Modeling A System And Improving It In Iterations
Lesson Plan: Class 08 / IPP / 01

Overall goal of the lesson	Modeling a system and improving it in iterations
Prior knowledge required	None

MODULE 1: **Module time:** 35 minutes

Goal:	Introduce the concept of modeling a system in iteration.
Description:	
Material required:	**Physical:** Printed copy of the worksheet 08-IPP-01-WS for each student, pencil and eraser. **Electronic:** (Power Point presentation)
Procedure Summary:	Explain the examples as per procedure details. Ask students to write their guesses about the functions in first three examples while proceeding with the explanation.
Procedure Details:	Slide#2: We will start with an example. Ask students to consider a function f(x). Give them information that the function has value 0 when x is 0. Ask them to guess the function and write it on their worksheet. Ask them whether the function is f(x) = 0. Tell them that f(x) = 0 can be true because the given information is satisfied by the function. Then tell the students that they have more information about the function. The function returns 1 when the value of x is 1. Ask them whether this information is validated by our function definition, i.e. f(x) = 0. Ask them to refine the function in order to validate the new information as well. Now ask them whether f(x) = x can be our function. Tell them that this can be our function as it validates both the information. Slide#3: Tell the students that they have new information about function. The function gives 4 when x is 2. Ask them whether it is validated by our function f(x) = x and tell them to refine the function to validate this new information. Now ask them whether $f(x) = x^2$ can be the function. Tell them that this can be our function as it validates all the information provided. Slide#4: Tell the students that they are given more information. The function returns 9 when x is 3. Ask them whether it is validated by the function and whether there is any need to refine further. Tell them that there is no need to further refine the function as it validates all the information provided. Slide#5: Explain the students how they have arrived at the function. • Tell them that we have validated the function. We check whether our function satisfies the information. If our function gives the correct output as per the information provided, we say that it is validated.

	• When the function does not validates the new information we do refinement. With every new information we have modified the function such that it validated for the new information as well. • We have repeated the process till we get a function which is validated for all given information. This process of repetition is iteration. Slide#6, Slide#7 and Slide#8: It is similar example. Teachers need to follow similar steps as given in the first example. Slide#9 and Slide#10: It is similar example. Teachers need to follow similar steps as given in the first example. Slide#11: The example on this slide shows how the team for the Kabaddi can be selected in iteration. The players are shortlisted based on who satisfies information at each iteration. Refining the team to select best 12 players who satisfy all information present. Slide#12: This is the next example. Ask students what happens when the AC is switched on and it does not keep the temperature constant. You will start feeling cold after some time. Ask them whether it is required to switch ON and OFF AC to avoid excess cold. Slide#13: Now we will tell students how does AC works to maintain the temperature to desired value Td set by user. At every iteration AC compares the room temperature (T) with the desired temperature and takes proper action which is cooling mode or fan mode. Next slide shows how does it happens. Slide#14: Tell them there are 2 modes in an AC. 1. Cooling mode: The AC cools the air and blows it into the room. 2. Fan mode: The AC blows the normal air into room. Depending upon the room temperature the AC switches to one of the two modes. Show them the diagram. When T>Td then cooling mode is selected and when T<Td fan mode is selected. Show them the table which shows action of AC in each iteration. It validates the condition at every iteration and refines the mode selected. Slide#15: Tell students what we have learned in this class • With AC example we have learned that iterative process helps to maintain room temperature to desired temperature. • In an iterative process, validation and refinement at every iteration improves the desired result.

Solutions to Work sheet:

A.1

Iteration	Information	Function f(x)
1	Function returns 0 when input is 0, $f(0)=0$	$f(x) = 0$
2	$f(1)=1$	$f(x) = x$
3	$f(2)=4$	$f(x) = x^2$
4	$f(3)=9$	$f(x) = x^2$

Function: $f(x) = x^2$

A.2

Iteration	Information	Function f(x)
1	Function returns 5 when input is 0, $f(0)=5$	$f(x) = 5$
2	$f(2)=7$	$f(x) = x + 5$
3	$f(3)=11$	$f(x) = x^2 - x + 5$
4	$f(4)=17$	$f(x) = x^2 - x + 5$

Function: $f(x) = x^2 - x + 5$

A.3

Iteration	Information	Function f(x,y)
1	$f(2,2)=4$	$f(x,y) = x + y$ Or $f(x,y) = xy$
2	$f(3,2)=6$	$f(x,y) = xy$
3	$f(1,2)=2$	$f(x,y) = xy$

Function: $f(x,y) = xy$

B.1

Iteration	Information	Function f(x,y)
1	$f(0,0)=1$	$f(x,y) = 1$
2	$f(2,2)=5$	$f(x,y) = x + y + 1$ Or $f(x,y) = xy + 1$
3	$f(3,2)=6$	$f(x,y) = x + y + 1$
4	$f(3,3)=7$	$f(x,y) = x + y + 1$

Function: $f(x,y) = x + y + 1$

B.2

Iteration	Information	Function *f*(x)
1	*f*(0)=3	$f(x) = 3$
2	*f*(1)=4	$f(x) = x + 3$
3	*f*(2)=7	$f(x) = x^2 + 3$
4	*f*(3)=12	$f(x) = x^2 + 3$

Function: $f(x) = x^2 + 3$

B.3

Iteration	Information	Function *f*(x)
1	*f*(0)=0	$f(x) = 0$
2	*f*(1)=1	$f(x) = x$ Or $f(x) = x^2$ Or $f(x) = x^3$
3	*f*(2)=8	$f(x) = x^3$
4	*f*(3)=27	$f(x) = x^3$

Function: $f(x) = x^3$