KU4VACMAT204
MATHEMATICS IN REAL LIFE THROUGH GEOGEBRA

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
IV	VAC	200-299	KU4VACMAT204	2 + 1	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
2	2	1	25	50	75	1.5

Course Description

This course introduces mathematical modeling and visualization using GeoGebra. through this interactive software. Learners will dynamically explore 2D and 3D geometry, algebraic expressions, calculus concepts, and real-life applications in finance, motion, and design.

Course Prerequisite

Basic mathematical operations and algebraic skills.

Course Outcomes

CO No.	Expected Outcome	Learning Domains
1	Use GeoGebra tools to construct and analyze geometric figures.	Apply
2	Explore functions, graphs, and algebraic relationships dynamically.	Apply
3	Apply calculus tools in GeoGebra to model and solve problems.	Apply
4	Visualize and build 3D mathematical models and real-life applications.	Apply

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	✓			✓	✓		
CO 2	✓			✓	✓		
CO 3	✓			✓	✓		
CO 4	✓			✓	✓		

COURSE CONTENTS

Contents for Classroom Transaction

MODULE	UNIT	DESCRIPTION	HOURS
I		**Dynamic Geometry using GeoGebra**	7
	1	(a) GeoGebra interface and basic construction tools (b) Drawing points, lines, angles, triangles, and polygons (c) Constructing perpendiculars, bisectors, circles (d) Geometric transformations (translation, reflection, rotation) (e) Locus exploration and angle chasing	
II		**Algebra, Functions and Graphing**	7
	1	(a) Entering equations and manipulating variables (b) Graphs of linear, quadratic, exponential, and trigonometric functions (c) Using sliders to vary coefficients (d) Data entry, scatter plots, and regression models (e) Dynamic tables and linked equations	

III	**Calculus and Measurement**		**8**
	1	(a) Understanding limits visually (b) Graphing and interpreting derivatives (c) Tangents, secants, and slope fields (d) Definite integrals and area under curves (e) Riemann sum approximation	

IV	**Applications and 3D Visualization**		8
	1	(a) Introduction to 3D Graphics View in GeoGebra (b) Building 3D objects: cube, cylinder, cone, and sphere (c) Exploring real-life mathematical modeling: finance, motion, optimization (d) Using parametric equations for paths and simulations (e) Interactive math applets for concept demonstrations	

	Teacher specific module	**30**
	Directions for Practicals	
V	**1:** Construct a triangle and reflect it across one of its sides. Color code both triangles and display angle measures. **2:** Create a perpendicular bisector of a segment using compass and straightedge tools. Verify its property by checking distances from any point on it to endpoints. **3:** Explore triangle centers: construct the centroid, orthocenter, and circumcenter. Show how these change with vertex dragging **4:**Plot $f(x) = ax^2 + bx + c$ and explore how a, b, and c affect shape and position using sliders. **5:** Input population data into a table and create a scatter plot. Fit a best-fit exponential model. **6:** Explore the function $f(x) = \sin(kx)$ and see the wavelength change dynamically with slider k. **7:** Plot $f(x) = \sin x$, graph its derivative, and draw tangent lines at key points using GeoGebra's tools. **8:** Shade the area under $f(x) = x^2$ from $x = 0$ to $x = 4$ using the integral feature. **9:** Show left, right, and midpoint Riemann sums for $f(x) = \sqrt{x}$ and compare with definite integral **10:** Create a compound interest model using $A = P(1 + r)^t$ with sliders for P, r, and t. **11:** Model a projectile motion path with parametric equations. Ani- mate the projectile over time. **12:** Create a 3D solid of revolution using a profile curve and rotate around an axis. Adjust input function and limits interactively	√_

Suggested Readings

1. Markus Hohenwarter et al., *GeoGebra Manual and Resources*, GeoGebra.org
2. Judith and Gary Kinsey, *Mathematics in Action Using GeoGebra*, Pearson

Assessment Rubrics

Evaluation Type	Marks
End Semester Evaluation (ESE)	**50 (35 T + 15 P)**
Continuous Evaluation (CCA)	**25 (15 T + 10P)**
Theory (CCA)	**15**
(a) Test paper*	8
(b) Assignment	4
(c) Seminar/Viva-voce	3
Practical (CCA)	**10**
(a) Skill	6
(b) Record	4
Total	**75**

* A student has to appear for at least two written tests. Average mark of best two tests is to be considered for internal mark.