Unit	Content	Specific objective	List of Tutorial Activity	Marks and question format	Content Coverage of question
Unit I: Limit Continuity and Derivatives(5hrs) **Total hours: 8 hours** (5+ hours Lecture + 3 hours Tutorial)	1.1 Introduction 1.2 Limit, continuity and differentiability 1.3 Higher order derivatives by Leibniz method.	Explain the importance of limit and continuity in differential problems and use Leibnitz theorem to evaluate higher derivatives.	1.1 Problems on Limit and continuity (1 hr) 1.2 Show that differentiability implies continuity but the converse may not be true (1hr) 1.3 Evaluation of higher order derivatives by Leibnitz method (1 hr)	8 Marks Question Number 1 (with two sub-questions: a)	1(a)- From 1.3
Unit II: Applications of Derivatives (8hrs) **Total hours: 16 hours (8 hours Lectures + 8 hours Tutorial)**	2.1 Mean value theorems: Rolle's theorem, Lagrange's Theorem (Geometrical interpretation and verification) and applications 2.2 Higher order mean value theorem: Taylor's Series, Maclaurin's Series expansion of function. 2.3 Asymptotes to Cartesian curves up to four degrees. 2.4 Curve tracing in Cartesian form and parametric form 2.5 Curvature	Apply derivatives in mean value theorem, series expansion, asymptotes and trace curve for the given function. .	2.1 Problems in Mean value theorems: Rolle's theorem, Lagrange's Theorem (1 hr) 2.2 Expand the functions through Taylor's Series, and Maclaurin's Series (2 hrs) 2.3 Evaluation of Asymptotes to Cartesian curves. (2 hrs) 2.4 Trace Curve for the equations in Cartesian form and parametric form (2 hrs) 2.5 Problems in Curvature (1 hr)	22(Marks) = (7+7+8) Number 1 (with two sub-questions: b) Question Number 2 (with two sub-questions: a, b)	1(b)- from 2.1 Compulsory (OR question) from 2.2 2(a)- from 2.3 2(b)- from 2.5
Unit III: Integral Calculus (6hrs) **Total hours: 10 hours** (6 hours Lecture +	3.1 Introduction 3.2 Review on Indefinite Integral and fundamental theorem of integral calculus. 3.3 Definite integral and its properties 3.4 Improper Integrals; comparison test.	Evaluate Proper and improper integrals.	3.1 Evaluation of Indefinite Integrals, Definite integrals, Improper Integrals; (2 hrs) 3.2 Deduce Reduction formula, and solve	15 Marks = [5+5+5] Question Number 3 (with four, sub-questions: a, b, c, d)	Any three from four 3(a) from3.2 3(b) from 3.3 3(c) from 3.4 3(d) from 3.5

4 hours Tutorial)	3.5 Reduction formula, Beta Gamma functions		problems related to Beta Gamma functions(2hrs)		
Unit IV: Application of Integral(6hrs) **Total hours: 9 hours** (6 hours Lectures + 3 hours Tutorial)	4.1 Application of integrals for finding area beneath a curve and between two curves and arc length 4.2 Surface and volume of solid of revolution in the plane for Cartesian and parametric curves.	Evaluate arc length, area, and volume through integration.	4.1 Evaluation of area, arc length, Surface and volume of solid of revolution in the plane for Cartesian and parametric curves. (3 hrs)	8 Marks Question Number 4 (with two sub-questions: a)	4(a)- from 4.2
Unit V: Partial Differentiation **Total hours: 5 hours** (3 hours Lectures + 2 hours Tutorial)	5.1 Introduction 5.2 Partial Derivatives 5.3 Homogeneous function and Euler's theorem for the function of two and three variables 5.4 Total Derivatives and Differentiation of Implicit functions.	Understand and compute partial derivatives with the concept of total differentials.	5.1 Prove Euler's theorem for the function of two and three variables (1 hr) 5.2Calculate total derivatives and differentiation of Implicit functions (1 hr)	7 Marks Question Number 4 (with two sub-questions: b)	4(b)from 5.2, 5.3 and 5.4
Unit VI: Application of Partial Differentiation (4hrs) **Total hours: 6 hours** (4 hours Lectures + 2 hours Tutorial)	6.1 Extrema of functions of two and three variables. 6.2 Lagrange's method of undetermined Multipliers (up to 2 multipliers	Define extreme value and compute its value for two and three variables through partial derivatives..	6.1Evaluation of Extrema of functions of two and three variables and Lagrange's method of undetermined Multipliers (up to 2 multipliers) (2 hrs) .	7 Marks Question Number 5 (with two sub-questions: a)	5(a) from 6.1 and 6.2
Unit VII: First Order Ordinary Differential Equations(6hrs) **Total hours: 9 hours**	7.1 Review of separable, homogeneous and exact differential equation with engineering applications 7.2 Linear, Bernoulli equation and Riccati's equation with engineering application.	Able to solve first order differential equations.	7.1 Solution of separable, homogeneous and exact differential equation Linear, Bernoulli equation and Riccati's equation with engineering applications (2hrs)	8 Marks Question Number 5 (with two sub-questions: b)	5(b) from7.2 Compulsory (OR question) from 7.3

(6 hours Lectures + 3 hours Tutorial)	7.3 Mathematical modeling of engineering problems using first order equation.		7.2 Mathematical modeling of engineering problems using first order equation. (1 hr)		
Unit VIII: Second Order Ordinary Differential Equations (7 hrs) **Total hours: 12 hours** (7 hours Lectures + 5 hours Tutorial)	8.1 Second order Homogeneous ODE with constant and variable coefficients, Euler-Cauchy equation. 8.2 Existence and uniqueness of solutions, Wronskian and general solutions for solving ODE. 8.3 Non-homogeneous second order ODE and Solution by undetermined coefficients and variation of parameters and engineering application	Solve the second order differential equations in relation to engineering problems.	8.1 Solve second order homogeneous ODE with constant and variable coefficients, Euler-Cauchy equation. (1hr) 8.2 Solve non-homogeneous second order ODE by undetermined coefficients and variation of parameters in engineering application	15=7+8 Question Number 6 (with two sub-questions: a, b)	6(a) from 8.1 6(b) from 8.3
				10=4*(2.5) Question Number 7 (With four sub-question: a, b, c, d)	From sections not covered in long questions with no repetition in the concepts.