Print("you are eligible for a Scholarship")
elif marks >= 85 and faminc < 500000:
    Print("you are eligible for a Scholarship")
else:
    Print("your not eligible for a Scholarship")
```

Output:-

```
Enter your Marks : 85
Enter family income: 600000
Enter 1 if you have single parent else 0: 1
you are eligible for a Scholarship
```

16. program on Online Exam Result

```
theory = int(input("Enter your theory marks:"))
Practical = int(input("Enter your practical marks:"))
total = theory + practical
if total >= 100 or (theory >= 40 and practical >= 40):
    Print("Pass")
else:
    Print("Fail")
```

Output:-

Enter your theory marks: 41

Enter your practical marks: 71

Pass.