Course No: NA	**Course Name:** Applied Mathematics III						**Course Code:** BMAS 0109
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**J**	**Credits**	**Contact Hrs. Per Week: 4**
2023-2027	B. Tech. (CSE- AIML) II Year And B. Tech. (CSE - Hons.) II year	III/IV	4	0	0	0	4	**Total Hours: 40**

Total Evaluation Marks: 100 **Mid Term:** 30 Marks **End Term:** 50 Marks **Internal Assessment**: 20 Marks	**Examination Duration:** Mid Term (2 hours), End Term (3 hours) **Pre-requisite of course:** NIL

Course Objective	To make the students understand the concepts of calculus and ordinary differential equations by giving more emphasis to their applications in modelling and problem solving.
Course Outcomes	After studying these topics, the students will be able to: **CO1:** Understand partial differentiation and its applications **CO2**: Expand a real valued function of several variables in Taylor's series **CO3:** Calculate Jacobian and know its applications **CO4:** Use Lagrange's method of multipliers in determining the extrema of functions **CO5:** Evaluate double and triple integrals and study their applications **CO6:** Apply numerical integration to solve definite integrals **CO7:** Find the gradient of a scalar field and divergence, curl of a vector field **CO8:** Know various integral theorems related to line, surface and volume integrals **CO9:** Solve ordinary differential equations of first and higher orders **CO10:** Numerically solve the initial value problems using Runge-Kutta IV order method

COURSE SYLLABUS

Module No.	Content	Hours
I	**[Course Outcome(s) No.: 1, 2, 3, 4, 5 and 6]** **Differential Calculus:** Introduction, Calculation of higher order derivatives, Partial Derivatives and its Interpretation in multiple dimensions, Euler's theorem, Composite functions, Total derivatives, Expansion of function of several variables by Taylor's series, Jacobian and its applications, Extrema of functions of several variables, Lagrange's method of multipliers. **Integral Calculus:** Beta and Gamma functions, Double and Triple Integrals in Cartesian and polar coordinate systems, Errors and their analysis, types of error, Numerical integration by Trapezoidal and Simpson's rules (without proofs).	20
II	**[Course Outcome(s) No.: 7, 8, 9 and 10]** **Vector Calculus:** Scalar and vector point functions, Gradient, divergence, curl and their applications, Line, surface and volume Integrals, Green's, Gauss' divergence and Stokes' theorems. **Ordinary Differential Equations:** Introduction, Linear differential equation of first order, Exact and reducible to exact differential equations, Linear differential equation of n^{th} order with constant coefficients, Complementary function and particular integral, Simultaneous differential equations, Numerical solution of first order initial value problems by Runge-Kutta IV order method. Applications of calculus and ordinary differential equations in modelling and problem solving.	20

Text Books:

- Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2011.
- M. K. Jain, S. R. K. Iyengar and R. K. Jain, Advanced Engineering Mathematics, Narosa Publishing House, New Delhi, 2002.
- W. E. Boyce and R. D. Prima, Elementary Differential Equations, John Wiley & Sons, 2009.
- B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 2014.
- S. S. Sastry, Introductory Methods of Numerical Analysis, PHI, 2012.

Reference Books:

- T. M. Apostol, Calculus, Volume I, John Wiley & Sons, Inc., USA, 1967.
- T. M. Apostol, Calculus, Volume II, Xerox Corporation, USA, 1969.
- G. B. Thomas and R. Finney, Calculus and Analytic geometry, Addison Wesley, USA, 1995.