

## Class – XII Lesson Plan-3

### Topic: Relations and Functions

#### Brief Description of the lesson:

After studying this lesson, students will be able to link pair of elements from two sets and then introduce relations between the two elements in the pair. They will learn about reflexive, symmetric, transitive and equivalence of relations and different types of Functions.

#### **Objectives:**

##### **I - Specific Objectives:**

To enable the students to:

S1 identify and analyse types of relations: reflexive, symmetric, transitive and equivalence relations **(Knowledge/Recalling) (Analysis)**

S2 identify and analyse different kind of functions (one-one, many-one, into, onto) **(Understand/Classifying) (Analysis)**

##### **II - Behavioural Objectives:**

By understanding and solving variety of problems, students will attain following behavioural objectives:

B1 To develop specific (Imaginative) problem-solving approach required in the topic through a lot of practice **(Apply/Implementation)**

B2 Develop the critical thinking skills by learning and applying different concepts learnt in variety of problems. **(Apply/Implementation)**

#### Process / Activities:

ACT1 To verify that the relation R in the set L of all lines in a plane, defined by  $R = \{(l, m): l \parallel m\}$  is an equivalence relation. **(Understand/Interpret)**

ACT2 To verify that the relation R in the set L of all lines in a plane, defined by  $R = \{(l, m): l \perp m\}$  is symmetric but neither reflexive nor transitive relation. **(Understand/Interpret)**

ACT3 Graphical identification a function which is one-one, onto, into, not one-one but is onto etc. **(Understand/Interpret) (Analysis)**

#### Skills:

- 1) Imagination
- 2) Logical thinking
- 3) Analysis

**Assessment:**

Assessment of activity will be done based on decided rubrics:

A1 If  $A = \{1, 2, 3\}$  and  $f, g$  are relations corresponding to the subset of  $A \times A$  indicated against them, which of  $f, g$  is a function? Why?

$$f = \{(1, 3), (2, 3), (3, 2)\}$$

$$g = \{(1, 2), (1, 3), (3, 1)\} \text{ (Knowledge/Recalling)}$$

A2 Show that the function  $f: \mathbb{R} \rightarrow \mathbb{R}$  defined by  $f(x) = \frac{x}{x^2+1}$  for all real  $x$ , is neither one-one nor onto. (Apply/Implementation)

A3 Are the following set of ordered pairs functions? If so, examine whether the mapping is injective or surjective.

(i)  $\{(x, y): x \text{ is a person, } y \text{ is the mother of } x\}$ .

(ii)  $\{(a, b): a \text{ is a person, } b \text{ is an ancestor of } a\}$ . (Analysis)

A4 If  $A = \{1, 2, 3, 4\}$ , define relations on  $A$  which have properties of being:

(a) reflexive, transitive but not symmetric

(b) symmetric but neither reflexive nor transitive

(c) reflexive, symmetric and transitive. (Synthesis)

**Expected Learning Outcomes:**

The students would be able to efficiently deal with:

1) Identify and analyse different types of relations and functions, such as reflexive, symmetric, transitive, equivalence relations, one-to-one, many-to-one, and onto functions.

(Knowledge/Recalling) (Analysis)

2) Determining the domain, codomain, and range of relations and functions.

(Understand/Interpret)

3) Apply relations and functions to solve real-world problems. (Apply/Implementation)

**Placements of Objectives, Instructional Activities and Assessment:**

Topic/Start Date/Assessment					
Knowledge	Understanding	Application	Analysis	Synthesis	Evaluation
S1	S2	S3	S1		
A1	ACT1	B1	S2		
	ACT2	B2	ACT3	A4	
	ACT3	A2	A3		

## REVIEW OF THE LESSON PLAN

(To be done when the lesson gets over)

### Problems Faced:

1. Few students faced difficulty distinguishing between relations and functions, which are two closely related concepts
2. There are many different types of relations and functions, such as one-to-one, onto, and invertible functions; reflexive, transitive, and symmetric relations. One or two students may have difficulty understanding the definitions of these different types of relations (because of their abstract nature) and functions and how to identify them.
3. Initially chapter took a lot of time because its related to class XI and many students didn't revise the concepts/material learnt in class XI.

**Success:** about 95% of the students understand the topic better and have ability to express it properly.

**Failure:** about 5 % of students not be able to solve a particular set of questions (Proving a functions equivalence).

**Real Learning Outcomes:** Students were able to

1. to define and identify relations and functions.
2. distinguish between different types of relations (reflexive, transitive, and symmetric) and functions (one-to-one, onto, and invertible functions).
3. represent relations and functions using graphs, tables, and equations.

**Student's response/participation:** Overall participation was good. Few were struggling with types of relations proving questions,

### Teacher's learning:

1. By teaching Functions in math, teachers can solidify their own understanding of the material and develop new insights.
2. Teaching Functions in math can help teachers develop their teaching skills in a number of ways. Teachers can learn how to explain complex concepts in a clear and concise way, use a variety of teaching methods and strategies to engage students, differentiated instruction to meet the needs of all learners.
3. Teachers can learn about common student misconceptions, effective learning strategies, and the impact of different teaching methods on student learning.