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Class	10th	Chapter	04
Subject	Computer Science	Board	Punjab

CHAPTER 04: Control Structures in Python

EXERCISE SOLUTIONS

Multiple Choice Questions (MCQs)

1. What does the range () function do in Python?

(a) Generates a list of numbers (b) Creates a sequence of numbers (c) Calculates the sum of numbers (d) Prints a range of numbers

Correct Answer: (b) Creates a sequence of numbers

2. What is the output of the below code?

```
count = 0
for i in range(2):
for j in range(3):
count += 1
print(count)
```

(a) 4 (b) 5 (c) 6 (d) 7

Correct Answer: (c) 6

3. Which method is used to add an item at the end of the list in Python?

(a) insert() (b) append() (c) add() (d) extend()

Correct Answer: (b) append()

4. What is the purpose of control structures in programming?

(a) Only to make code longer (b) To manage decision-making and repetition of tasks (c) To create variables (d) To import libraries

Correct Answer: (b) To manage decision-making and repetition of tasks

5. Which statement is used to execute code when a condition is false?

(a) if (b) elif (c) else (d) while

Correct Answer: (c) else

6. How do you prevent print() from adding a newline?

(a) Use end="" (b) Use newline=False (c) Use break (d) Use continue

Correct Answer: (a) Use end=""

7. Which library is used to generate random numbers?

(a) Datetime (b) statistics (c) random (d) math

Correct Answer: (c) random

8. What does list.append() do?

(a) Removes the first item (b) Adds an item to the end (c) Sorts the list (d) Reverses the list

Correct Answer: (b) Adds an item to the end

9. What is the purpose of the range() function?

(a) To create a list of numbers (b) To generate a sequence of numbers (c) To calculate the range of values (d) To sort numbers

Correct Answer: (b) To generate a sequence of numbers

10. Which debugging technique involves adding output statements?

(a) Unit testing (b) Print statements (c) Error messages (d) Integration testing

Correct Answer: (b) Print statements

Short Answer Questions

1. Explain the use of the range() function in for loop?

Answer:

The range() function generates an immutable sequence of numbers, commonly used in for loops to control the exact number of iterations. It accepts up to three arguments: range(start, stop, step).

Example: for i in range(1, 6): iterates 5 times with i taking values from 1 to 5.

2. What is the difference between the append and remove methods in Python lists?

Answer:

- **append(item):** Adds a single element to the very end of a list, increasing its total length by one.
- **remove(value):** Searches for and deletes the first occurrence of a specified value from the list, reducing its length.

3. Define debugging.

Answer:

Debugging is the process of detecting, diagnosing, and resolving errors (syntax, runtime, or logical bugs) within computer software code so that it operates correctly as intended.

4. What are the three parameters of the range() function?

Answer:

1. **Start:** The starting integer of the sequence (inclusive; defaults to 0 if omitted).
2. **Stop:** The ending integer of the sequence (exclusive; the sequence stops before reaching this value).
3. **Step:** The increment or decrement value between each number (defaults to 1).

5. Name three list methods and their purposes.

Answer:

1. **append(item):** Appends an item to the end of the list.
2. **sort():** Sorts the list items in ascending or alphabetical order.

pop(index): Removes and returns the item at the specified index position. .3

6. How do you import a library in Python?

Answer:

A library is imported in Python using the import keyword followed by the library name.
Example: import random or import statistics.

7. What is unit testing and why is it important?

Answer:

Unit testing involves testing individual components, methods, or functions of a program independently to ensure each part functions correctly. It is important because it catches bugs early in development and prevents regression when updating code.

8. How do you access the third element in a list?

Answer:

Because Python lists use zero-based indexing, the third element is accessed using index 2.
Example: my_list[2]

9. What is the purpose of the end parameter in print()?

Answer:

The end parameter specifies what string character is printed at the end of the print() function execution instead of the default newline character (\n). Setting end="" keeps subsequent output on the same line.

10. How can we assess an element from the list?

Answer:

An element in a list is accessed by placing its index number inside square brackets after the list variable name, such as my_list[index].

11. How do you modify an existing item in a list?

Answer:

An item is modified by referencing its specific index position and assigning a new value to it using the assignment operator (=).
Example: my_list[1] = "Updated Value" updates the second item in the list.

Long Answer Questions

1. Explain the different types of decision-making statements in Python with examples for each.

Answer:

Decision-making statements control the flow of execution based on specified conditions.

if Statement: .1

Executes a code block only if the given condition evaluates to True.

```
Python
score = 85
if score >= 50:
    print("Pass")
```

2. **`if-else` Statement:**
   Provides an alternative code block to execute if the condition evaluates to `False`.
   ```python
   age = 16
   if age >= 18:
      print("Eligible to vote")
   else:
      print("Not eligible to vote")
   ```

if-elif-else Statement: .3

Checks multiple sequential conditions until one evaluates to True.
Python
```
marks = 75
if marks >= 80:
   print("Grade A")
elif marks >= 60:
   print("Grade B")
else:
   print("Grade C")
```

---

2. Compare while loops and for loops.[cite: 8, 9]

Answer:

Feature	`for` Loop	`while` Loop
Primary Use	Used when iterating over a fixed sequence or range.	Used when execution depends on a condition remaining `True`.
Iterations	**Determinate:** Total iterations are generally known in advance.	**Indeterminate:** Runs continuously until the condition becomes `False`.
Variable Management	Automatically manages iteration variables.	Requires manual variable initialization and updates inside the loop.

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3. Describe how to work with Python lists, including creation and modification. Provide code examples for adding items, removing items and accessing elements.[cite: 8, 9]

Answer:

Lists are ordered, mutable collections of items enclosed in square brackets `[]`.

* **Creation:**
  ```python
  fruits = ["Apple", "Banana", "Mango"]
**Accessing Elements:** •
Python
first_item = fruits[0]  # Accesses "Apple"

* **Adding Items:**
  ```python
  fruits.append("Orange")  # Adds "Orange" to the end
**Removing Items:** •
Python
fruits.remove("Banana")  # Deletes "Banana" from list

---

### 4. Explain the importance of testing and debugging in programming. Discuss different debugging techniques.

**Answer:**

* **Importance:** Testing ensures program correctness, prevents unexpected crashes, and verifies compliance with design requirements. Debugging removes functional defects and logical flaws to optimize software reliability.
* **Debugging Techniques:**
  1. **Print Statement Debugging:** Inserting `print()` calls at key execution points to track variable values and logic paths[cite: 8].
  2. **Code Inspection (Dry Run):** Step-by-step manual tracing of code logic on paper.
  3. **Interactive Debuggers (`pdb`):** Using debugging software tools to set breakpoints, pause execution, and inspect call stacks.

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### 5. How do Python libraries enhance programming efficiency? Provide an example.

**Answer:**

Python libraries increase productivity by providing pre-written, tested functions and modules for complex operations, saving time and preventing redundant code development.

**Example:**
Instead of implementing square root algorithms manually, importing the `math` module provides instant functionality[cite: 8]:
```python
import math
print(math.sqrt(49))  # Outputs 7.0
```
6. Write a Python program using a loop that prints all the odd numbers between 1 and 20.
Answer:
Python
```
# Program to print odd numbers between 1 and 20
for num in range(1, 21, 2):
    print(num, end=" ")
```
7. Write a Python program that performs the following tasks:
(a) Generates a list of 5 random numbers between 1 and 20.
(b) Uses the statistics library to calculate and print the mean of the generated numbers.
Answer:
Python
```
import random
import statistics

# (a) Generate 5 random numbers between 1 and 20
random_nums = [random.randint(1, 20) for _ in range(5)]
print("Generated Numbers:", random_nums)

# (b) Calculate and print the mean
mean_value = statistics.mean(random_nums)
print("Mean of Numbers:", mean_value)
```
8. Write a Python program that performs the following operations:
(a) Create a list of popular Pakistani dishes: ["Biryani", "Nihari", "Karahi", "Seekh Kebabs"].
(b) Add a new dish "Quorma" to the list.
(c) Change "Karahi" to "Chicken Karahi".
(d) Remove "Nihari" from the list.
Answer:
Python
```
# (a) Create list
dishes = ["Biryani", "Nihari", "Karahi", "Seekh Kebabs"]
```

```
# (b) Add "Quorma"
dishes.append("Quorma")

# (c) Change "Karahi" to "Chicken Karahi"
karahi_index = dishes.index("Karahi")
dishes[karahi_index] = "Chicken Karahi"

# (d) Remove "Nihari"
dishes.remove("Nihari")

# Display updated list
print("Final Dishes List:", dishes)
```

9. Write a code to print stars (asterisk) in rectangular pattern using nested loops with three rows and five columns.

[cite: 9]

Answer:

Python

```
# Program to print a 3x5 star rectangle pattern
for i in range(3):       # 3 rows
    for j in range(5):   # 5 columns
        print("*", end="")
    print()              # Move to next line
```

10. Write the output of the following code:

[cite: 9]

Python

```
print("=== Multiplication Table (1-5) ===")
for i in range(2, 4):      # Outer: 2 to 3
    for j in range(1, 11): # Inner: 1 to 10
        print(f"{i} x {j} = {i*j:2d}", end=" ")
    print()
```

Answer:

Plaintext

```
=== Multiplication Table (1-5) ===
2 x 1 =  2 2 x 2 =  4 2 x 3 =  6 2 x 4 =  8 2 x 5 = 10 2 x 6 = 12 2 x 7 = 14 2 x 8 = 16 2 x 9 = 18 2 x 10 = 20
3 x 1 =  3 3 x 2 =  6 3 x 3 =  9 3 x 4 = 12 3 x 5 = 15 3 x 6 = 18 3 x 7 = 21 3 x 8 = 24 3 x 9 = 27 3 x 10 = 30
```

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