Name of the Teacher: Binny Gindra

Class: M.Sc. Mathematics (3rd Semester), MM-505 (Opt. (i)Integral Equations )

**Lesson Plan**

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| **S No** | **Period** | **Topics to be Covered** | **Academic Activity to be Organized** |
|  | **17-31 July 2017** | Definition of Integral Equations and their classifications. Eigen values and Eigen functions. Special kinds of Kernel Convolution Integral. The inner or scalar product of two functions | **Oral Presentations** |
|  | **01-31 Aug 2017** | Reduction to a system of algebraic equations. Fredholm alternative, Fredholm theorem, Fredholm alternative theorem, An approximate method. Method of successive approximations, Iterative scheme for Fredholm and Volterrra Integral equations of the second kind. Conditions of uniform convergence and uniqueness of series solution. Some results about the resolvent Kernel. | **Oral Presentations** |
|  | **01-30 Sept 2017** | Application of iterative scheme to Volterra integral equations of the second kind. Classical Fredholm’s theory, the method of solution of Fredholm equation, Fredholm’s First theorem, Fredholm’s second theorem, Fredhom’s third theorem | **Group Discussion** |
|  | **01-31 Oct 2017** | Symmetric Kernels, Introduction, Complex Hilbert space. An orthonormal system of functions, Riesz-Fisher theorem, A complete two-Dimensional orthonormal set over the rectangle a . , d tcbs ≤ ≤≤≤ Fundamental properties of Eigenvalues and Eigenfunctions for symmetric Kernels. Expansion in eigen functions and Bilinear form. Hilbert-Schmidt theorem and some immediate consequences. Definite Kernels and Mercer’s theorem. Solution of a symmetric Integral Equation. Approximation of a general 2  -Kernel(Not necessarily symmetric) by a separable Kernel. The operator method in the theory of integral equations. Rayleigh-Ritz method for finding the first eigenvalue., | **Group Discussion** |
|  | **01-13 Nov 2017** | (Two Questions) The Abel Intergral Equation. Inversion formula for singular integral equation with Kernel of the type h(s)-h(t), 0<α<1, Cauchy’s principal value for integrals solution of the Cauchy-type singular integral equation, closed contour, unclosed contours and the Riemann-Hilbert problem. The Hilbert-Kernel, solution of the Hilbert-Type singular Intergal equation.. |  |

**Topics of Assignments/ Class Tests to be given to the Students:**

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| **Assignment 1** | Reduction to a system of algebraic equations. Fredholm alternative, Fredholm theorem, Fredholm alternative theorem. |
| **Assignment 2** | Symmetric Kernels, Introduction, Complex Hilbert space. |
| **Class Test** | Method of successive approximations, Iterative scheme for Fredholm and Volterrra Integral equations of the second kind. Conditions of uniform convergence and uniqueness of series solution. Some results about the resolvent Kernel. |