MATHEMATICS (MAC01) 1ST SEMESTER SYLLABUS

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| Course Code | Title of the course | | Program Core (PCR) / Electives  (PEL) | Total Number of contact hours | | | | Credit |
| Lecture (L) | Tutorial (T) | Practical (P) | Total  Hours |
| **MAC 01** | **Mathematics - I** | | PCR | 2 | 1 | 0 | 3 | 3 |
| Pre-requisites | | | Course Assessment methods (Continuous (CT) and end assessment (EA)) | | | | | |
| Basic concepts of function, limit, differentiation and integration. | | | CT+EA | | | | | |
| Course Outcomes | | * CO1: Fundamentals of Differential Calculus * CO2: Fundamentals of Integral Calculus * CO3: Fundamentals of Vector Calculus * CO4: Basic Concepts of Convergence | | | | | | |
| Topics Covered | | **Functions of Single Variable:** Rolle’s Theorem and Lagrange’s Mean  Value Theorem (MVT), Cauchy's MVT, Taylor’s and Maclaurin’s series, Asymptotes & Curvature (Cartesian, Polar form). (8)  **Functions of several variables:** Function of two variables, Limit, Continuity and Differentiability, Partial derivatives, Partial derivatives of implicit function, Homogeneous function, Euler’s theorem and its converse, Exact differential, Jacobian, Taylor's & Maclaurin's series, Maxima and Minima, Necessary and sufficient condition for maxima and minima (no proof), Stationary points, Lagrange’s method of multipliers. (10)  **Sequences and Series:** Sequences, Limit of a Sequence and its properties, Series of positive terms, Necessary condition for convergence, Comparison test, D Alembert’s ratio test, Cauchy’s root test, Alternating series, Leibnitz’s rule, Absolute and conditional convergence. (6)  **Integral Calculus:** Mean value theorems of integral calculus, Improper integral and it classifications, Beta and Gamma functions, Area and length in Cartesian and polar co-ordinates, Volume and surface area of solids of revolution in Cartesian and polar forms, (12)  **Multiple Integrals:** Double integrals, Evaluation of double integrals, Evaluation of triple integrals, Change of order of integration, Change of variables, Area and volume by double integration, Volume as a triple integral. (10)  **Vector Calculus:** Vector valued functions and its differentiability, Line integral, Surface integral, Volume integral, Gradient, Curl, Divergence, Green’s theorem in the plane (including vector form), Stokes’ theorem, Gauss’s divergence theorem and their applications. (10) | | | | | | |
| Text Books, and/or reference material | | **Text Books:**   1. E. Kreyszig, Advanced Engineering Mathematics: 10 th edition, Wiley India Edition. 2. Daniel A. Murray, Differential and Integral Calculus, Fb & c Limited,2018. 3. Marsden, J. E; Tromba, A. J.; Weinstein: Basic Multivariable Calculus, Springer, 2013.   **Reference Books:**   1. Tom Apostal, Calculus-Vol-I & II, Wiley Student Edition, 2011. 2. Thomas and Finny: Calculus and Analytic Geometry, 11 th Edition, Addison Wesley. | | | | | | |