Round 1 (R1) Pedagogy

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Discipline to which the Lab belongs: Information Technology

Name of the Lab: Data Structure

Name of experiment : Tower of Hanoi

Kindly Refer these documents before filling the worksheet

1. Coursework (MOOC) on Pedagogy , Storyboard , Lab Manual : http://bit.ly/Vlabs-MOOC 2. Additional Documentation booklet for reference. http://vlabs.iitb.ac.in/vlabs-dev/document.php

3.Sample Git Repository. : https://github.com/BootTeam11/Boot2k19.git

1.1 FOCUS AREA:

Make the student understand and code the problem of Tower of Hanoi using recursion for n disks.

1.2 About the Experiment:

The Tower of Hanoi is a mathematical game or puzzle. It consists of three rods, and a number of disks of different sizes which can slide onto any rod. The puzzle starts with the disks in a neat stack in ascending order of size on one rod, the smallest at the top, thus making a conical shape. The objective of the puzzle is to move the entire stack to another rod, obeying the following simple rules:
• Only one disk can be moved at a time.
• Each move consists of taking the upper disk from one of the stacks and placing it on top of another stack i.e. a disk can only be moved if it is the uppermost disk on a stack.
 • No disk may be placed on top of a smaller disk. With three disks, the puzzle can be solved in seven moves.
 The minimum number of moves required to solve a Tower of Hanoi puzzle is 2^n - 1, where n is the number of disks.

1.3 Learning Objectives:

S.No.	Learning Objective	Cognitive Level
1.Students will be able to :	Move 3 disks from first rod to the last rod using spare rod.	Understand
2.Students will be able to :	Move n disks from first rod to the last rod using spare rod.	Understand
3.Students will be able to :	Observe the pattern and derive the expression for minimum number of moves to solve the puzzle.	Analyze
4. Students will be able to :	Calculate the minimum number of moves for solving the puzzle with n disks.	Evaluate
5.Students will be able to :	Analyze the pattern and come up with an algorithm to solve the puzzle.	Analyze
6.Students will be able to :	Understand the concept of recursion and use it for solving the puzzle as its application.	Apply
7. Students will be able to :	Write the code for the puzzle using recursion.	Apply

2. Instructional Strategy

2.1 Instructional Strategy:

- Make the student play the puzzle consisting of 3 disks.
- Make the student play the puzzle consisting of 7 disks.
- Make the student understand mathematical expression for minimum number of moves required for solving the puzzle.
- Make the student understand the concept of recursion.
- Write the code for solving the puzzle of Tower of Hanoi.

2.2 Assessment Method:

- Successfully transferring the stack of 3 disks from first tower to last tower using the spare tower.
- Successfully transferring the stack of 7 disks from first tower to last tower using the spare tower.
- Answering quiz questions based on the puzzle.

2.3 Description of sections:

- **A Glimpse at the Puzzle**
  The student is made aware of the importance of the puzzle through mentioned history.

- **Game Play of 3 disks**
  The student is supposed to solve the puzzle consisting of three disks following the instructions.

- **Game Play of 7 disks**
  The student is supposed to solve the puzzle consisting of seven disks following the instructions.

- **Coding the Solution**
  The student is supposed to understand the approach to solution of the puzzle ad comprehend the code.

- **Quiz**
  The student is supposed to answer the questions after playing the games and comprehending the code.

3. Task & Assessment Questions

Complete the following table with details of the various tasks and assessment questions you will give to the students.

Sr No.	Learning Objective to be met	Tasks to be performed by the students	Assessment questions aligne to the task
1	Observe the pattern	Move 3 disks from first rod to the last rod using spare rod.	
2	Observe the pattern	Move n disks from first rod to the last rod using spare rod.	
3	Comprehend the mathematical expression for min moves given n number of disks	Evaluate minimum number of moves for n number of disks.	
4	Understand the code of solution to the problem	Read the code and answer the quiz later.	A sequence of questions followed based on gameplay and solution to the code.

4.Simulator Interactions

Complete the following table giving the details of the Simulator interactions.

What Simulator will do? What students will do? Purpose of the task

Write your content in the table below.

What students will do?	What simulator will do?	Purpose of the task
Play the game where tower is made up of 3 disks.	Calculate the number of moves.	Student observes the pattern.
Play the game where tower is made up of n disks.	Calculate the number of moves.	Student observes the pattern and think about the algorithm.
Answer questions.	Ask Questions	Comprehension check.