

PROVIDENCE COLLEGE OF ENGINEERING

Department Of Computer Science & Engineering

UCEST105 ALGORITHMIC THINKING WITH PYTHON

Question Bank Module I & II (Common To All Branches)

Module I

Short Questions

1. Differentiate between Heuristic and mean end analysis method with a suitable example.
2. Computer is used a model of computation justify your answer with suitable steps.
3. List the difference between variables, identifiers, keyword in python with suitable examples.
4. Explain the process of algorithmic thinking and its importance in programming. Write a simple algorithm to bake a cake.
5. Describe about any three operators with suitable examples.
6. Explain the process of managing basic input and output in Python, and provide an example to demonstrate it?
7. Write a Python program to solve the following string manipulations
 - (a) Read a string from user.
 - (b) Calculate the length of the string.
 - (c) Find the character at position 5.
 - (d) Find the last character of the string.
8. Evaluate the expression
 - (a) $(3*22)+-8**2+5$
 - (b) $4*2+-75$
9. Write a python program to convert the input time in minutes to hours and minutes.
10. Write python program that takes an amount in dollars and convert it to Indian Rupees.
11. Write python program to convert kilometre to miles.
12. Python program to convert Fahrenheit to Celsius and vice versa.
13. Rearrange the letters in the words “new door” to make “one word”. Illustrate the steps for rearrangement.
14. When will you prefer heuristic method over algorithmic method?
15. Give a real-life situation where you use trial and error approach
16. Compare algorithm and heuristic methods
17. Solve a simple problem using backtracking method.
18. Give an example problem which can be solved by decision matrix method
19. What is the difference between testing and debugging?
20. From different possible algorithms for solving a problem, how will you choose the optimal one?

Essay Questions

1. A mad scientist wishes to make a chain out of plutonium and lead pieces. There is a problem, however. If the scientist places two pieces of plutonium next to each other, BOOM! The question is, in how many ways can the scientist safely construct a chain of length n ?
2. Use Problem solving steps to find the largest among three numbers.
3. How will you employ means end analysis to devise a strategy for completing your assignment before deadline?
4. Name two current problems in your life that might be solved through a heuristic approach. Explain why each of these can be solved using heuristic approach.
5. Demonstrate the decomposition strategy to design a menu driven calculator that support Addition, Subtraction, Multiplication and Division.
6. Among 12 ball bearings, one is defective, but it is not known if it is heavier or lighter than the rest. Using a traditional balance (with two pans hanging down the opposite ends of a lever supported in the middle), how do you determine which is the defective ball bearing, and whether it is heavier or lighter than the others, within three attempts?
7. Write short notes on the following problem-solving strategies
 - (a) Trial and Error
 - (b) Algorithm
 - (c) Heuristics
 - (d) Means ends analysis
 - (e) Backtracking
8. Write short notes on the following:
 - (a) Brainstorming
 - (b) Root Cause Analysis
 - (c) Mind Mapping
 - (d) SWOT Analysis
 - (e) Simulation
9. Explain the steps involved in algorithmic problem-solving process.

Module II

Short Questions

1. Differentiate algorithm and pseudocode with a suitable example
2. What are the different types of pseudocode. Explain `if..else` and `if ..elseif ..else` with example.
3. Write pseudocode to determine the largest of two numbers.
4. Write pseudocode to determine the entry-ticket fare in a zoo based on age. Age <10 fare =7, age ≥ 10 & age <60 fare=10, age >60 fare=5
5. Write pseudocode to print the days of a week .

6. Write a switch statement that will examine the value of flag and print one of the following messages, based on the value assigned to the flag.

Flag value	Message
1	HOT
2	LUKE WARM
3	COLD
Any other value	OUT OF RANGE

7. If the three sides of a triangle are input, write an algorithm to check whether the triangle is isosceles, equilateral, or scalene.
8. Write an algorithm that inputs two values a and b and that finds a^b . Use the fact that a^b is multiplying a with itself b times.
9. Draw flowcharts to find the volume of a hemisphere by inputting the radius.
10. Draw flow chart to find the factorial of a number.
11. What is an algorithm?
12. What is a pseudocode?
13. What are the advantages of using pseudocode?
14. Explain about sequencing, selection and loop constructs in a pseudocode.
15. What are the different selection structures possible in a pseudocode?
16. When will you prefer 'case' structure over 'if' structure?
17. What is the use of default_block in case structure?
18. If 'break' statement is not included in a case structure, how the control flow will be affected?
19. What is the use of loop constructs?
20. What you mean by definite and indefinite iterations?
21. What are the possible types of loop constructs in a pseudocode?
22. What are the two major differences between while and repeat-until loop constructs?
23. Explain entry controlled and exit controlled loops with suitable examples.
24. When will you prefer while loop over a for loop?
25. Write short notes on flowcharts.

Essay Questions

- Write algorithms for the following:
 - to find the area and circumference of a circle.
 - to find the area of a triangle given its three sides.
 - to find the area and perimeter of a rectangle.
 - to find the area of a triangle given its length and breadth.
- Write algorithms for the following:

- (a) to display all odd numbers between 1 and 500 in descending order.
 - (b) to compute and display the sum of all integers that are divisible by 6 but not by 4 and that lie between 0 and 100.
 - (c) to read a value, and do the following: If the number is even, halve it; if it's odd, multiply by 3 and add 1. Repeat this process until the value is 1, printing out each value.
3. You visit a shop to buy a new mobile. In connection with the festive season, the shop offers a 10% discount on all mobiles. In addition, the shop also gives a flat exchange price of | 1000 for old mobiles. Draw a flowchart to input the original price of the mobile and print its selling price. Note that all customers may not have an old mobile for exchange.
 4. Draw flowcharts for the following:
 - a. to find the volume of a hemisphere by inputting the radius.
 - b. to find the profit or loss incurred by getting the cost price and selling price of an item. Note that you are not asked to determine whether profit or loss is incurred but rather the value of profit or loss. Assume cost price \neq selling price.
 - c. to find the average of a list of numbers entered by the user. The user will stop the input by giving the value -999.
 5. Mr. Shyam, history professor, would like you know the percentage of increase in the population of our country per decade given the first decade and last decade. Other given data include population at the beginning of each decade. Draw a flow chart to represent the percentage of increase in population.
 6. Draw a flow chart to find the average mileage of a car in kilometer per litre after six fill ups in petrol pump. Input data include the number of liters of diesel, the starting odometer reading and the odometer reading at each fillups.
 7. Explain different flowchart symbols and their meaning.
 8. Draw a flowchart to find the average of 'n' given numbers.
 9. Write a pseudocode for a menu-driven calculator.
 10. Make a comparison of compiler and interpreter.
 11. What is a translator software? Explain different translator softwares in detail.

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