(MT-114) - Calculus

Course Outline:

1. **Set and Functions:**
    1. Define rational, irrational and real numbers;
    2. Rounding off a numerical value to specified value to specified number of decimal places or significant figures;
    3. Solving quadratic, and rational inequalities in involving modulus with graphical representation;
    4. Definition of set, set operations, Venn diagrams, DeMorgan's laws, Cartesian product, Relation, Function and their types (Absolute value, greatest integer and combining functions).
    5. Graph of some well-known functions.
    6. Limit of functions and continuous and discontinuous functions with graphical representation.
2. **Differential Calculus:**
    1. Differentiation and Successive differentiation and its application: Leibnitz theorem.
    2. Taylor and Maclaurin theorems with remainders in Cauchy and Lagrange form, power series.
    3. Taylor and Maclaurin series, L Hopitals rule, extreme values of a function of one variable using first and second derivative test.
    4. Asymptotes of a function.
    5. Curvature and radius of curvature of a curve.
    6. Partial differentiation.
    7. Exact differential and its application in computing errors.
    8. Extreme values of a function of two variables with and without constraints.
    9. Solution of non-linear equation, using Newton Raphson method.
3. **Integral Calculus**
    1. Indefinite integrals and their computational techniques.
    2. Reduction formulae.
    3. Definite integrals and their convergence.
    4. Beta and Gamma functions and their identities.
    5. Applications of integration.
    6. Centre of pressure and depth of centre of pressure.
4. **Sequence & Series:**
    1. Sequence.
    2. Infinite Series.
    3. Application of convergence tests such as comparison, Root, Ratio, Raabe's and Gauss tests on the behavior of series.
5. **Complex Number:**
    1. Argand diagram.
    2. De Moivre formula.
    3. Root of polynomial equations, curve and regions in the complex plane.
    4. Standard functions and their inverses (exponential, circular and Hyperbolic functions).

Suggested Teaching Methodology:

- Lecturing
- Written Assignments Report Writing ## **Suggested Assessment:** ### **Theory (100%)**
- Sessional (20%)
- Quiz (12%)
- Assignment (8%)
- Midterm (30%)
- Final Term (50%)

Recommended Text and Reference Books:

1. Advanced Engineering Mathematics, by Erwin Kreyszig, 8th Edition
2. Calculus & Analytical Geometry, Howard Anton. Fifth Edition.
3. Calculus, Thomas & Finney, 1994
4. Calculus And Analytical Geometry, Schaum's Series
