23SH1104-DIFFERENTIAL EQUATIONS & VECTOR CALCULUS

(Common to all branches**)**

Course Category:	Engineering Science	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practical:**	3-0-0
Pre -requisite:	Intermediate Mathematics	**Sessional Evaluation:**	30
		External Evaluation:	70
		Total Marks:	100

Course Objectives	To make the student learn about	
	1. To enlighten the learners in the concept of differential equations and multivariable calculus. 2. To furnish the learners with basic concepts and techniques at plus two levelto lead them into advanced level by handling various real-world applications	
Course Outcomes	After completing the course the student will be able to	
	CO1	Solve the differential equations related to various engineering fields.
	CO2	Identify solution methods for partial differential equations that model physical processes
	CO3	Interpret the physical meaning of different operators such as gradient, curl and divergence.
	CO4	Estimate the work done against a field, circulation and flux using vector calculus.

Course Content

UNIT - I

Differential equations of first order and first degree: Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits.

UNIT - II

Linear differential equations of higher order (Constant Coefficients): Homogeneous Definitions, homogenous and non-homogenous, complementary function, general solution, particular integral, Wronskean, method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion.

UNIT - III

Partial Differential Equations: Introduction and formation of Partial Differential

	Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients. **UNIT - IV** **Vector differentiation:** Scalar and vector point functions, vector operator del, del applies to scalar point functions- Gradient, del applied to vector point functions-Divergence and Curl, vector identities. **UNIT - V** **Vector integration:** Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.
Textbooks & Reference Books	**TEXT BOOKS:** 1.Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2018. 2. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017. **REFERENCE BOOKS:** 1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett,2018. 2. Micheael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson edn 3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 14/e, Pearson Publishers, 2018. 4. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 5/e, Alpha Science International Ltd., 2021 (9th reprint). 5. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education, 2017

Contribution of Course Outcomes towards achievement of Program Outcomes (3-High, 2-Medium, 1-Low)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	-	-	3	3	-	-
CO2	3	3	2	-	-	-	-	-	-	-	3	2	-	-
CO3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
CO4	3	3	3	-	-	-	-	-	-	-	2	2	-	-