**FIRST SEMESTER MTS1 C01:MATHEMATICS­1**

**4 hours/week 3 Credits 75 Marks[Int.15 + Ext. 60]**

**Text (1) Calculus I (2/e) : Jerrold Marsden & Alan Weinstein Springer­Verlag New York Inc(1985) ISBN 0­387­90974­5**

**Text (2) Calculus II (2/e) : Jerrold Marsden & Alan Weinstein Springer­Verlag New York Inc(1985) ISBN 0­387­90975­3**

**Module I 14 hrs** 1.1: Introduction to the derivative­instantaneous velocity, slope of tangent line, differentiating simplest functions 1.2: Limits­ Notion of limit, basic properties, derived properties, continuity, continuity of rational functions, one sided limit, limit involving ±∞ 1.3: The derivative as Limit­ formal definition, examples, differentiability and continuity, Leibnitz notation, 1.4: Differentiating Polynomials­power rule, sum rule etc., 1.5: Product and quotients­ product, quotient, reciprocal & integral power rule 1.6: Linear Approximation and Tangent Lines­ equation of tangent line and linear approximation,

**Module II 13 hrs** 2.1: Rate of change and Second derivative­ linear or proportional change, rates of change, second derivative, 2.2: The Chain Rule­ power of a function rule, chain rule, 2.3: Fractional Power & Implicit Differentiation­rational power of a function rule, implicit differentiation 2.4: Related rates and parametric curves­ Related rates, parametric curves, word problems involving related rates 2.5: Anti derivatives­ anti differentiation and indefinite integrals, anti differentiation rules

**Module III 18 hrs** 3.1: Continuity and Intermediate value theorem­IVT: first and second version 3.2: Increasing and decreasing function­ Increasing and decreasing test, critical point test, first derivative test 3.3: Second derivative and concavity­ second derivative test for local maxima , minima and concavity , inflection points 3.4: Drawing of Graphs­ graphing procedure, asymptotic behaviour 3.5: Maximum­ Minimum Problems­ maximum and minimum values on intervals, extreme value theorem, closed interval test, word problems 3.6: The Mean Value Theorem­ The MVT, consequences of MVT­Rolles Theorem, horserace theorem 11.2: L’Hospital rule­ Preliminary version, strengthened version

**Module IV 19 hrs** 4.1: Summation­ summation, distance and velocity, properties of summation, telescoping sum (quick introduction­ relevant ideas only ) 4.2: Sums and Areas­step functions, area under graph and its counterpart in distance­velocity problem 4.3: The definition of Integral­ signed area (The counterpart of signed area for our distance­velocity problem), The integral, Riemann sums 4.4: The Fundamental Theorem of Calculus­Arriving at FTC intuitively using distance velocity problem, Fundamental integration Method, proof of FTC, Area under graph, displacements and velocity 4.5: Definite and Indefinite integral­indefinite integral test, properties of definite integral, fundamental theorem of calculus: alternative version (interpretation and explanation in terms of areas) 4.6: Applications of the Integral­ Area between graphs, area between intersecting graphs, total changes from rates of change, 9.1: Volume by slice method­ the slice method, volume of solid of revolution by Disk method 9.3: Average Values and the Mean Value Theorem for Integrals­ motivation and definition of average value, illustration, geometric and physical interpretation, the Mean Value Theorem for Integrals

**References:**

1 Soo T Tan: Calculus Brooks/Cole, Cengage Learning(2010 )ISBN 0­534­ 46579­X

2 Gilbert Strang: Calculus Wellesley Cambridge Press(1991)ISBN:0­9614088­ 2­0 3 Ron Larson. Bruce Edwards: Calculus(11/e) Cengage Learning(2018) ISBN: 978­1­337­27534­7 4 Robert A Adams & Christopher Essex : Calculus Single Variable (8/e) Pearson Education Canada (2013) ISBN: 0321877403 5 Joel Hass, Christopher Heil & Maurice D. Weir : Thomas’ Calculus(14/e) Pearson (2018) ISBN 0134438981 6 Jon Rogawski & Colin Adams : Calculus Early Transcendentals (3/e) W