Class – XII
Lesson Plan 5

Topic: Indefinite Integration

Brief Description of the lesson:

In this chapter, students will study about an anti-derivative(integral) of a function and various methods to calculate anti-derivatives.

Objectives:

I - Specific Objectives:

To enable the students to:
S1 Interpret integration, learn the basic integration rules, such as the power rule, the sum and difference rule, the constant multiple rule, and the product rule. **(Understand/Classifying)**
S2 understand the concept of the constant of integration and its implications. **(Understand/Classifying)**
S3 be able to apply integration by parts, substitution, partial fractions to solve more complex integration problems. **(Apply/Implementation)**
S4 develop a deeper understanding of the entire topic by a lot of practice of derivations involved in the topic, to be able to develop new techniques on their own. **(Synthesis)**

II - Behavioural Objectives:

By understanding and solving variety of problems, students will attain following behavioural objectives:
1) B1 Critical Thinking
2) B2 Systematic approach
3) B3 To handle real life situation

Process / Activities:
1) ACT1 Students will be asked to recall derivatives of certain terms and reverse process. Students will be given time and then asked the different basic formulae involved in integration. **(Knowledge/Recalling)**

2) ACT 2 To derive different necessary formulae to bolster students understanding. **(Synthesis)**

Skills:
1) Analysis
2) Problem solving
3) Application

Assessment:
Assessment of activity will be done based on decided rubrics:

A1 (a) Evaluate $\int \frac{3ax}{b^2+c^2x^2}\,dx$. **(Understand/Classifying)**

A2 (b) Verify the following using the concept of integration as an antiderivative:
$\int \frac{x^3}{x+1}\,dx = x - \frac{x^2}{2} + \frac{x^3}{3} - \log|x+1| + c$ **(Knowledge/Recalling)**
A3 Evaluate $\int e^{\tan^{-1}x}\left(\frac{1+x+x^2}{1+x^2}\right)\,dx$ **(Analysis)**
A4 Evaluate $\int \log x\;dx$, $\int \sec x\;dx$, $\int \sqrt{a^2-x^2}\,dx$ **(Synthesis)**

Expected Learning Outcomes:

The students would be able to efficiently deal with:
1) the different methods of indefinite integration **(Understand/Classifying)**
2) indefinite integrals of a variety of functions, including polynomials, rational functions, trigonometric functions, exponential functions, and logarithmic functions.
(Understand/Classifying) (Analysis)

Placements of Objectives, Instructional Activities and Assessment:

Topic/Start Date/Assessment					
Knowledge	Understanding	Application	Analysis	Synthesis	Evaluation
ACT1	S1	S3	S4	S4	
A2	S2	A3		ACT2	
	A1			A4	
	A3				

REVIEW OF THE LESSON PLAN

(To be done when the lesson gets over)

Problems Faced:

1. Students' lack of prior knowledge of calculus concepts such as derivatives, anti-derivatives, and the fundamental theorem of calculus.

2. Students' lack of practice of fundamental questions on differentiation.

3. Many varieties of questions made it difficult for the students to perform well in assessments/tests.

4. Lack of time. Indefinite integration is a complex and vast topic, and it can be difficult to cover all the material in the allotted time.

Success: about 80% of the students understand the topic better and have ability to express it properly.

Failure: 20% of students were not able to solve the newer questions at first or second glance. Few students were not able to reach to the final answer, having correct initial steps.

Real Learning Outcomes: Students were able to

1. define the indefinite integral and explain its relationship to the derivative. Students were able to explain the difference between indefinite and definite integrals.

2. find indefinite integrals of a variety of functions using standard methods, such as the power rule, the integration by parts formula, and trigonometric substitution. This includes finding integrals of polynomials, rational functions, trigonometric functions, and exponential functions.

3. think critically about the concepts of integrals and their applications.

Student's response/participation: As every student know the difficulty level of the topic, so the participation was good.

Teacher's learning:

1. Teachers can reflect on their own teaching practices and identify areas where they can improve. For example, they might ask themselves are the students able to understand the concepts of indefinite integration, apply the indefinite integration rules to solve problems etc.

2. Teachers can use inquiry-based learning to allow students to explore the concepts of indefinite integration for themselves. For example, teachers might give students a problem to solve and ask them to explain their reasoning. This can help teachers to **identify areas** where students need additional support.

3. Teachers can use formative assessment to monitor student progress and identify areas where students need additional instruction. For example, teachers might give students short quizzes or have them complete problem sets. This feedback can help teachers to **adjust their teaching as needed.**