

SUBJECT- MATHEMATICS
Session 2023-24
LESSON PLAN: GRADE XII
TOPIC:DIFFERENTIAL EQUATIONS

BRIEF DESCRIPTION

In this chapter, students are taught about:

- Formation of differential equation
- To reduce differential equation to its general form and particular form.

Following pattern of differential equations can be converted to the general form and particular form:

1. Variable separable type differential equation
2. Homogeneous differential equation
3. Linear differential equation

Objectives:

I - Specific Objectives

To enable the students to:

S1 Interpret the function when differential equations are given. (U)

S2 Find degree and order of differential equations (An)

S3 Develop Solution of various forms of differential equations (Sy)

S4 Categorize General and particular solution (U)

Behavioural Objectives:

Through this chapter students will attain following behavioral objectives, values and skills through solving variety of problems.

- Logical thinking
- Critical thinking
- Imagination
- Systematic approach
- Efficiency
- Manipulation

Differential equation is applied in various practical fields of life. It is used to define various physical laws and quantities. **Extended**

Differential equations have a remarkable ability to predict the world around us. They are used in a wide variety of disciplines, from biology, economics, physics, chemistry and engineering. **Extended**

They can describe exponential growth and decay, the population growth of species or the change in investment return over time. **Extended**

One of the most basic examples of differential equations is the Malthusian Law of population growth $dp/dt = rp$ shows how the population (p) changes with respect to time. The constant r will change depending on the species. Malthus used this law to predict how a species would grow over time. **Extended**

More complicated differential equations can be used to model the relationship between predators and prey. For example, as predators increase then prey decrease as more get eaten. But then the predators will have less to eat and start to die out, which allows more prey to survive. The interactions between the two populations are connected by differential equations. **Extended**

Some other uses of differential equations include: **Extended**

- 1) In medicine for modeling cancer growth or the spread of disease
- 2) In engineering for describing the movement of electricity
- 3) In chemistry for modeling chemical reactions
- 4) In economics to find optimum investment strategies
- 5) In physics to describe the motion of waves, pendulums or chaotic systems.

QUESTIONS

Q Form the differential equation of the family of hyperbolas having foci on x -axis and centre at origin. **Multistructural**

Q Form the differential equation of the family of circles having centre on y -axis and radius 3 units. **Multistructural**

Q Find the equation of a curve passing through the point $(0, 0)$ and whose differential equation is $y' = e^x \sin x$. **Multistructural**

Q $\left\{ x \cos\left(\frac{y}{x}\right) + y \sin\left(\frac{y}{x}\right) \right\} y dx = \left\{ y \sin\left(\frac{y}{x}\right) - x \cos\left(\frac{y}{x}\right) \right\} x dy$ **Multistructural**

Q Find the equation of a curve passing through the point $(0, 2)$ given that the sum of the coordinates of any point on the curve exceeds the magnitude of the slope of the tangent to the curve at that point by 5. **Multistructural**

LEARNING OUTCOMES

Students learnt about:

Degree and order, General and particular solution, Formation of differential equation, Solution to first order, first degree differential equations

To form differential equation when solution is given, To solve differential equations using variable separable, homogeneous, Linear DE method

REVIEW OF THE LESSON PLAN
(TO BE DONE WHEN THE LESSON GETS OVER)

Problems faced –

Success-

Failure-

Real Learning Outcomes

ELO-

Students' response/ participation

Teacher's Learning

TO INCORPORATE IN TERM 2-