**Assignment 1:-**

Q: Explain the problem solving life cycle steps and solve the following problems:

Soln: Problem solving is a process of working through the details of a problem to reach a solution.There are 7 steps of problem solving-

1)Define and Identify the Problem- Clearly understand and articulate the problem you're trying to solve.

2)Analyze the Problem- Investigate the root causes and gather relevant information to break down the problem.

3)Identifying Possible Solutions- Brainstorm a variety of potential solutions without filtering ideas.

4)Selecting the Best Solutions- Evaluate each option based on feasibility, effectiveness, and resources, and select the most suitable one.

5)Evaluating Solution/s- Assess the selected solution's potential impact and identify any risks or side effects.

6)Develop an Action Plan- Create a step-by-step plan to implement the solution, with clear goals and deadlines.

7)Implement the Solution- Put the action plan into action, monitor progress, and adjust if necessary.

Problem 1 : There is a goat, a tiger, a man and a bundle of grass on one side of the river. There is a boat which can only carry two at a time & can only be rode by the man. How can they cross the river?

* Seven steps of problem solving-

1. Define and Identify the Problem-

A man needs to transport a goat, a tiger, and a bundle of grass across a river using a boat that can only hold two entities at a time. Therefore the problem requires finding a sequence of boat trips to transport all entities safely across the river.

1. Analyze the Problem-

1. Only two entities can be taken on the boat at a time

2. The Great Man (the man) will always be on the boat

3. The goat and tiger cannot be taken together or left alone.

4. The goat and bundle of grass cannot be left alone.

1. Identifying Possible Solutions

1. Take tiger first. 2. Take goat first.

3.Take grass first.

1. Evaluating the Solutions

1. If we take tiger first then goat will eat grass. 2. If we take goat first then left with tiger and grass.

3. If we take grass first then tiger will eat goat

1. Best solution-

Take goat first.

1. Develop an Action Plan-

1. Take the goat to the other side.

2. Come back alone to the original side.

3. Take the tiger to the other side.

4. Bring the goat back to the original side.

5. Take the grass to the other side.

6. Come back alone to the original side.

7. Take the goat to the other side.

1. Implement the solution-

The man crosses the river with the goat, returns alone, then takes the tiger across and brings the goat back. Finally, he takes the grass across, returns alone, and reunites with the goat, safely transporting everyone.

* Algorithm –

Step 1: Start.

Step 2: Take the Goat across the river.

Step 3: Return alone to the side.

Step 4: Take the Tiger across the river.

Step 5: Bring the Goat back to the side.

Step 6: Take the Grass across the river.

Step 7: Return alone to the side.

Step 8: Take the Goat across the river.

Step 8:End

* Flowchart –

TAKE THE GOAT

RIDE TO OTHER SIDE OF RIVER

DROP THE GOAT

GO BACK

TAKE TIGER

RIDE TO OTHER SIDE OF RIVER

DROP THE TIGER

IF TIGER &GOAT ARE TOGETHER

NO

YES

TAKE GOAT

GO BACK & DROP GOAT

TAKE GRASS

RIDE TO OTHER SIDE

DROP GRASS

IF TIGER & GRASS ARE TOGETHER

YES

GO BACK

TAKE GOAT

RIDE TO OTHER SIDE OF RIVER

DROP GOAT

Problem 2- There are three temples, one plant of flower and a pond. A boy goes there and before entering the first temple he plucks the flower and has to take a bath in the pond before entering into every temple. The specialty of the pond is that if a person is carrying flowers with him and he takes a dip in the pond the number of the flowers gets doubled. He takes a dip and offers some flowers in the first temple, then he again takes a dip and offers flowers in second temple, and again the same in the third temple. The boy offers EQUAL number of flowers in all the 3 temples and goes back with EMPTY hand after offering flower in the third temple. How many flowers could he have offered in each temple?

* **Seven steps of problem solving-**

1. **Define and Identify the Problem-**

A boy starts with some flowers. Before entering each of the 3 temples, he dips in a pond, which doubles the number of flowers he has. At each temple, he offers the same number of flowers. After offering flowers at the third temple, he has no flowers left.

1. **Analyze the Problem-**

Let’s consider the boy starts with 7 flowers. After taking a dip in the first pond, the number of flowers doubles, giving him 14 flowers. He offers 8 flowers at the first temple, leaving him with 6 flowers. After taking a dip in the second pond, his flowers double again, and he has 12 flowers. He offers 8 flowers at the second temple, leaving him with 4 flowers. After taking a dip in the third pond, his flowers double again, and he has 8 flowers. He offers all 8 flowers at the third temple, leaving him with no flowers left.After the third temple, he has 0 flowers left.

1. **Identifying Possible Solutions**

The boy needs to offer the same number of flowers at all three temples.

Since the problem is a puzzle and therefore has only one solution as the best solution and that is considering that the boy starts with 7 flowers and satisfy all the conditions and thus has zero flowers left with him.

1. **Evaluating the Solutions**

Since if he starts with 7 flowers and acc to condition that after each dip in the pond, his flowers double. At each temple, he offers 8 flowers, and after the third temple, he has no flowers left. Thus, the boy offers 8 flowers at each temple and ends with no flowers after the third temple. All the Conditions get satisfied.

1. **Best Solution**

Best solution will be considering that the boy starts with 7 flowers and after dip in 1st pond he has 14 flowers with him out of which he offer 8 flowers to 1st temple remaining with 6 flowers in his hand he take a dip in 2nd pond resulting to 12 flowers in his hand out of which he again offers 8 flowers to the 2nd temple and now he with him has 4 flowers again dips in 3rd pond and now has 8 flowers with him and offers all the 8 flowers in the temple 3. Thus the condition of offering same flowers in all the 3 temples gets satisfied. And thus it becomes the best solution.

**6) Develop an Action Plan**

**1.** Start with **7 flowers**.  
 **2.** The boy dips in the pond before the first temple, which doubles the flowers **(7\*2 =14).**  
 **3.** The boy offers **8 flowers** at the first temple **(14-8=6).**  
 **4.** The boy dips in the pond again before the second temple, doubling the flowers **(6 \* 2 =12).**  
 **5.** The boy offers **8 flowers** at the second temple **(12-8=4).**  
 **6.** The boy dips in the pond again before the third temple, doubling the flowers **(4\*2=8).**  
 **7.** The boy offers **8 flowers** at the third temple **(8-8=0),** and finally, he has **0 flowers** left after offering at the last i.e the 3rd temple.

**7) Implement the solution-**

Consider the boy has 7 flower at starting and solve the qn mathematically and thus satisfying all the conditions of the questions.

* Algorithm –

Step-1: Start.

Step-2: He starts with 7 flowers.

Step-3: After taking a dip in the first pond, he has 14 flowers.

Step-4: He offers 8 flowers at the first temple, leaving him with 6 flowers.

Step-5: After taking a dip in the second pond, he has 12 flowers.

Step-6: He offers 8 flowers at the second temple, leaving him with 4 flowers.

Step-7: After taking a dip in the third pond, he has 8 flowers.

Step-8: He offers all 8 flowers at the third temple, leaving him with no flowers.

Step-9: Stop

* Flowchart :-

TAKE N FLOWERS

DIP IN 1ST POND

OFFER M FLOWER IN TEMPLE 1

NO

YES

GO TO TEMPLE 2

OFFER M FLOWER IN TEMPLE 2 2

DIP IN 2ND POND

N0

YES

M FLOWER OFFERED IN TEMPLE 3

TE

DIP IN POND 3

GO TO TEMPLE 3

NO

OFFER M FLOWERS IN TEMPLE 3

YES

0 FLOWERS LEFT

NO

YES