

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
B.Tech Degree S1(S) Examinations May 2026 (2024 Scheme)



Course Code: UCEST105

Course Name: ALGORITHMIC THINKING WITH PYTHON

Max. Marks: 60

Duration: 2 hours 30 minutes

PART A

(Answer all questions. Each question carries 3 marks)

CO Marks

- | | | | |
|---|--|-------|-----|
| 1 | Identify two ill-defined problems and well-defined problems. | (CO1) | (3) |
| 2 | Evaluate the following Python expressions and write the final output: i) $(5 > 3)$ and $(8 < 6)$ or $(7 == 7)$ ii) $2**3**2$ iii) 15 and -8 | (CO1) | (3) |
| 3 | Write pseudocode to calculate the sum of all even numbers from 1 to N. | (CO2) | (3) |
| 4 | Draw a flowchart to find the factorial of a number. | (CO2) | (3) |
| 5 | Given the string: <code>s = "MALAYALAM"</code> Write the output of the following slicing operations: i) <code>s[-3:]</code> ii) <code>s[::-1]</code> iii) <code>s[1:8:2]</code> | (CO3) | (3) |
| 6 | What is modularization in software development? Discuss its benefits. | (CO3) | (3) |
| 7 | Compare Divide and Conquer with Dynamic Programming. | (CO4) | (3) |
| 8 | In what type of problems is the greedy method guaranteed to work? Explain with a suitable example. | (CO4) | (3) |

PART B

(Answer any one full question from each module, each question carries 9 marks)

Module -1

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|---|--|-------|-----|
| 9 | a) Apply the six steps of the problem-solving process to the task of calculating the real roots of a quadratic equation. | (CO1) | (6) |
|---|--|-------|-----|

- b) Mention any three functions available in the Python math library and state what each function does. (CO1) (3)
- 10 a) For each of the following problem-solving approaches, list any two real-world use cases where the approach can be effectively applied. Also justify your answer. (CO1) (6)
1. Trial and Error
 2. Heuristic Approach
 3. Means–Ends Analysis
- b) Write a Python program to reverse a three-digit number without using any loops. (CO1) (3)

Module -2

- 11 a) Define pseudocode. List any two advantages of using pseudocode while designing algorithms. (CO2) (3)
- b) Write pseudo code to find the average height of boys and average height of girls in a class of n students. (CO2) (6)
- 12 a) Draw a flowchart using a CASE construct to display the day of the week based on a number (1–7). (CO2) (4)
- b) Using a for loop construct, draw a flowchart to identify the largest of n input numbers. (CO2) (5)

Module -3

- 13 a) Write a menu-driven program in Python to maintain a telephone directory using a dictionary with operations: add contact, update contact, delete contact, display all contacts, and exit. (CO3) (6)
- b) Write a Python program to create a one-dimensional NumPy array and reverse its contents without using a second array. (CO3) (3)
- 14 a) To register for the end-semester examination, you need to log into the University portal with your credentials. Write a Python program to validate the credentials. Assume that the usernames are stored in a list called USERNAME and the corresponding passwords are stored in another list PASSWORD such that PASSWORD[i] is the password for the user USERNAME[i]. (CO3) (5)

- b) Write a recursive Python function to add two positive numbers. (CO3) (4)

Module -4

- 15 a) Subset Sum Problem is the task of checking whether a subset of numbers from a given set can produce a specified target sum. For example, given the set {2, 4, 6, 8} and target 10, the subset {4, 6} satisfies the condition. Write a brute-force approach to solve this problem. (CO4) (5)
- b) Write the bottom-up Dynamic Programming algorithm to compute the n^{th} Fibonacci number. (CO4) (4)
- 16 a) Explain and illustrate the Merge Sort procedure by applying it to the list: 38, 27, 43, 3, 9, 82, 10. (CO4) (6)
- b) Explain how a randomized method can be used to approximate the expected number of people who get their own hat back when n hats are randomly distributed among n people. (CO4) (3)
