**UNIT I (GE8151 PROBLEM SOLVING AND PYTHON PROGRAMMING)**

ILLUSTRATIVE PROBLEMS:

**1. Guess an integer number in a range**

Guessing game – guessing a number within a range of numbers.

**Algorithm:**

1. Start
2. Read n.
3. Read a guess number.
4. If guess > n
5. Print "Your guess is too high"
6. If guess < n
7. Print " Your guess is too low"
8. Else
9. If guess = n
10. Print "Good job" else print "no"
11. Stop

**Pseudo code:**

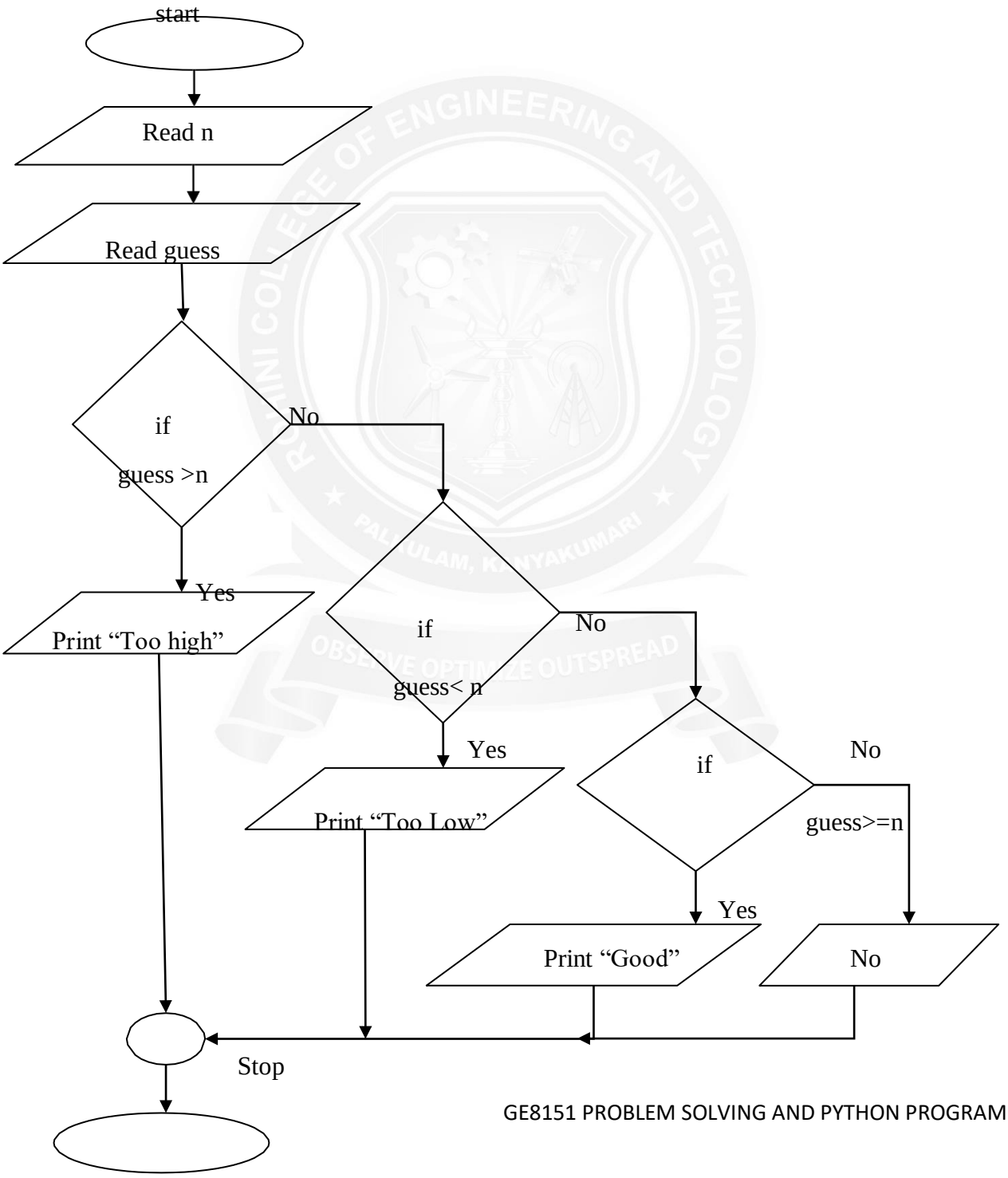
```
BEGIN
READ n
OBTAIN guess
IF guess > n
        DISPLAY "Your guess is too high"
IF guess < n
        DISPLAY "Your guess is too low"
ELSE
IF guess=n
        DISPLAY "Good Job" ELSE DISPLAY "No'
ENDIF
```

ENDIF

ENDIF

END

**Flowchart**:



## 2. Tower's of Hanoi

A Tower's of Hanoi is a children's playing game, played with three poles and a number of different sized disks which is stacked on the poles. The disks are stacked on the left most pole in ascending order initially. ie) The largest on the bottom and the smallest on the top.

**Rules to be followed:**

i) Only one disk can be moved among the towers at any given time.

ii) Only the "top" disk can be removed.

iii) No large disk can sit over a small disk.

The objective is to transfer the disks from the left most pole to the right most pole by using the centre pole as the temporary pole.

The steps are

i) Move the top n-1 disks from the left pole to the centre pole, n is the number of disks.

ii) Move the nth largest disk to the right pole.

iii) Move the n-1 disks on the centre pole to the right pole.

The total number of moves will be $2^n - 1$, where n is the number of disks.

**Algorithm:**

1. Start
2. Read disk, source, dest, aux
3. Call the function Hanoi(disk, source, dest, aux)
4. Stop

**Algorithm for function Hanoi(disk, source, dest, aux):**

1. Start
2. If disk=1

   Move disk from source to dest
3. Else

Hanoi(disk-1, source, aux, dest)

Move disk from source to dest

Hanoi(disk-1, aux, dest, source)

4. Return

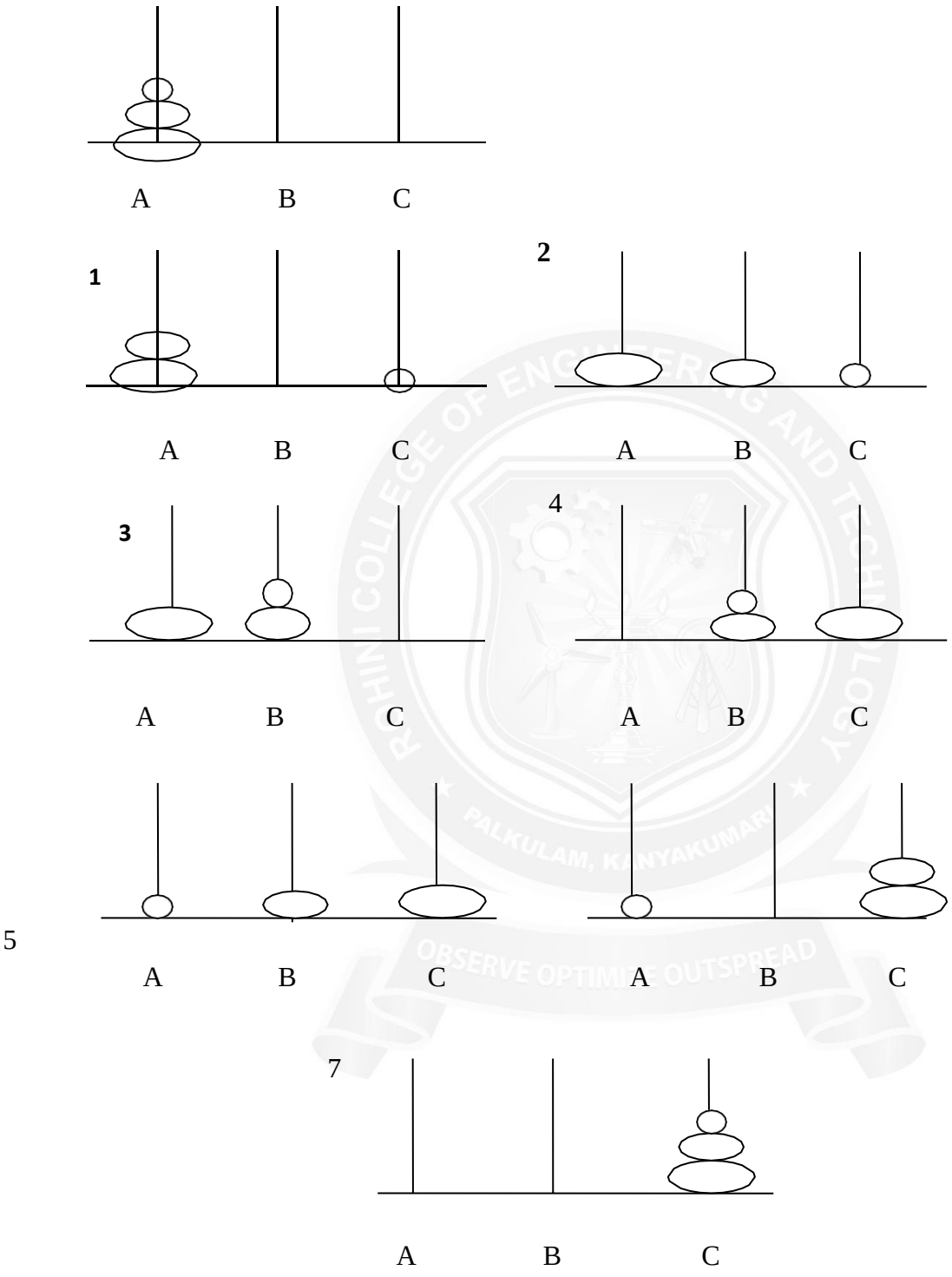
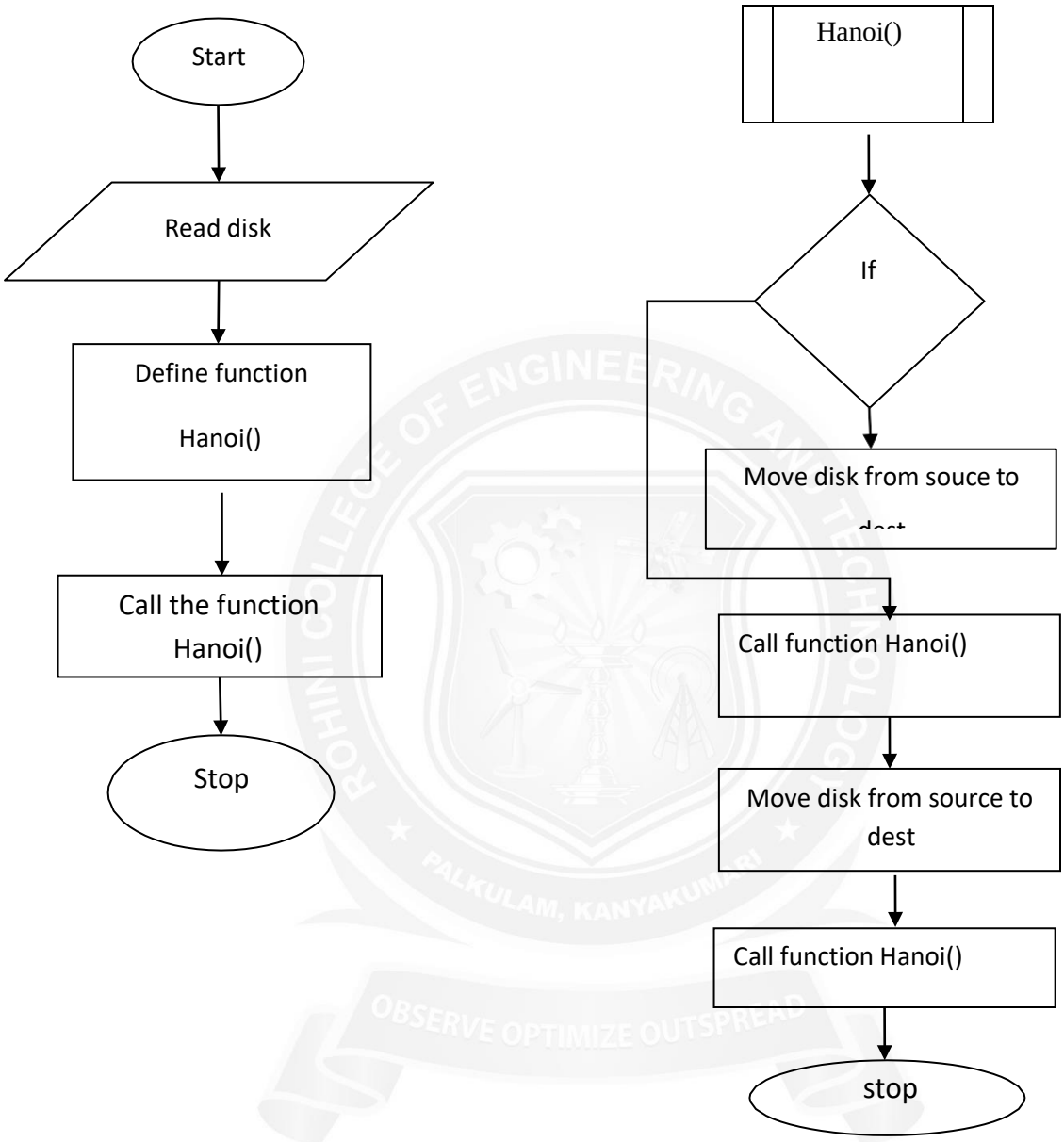



Fig 1: Tower's of Hanoi with 3 disks

**Flowchart:**


Start
Read disk
Define function
Hanoi()
Call the function
Hanoi()
Stop
Hanoi()
If
Move disk from souce to
Call function Hanoi()
Move disk from source to
dest
Call function Hanoi()
stop

**Pseudo code:**

```
BEGIN
READ disk, source, dest, aux
FUNCTION Hanoi (disk, source, dest, aux)
END
```

**Pseudo code for function Hanoi (disk, source, dest, aux)**

```
BEGIN
IF disk=1 THEN
        Move disk from source to dest
ELSE
        Hanoi (disk-1, source, aux, dest)
        Move disk from source to dest
        Hanoi (disk-1, aux, dest, source)

ENDIF
END
```

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