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1. Explain programming and python in detail.

- Definition and purpose of programming

Definition: programming is the process of designing, writing, testing and maintaining instructions that a computer follows to perform specific tasks.

Purpose:

* Solve real-world problems logically
* Automate repetitive tasks
* Develop software, websites, apps, and systems
* process and analyze data efficiently.

Example:

A program that calculates student grades automatically instead of manual calculation.

What is python?

python is a high-level, interpreted, general purpose programming language created by "Guido van Rossum". It focuses on simplicity and readability.

characteristics of python:

* Easy to learn and use
* Interpreted language
* object oriented and functional
* platform independent

* Large standard library
* Free and open source

Applications of python
* web development
* Data science and AI
* Automation and scripting
* cyber security tools
* Game development

• Type of comments in python with syntax
=> Single-line comment : used to write a short comment in one line and starts with # symbol.
Syntax : # This is a single-line comment

=> Multi-line comment : used to write long comments in multiple lines and written using triple quotes.
Syntax : """ This is a multi-line comment """

=> In-line comment : comment written at the end of a statement and used to explain a specific part of code.
Syntax : x = 10 # assigning value 10 to x
print(x) # printing the value of x

• Importance of python in modern software development
* Faster development due to simple syntax.
* widely used in AI, ML and data science.
* strong community support.

* used in modern technologies
* used by any companies like Google, Netflix.

2 Describe data types and operators in python

• Built-in Data types in python

1. Numeric : used to store numbers
-> int
-> float
-> complex

2. Sequence : These store multiple items in an ordered manners.
-> String
-> List
-> Tuple

3. set : Store unordered items and no duplicates are allowed. set data type used "{ }".

4. Mapping : Store data in key: value pairs.
Only 'Dictionary' belongs to mapping type

5. Boolean : Store True or False values

• Type identification using type( )

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

Syntax : type(object)

Example :

```
name = "Revathi"
Print (type(name))  # <class 'str'>
```

- Various python operators

1. Arithmetic operator

operator	Meaning
+	Addition
−	subtraction
*	multiplication
/	division
%	modulo

2. Assignment operators :

operator	Meaning
=	Assign
+=	Add & Assign
-=	subtract & assign
*=	multiply & Assign
/=	Divide & Assign
%=	modulus & Assign

3. Logical operator

operator	meaning
and	True if both True
or	True if atleast one True
not	Reverse the condition

4. comparision operator

operator	meaning
==	Equal to
!=	Not equal to
>	Greater than
<	Less than
>=	Greater or Equal
<=	Less or Equal

5. Membership Operator

operator	meaning
in	True if value present
not in	True if not present

6. Identity operator

operator	meaning
is	True if same object
is not	True if not same object

- Real - World usage of operators

-> Arithmatic : calculating thing in daily life

-> Comparision : used to compare values

-> Logical : used to combine conditions

-> Assignment : used to store values in program

-> membership : used to check if something in a list or group exists.

Explain python Input and output operations in detail.

- Input() function and its default data types

Input() Function: used to take input from users.

Syntax: var = input("Message")

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

- Type conversion while taking input

eg: a = int(input("Enter age"))

- Taking multiple inputs

Eg: a, b = input("Enter two numbers").split()

- Formatted output using print(), seperator and format Specifiers

using print: used to display output

Eg: print("Hello", name)

Using Seperator: sep changes the seperator between values

eg: print(1, 2, 3, sep = "=")

using format()

eg: print("Age is {}".format(age))

4. Control statements and Decision making statements

Control statements decide which part of the program runs and how many times it runs.

- Types of control statements
  - * Decision making
  - * Looping
  - * Jumping
- Decision making statements

1. if statement

```
age = 18
if age >= 18:
    print("eligible to vote")
```

2. if-else statement

```
age = 18
if age >= 18:
    print("Eligible")
else:
    print("not eligible")
```

3. if-elif-else statement

```
marks = 85
if marks >= 90:
    print("Grade A")
elif marks >= 75:
    print("Grade B")
elif marks >= 60:
    print("Grade C")
else:
    print("Fail")
```

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 to do in a clear and step-by-step way.

-> Breaking problems into steps

-> doing tasks automatically

-> Giving fast and correct results.

• python syntax as simplicity and readability

Simplicity in syntax: python focuses on writing less code with clear meaning. It avoids complicated symbols and unnecessary rules.

Readability: Readability means the code is easy to read and understand even after many months.

• Use of comments for code documentation

Comments are notes written inside a program that are not executed by the computer. They are used only for explaining the code to humans.

• Data types, operators and input/output operations

Data types: Data types define the type of data a variable can hold. They help the computer understand how to store and use the data. Common data types are int, float, string, boolean, list, tuple, complex, dictionary.

Operator : Operators are symbols that perform operations on variables. Python provides various operators like arithmetic operators, comparision, assignment, logical, membership operator etc.

Input/output operations:

Input/output operation allow communication between user and program.

- Control flow using decision-making statements

control flow in python is managed by decision making statements like if, if-else, if-elif-else. This statements help the program make decisions based on conditions and executes the required block of code.

Overall, Python fundamentals form a strong base for building efficient and reliable programs.

Real-World problems using python programming

1. Movie-Ticket pricing

A movie theatre charges:

₹ 150 for children (age < 13)

₹ 250 for adults (age 13-59)

₹ 200 for seniors (age ≥ 60)

if the person is watching a 3D movie, add ₹ 50 extra.

Write a program that takes age and if 3D (1 or 0) and prints the final ticket price.

```
age = int(input("Enter your age: "))
is3D = int(input("Enter 1 if you are watching 3D movie
                 else 0: "))
if is3D == 1:
    if age < 13:
        print("price ₹ 200")
    elif age >= 13 and age <= 59:
        print("price ₹ 300")
    else:
        print("price ₹ 250")
elif age < 13:
    print("price ₹ 150")
elif age >= 13 and age <= 59:
    print("price ₹ 250")
else:
    print("price ₹ 200")
```

2. College Attendence Rule

A student is allowed to write the exam if:

attendence ≥ 75

OR

attendence ≥ 60 AND has medical certificate (1 = yes, 0 = no)

Take attendence percentage and medical certificate as input and print.

"Allowed" or "Not Allowed".

```
att = int(input("Enter Attendence percentage:"))
med = int(input("Enter 1 if medical certificate is exist
                else 0:"))
if att >= 75 OR (att >= 60 and med == 1):
    print("Allowed")
else:
    print("Not Allowed")
```

3. E-commerce Discount

A shopping site gives:

20% discount if bill ≥ 5000

10% discount if bill between 2000 and 4999

No discount if bill < 2000

But if the customer is a prime member, they get extra 5% discount.

input: bill amount, isprime(1 or 0)

print final amount to be paid.

```
bill = int(input("if you are prime member enter 1 else 0:"))
prime = int(input("if you are .
bill = int(input("enter the total bill amount:"))
prime = int(input("if you are prime member enter 1
                  else 0:"))
if bill >= 5000:
    if prime == 1:
        price = bill - (25/100)*bill
```

```
        print (price)
    else:
        price = bill - (20/100) * bill
        print (price)
elif bill > 2000 and bill <= 4999:
    if prime == 1:
        price = bill - (15/100) * bill
        print (price)
    else:
        price = bill - (10/100) * bill
        print (price)
else:
    print (bill)
```

4. Smartphone Battery warning

A phone shows:

"Low Battery" if battery ≤ 20

"Normal" if battery between 21-80

"Full" if battery > 80

But if phone is charging, it should show "charging" instead of any message.

Input: battery percentage, is charging (1 or 0)

```
bat per = int (input ("enter your battery percentage "))
is char = int (input ("enter 1 if phone is charging else 0 "))
if ischar == 0:
    if batper <= 20:
```

```
            print("Low battery")
        elif battery <= bat per <= 75:
            print("normal")
        else:
            print("Full")
elif ischar == 1:
        print("charging")
else:
    print("Enter 0 or 1")
```

5. Driving license check

A person can get a driving license if:

age ≥ 18

AND

Passed driving test (1 = yes)

But if age ≥ 60, driving test is not required.

Input: age, test passed

print "eligible" or "not eligible"

```
age = int(input("Enter your age: "))
test = int(input("Enter 1 if you passed test else 0: "))
if (age >= 18 and test == 1) or age >= 60:
        print("eligible")
else:
        print("not eligible")
```

6. Online Food Delivery

A restaurant gives free delivery if:

Order amount ≥ 500

OR

User is a gold member

But if the distance is more than 10 km, delivery is never free.

Input: amount, isGold (1 or 0), distance

```
amount = int(input("enter order amount "))
isGold = int(input(" Enter 1 if you are a Gold member else 0: "))
if (amount >= 500 and dis <= 10) or (isGold == 1 and dis ≤10):
        print (" Free delivery ")
else:
    print (" delivery is never free ")
```

7. Bank Loan Approval

A bank approves a loan if:

Salary ≥ 30000 AND credit score ≥ 700

OR

Salary ≥ 50000 (credit score ignored)

input: Salary, creditScore

print "Loan Approved" or "Loan Rejected"

```
Sal = int(input(" enter your salary "))
CreSco = int(input(" enter your credit score: ")
if (sal >= 30000 and CreSco ≥ 100) or sal > 5000:
        print (" Loan Approved ")
```

else:
    print("Loan Rejected")

8. Electricity Bill

units consumed:
First 100 units -> ₹ 2/unit
next 100 units -> ₹ 3/unit
Above 200 units -> ₹ 5/unit

Note: no loops
print final bill amount

```
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)
```

9. Student scholarship

A student get a scholarship if:

marks ≥ 85

AND

family income < 500000

But if the student is a single parent child, income condition is ignored.

input: marks, income, singleParent (1 or 0)

```
marks = int(input("enter your marks"))
fincome = int(input("enter family income"))
singleparent = int(input("enter 1 if you have single parent else
                                    0:"))
if singleparent == 1 and marks >= 85 or marks >= 85 and
        fincome < 500000:
    print("Eligible for scholarship")
else:
    print("not eligible for scholarship")
```

10. Online Exam Result

A student passes if:

theory ≥ 40 AND practical ≥ 40

But if total (theory + practical) ≥ 100, pass even if one is less than 40.

input: theory, practical

```
theory = int(input("enter your theory marks")
practical = int(input("enter your practical marks")
if total >= 100 or (theory >= 40 and practical >= 40):
        print("pass")
else:
    print("Fail")
```

11. Hotel Room pricing

A hotel charges

₹ 3000 per day for normal days

₹4000 per day on weekend
if customer stays more than 3 days, give 15% discount
input : isweekend (1 or 0), days stayed
print final bill

```
Stay = int(input("Enter number of days stayed: "))
isweekend = int(input("Enter 1 if stay is weekend else 0: "))
if stay >= 3:
    if isweekend == 1:
        bill = 4000 * stay
        price = bill - (15/100) * bill
        print("Final bill amount is: ", price)
    else:
        bill = 3000 * stay
        price = bill - (15/100) * bill
        print("Final bill amount is", price)
else:
    if isweekend == 1:
        bill = 4000 * stay
        Print("Final bill amount is ", bill)
    else:
        bill = 3000 * stay
        print("Final bill amount is ", bill)
```

2 Gaming level unlock
A game unlocks next level if :

score ≥ 100 or player has premium pass
But if player used cheating, access is denied
input : score, ispremium, usedcheat

```
score = int(input("Enter the score "))
ispremium = int(input("Enter 1 if you have premium else 0:"))
used cheat = int(input("Enter 1 if you used cheating else 0:"))
if (score >= 100 or ispremium == 1) and usedcheat == 0:
    print("Next level is unlocked")
elif usedcheat == 1:
    print("Access denied")
else:
    print("Next level is locked")
```

13 Mobile Data usage
A network gives unlimited data if :
daily usage ≤ 2 GB or user has unlimited plan
But if roaming is on, unlimited plan does not work
input : Dataused, hasunlimitedplan, isRoaming

```
usage = float(input("Enter daily usage of data in GB "))
unlimited = int(input("Enter 1 if you have unlimited plan
                  else 0 : "))
isRoaming = int(input("Enter 1 if roaming is on else 0:"))
if usage <= 2 and unlimited == 1 and isRoaming == 0:
    print("unlimited data available")
else:
```

print ("unlimited data is unavailable")

14. Office entry System

An Employee can enter the office if

IDcard is valid AND (finger print matches or face scan matches)

But if it is a holiday entry is denied for everyone

input: Idvalid, fingerprint, facescan, isHoliday

Id = int(input("enter 1 if Id is valid else 0: "))

finger = int(input("enter 1 if fingerprint matches else 0: "))

face = int(input("enter 1 if face scan matches else 0: "))

isHoliday = int(input("enter 1 if holiday else 0: "))

if id == 1 AND finger == 1 AND face == 1 AND - isHoliday == 1:

print("entry is confirmed")

else:

print("entry is denied")

15 Movie Rating display

A movie app shows rating based on average score

Average ≥ 8.5 -> Excellent

Average between 6.0 and 8.4 -> Good

Average < 6.0 -> "Average"

But if the movie is marked as editor's choice, always show "Recommended".

input: averageRating, isEditorsChoice (1 or 0)

print the message

```
average = float(input("enter rating"))
iseditchoi = int(input("enter 1 if it's editor choice else 0:"))
if iseditchoi == 1:
    print("Recommended")
elif average >= 8.5:
    print("Excellent")
elif average >= 6.0 and average <= 8.4
    print("Good")
else:
    print("Average")
```