

CURRICULAM PLAN OF Ms. VARSHA

FOR EVEN SEMESTER 2020-21

B.Sc(HONS.)PHYSICS(IIND YEAR)

PAPER- MATHEMATICAL PHYSICS-III(32221401)

CONTENT	ALLOCATION OF LECTURES	Month wise SCHEDULE FOLLOWED	Tutorial/assignment/presentation etc
Complex Analysis: Brief Revision of Complex Numbers and their Graphical Representation. Euler's formula, De Moivre's theorem, Roots of Complex Numbers. Functions of Complex Variables. Analyticity and Cauchy-Riemann Conditions. Examples of analytic functions. Singular functions: poles and branch points, order of singularity, branch cuts. Integration of a function of a complex variable.	(16 Lectures)	1-31 JAN	Syllabus Overview Reference books Problem solving Derivations and Numericals
Cauchy's Inequality. Cauchy's Integral formula. Simply and multiply connected region. Laurent and Taylor's expansion. Residues and Residue Theorem. Application in solving Definite Integrals. Fourier Transforms: Fourier Integral theorem. Fourier Transform.	(16 Lectures)	1 st -28 th FEB	Derivations and Numericals Class test on unit end Discussion of Important questions Home Register Checking

Examples. Fourier transform of trigonometric, Gaussian, finite wave train and other functions. Representation of Dirac delta function as a Fourier Integral			
Fourier transform of derivatives, Inverse Fourier transform, Convolution theorem. Properties of Fourier transforms (translation, change of scale, complex conjugation, etc.). One dimensional Wave Equations, Dirac delta function, definition and properties. (15 Lectures) Laplace Transforms: Laplace Transform (LT) of Elementary functions. Properties of LTs: Change of Scale Theorem, Shifting Theorem.	(12 lectures)	March	Class Test Revision Session Assignment given for IA Home exam paper discussion
. LTs of 1st and 2nd order Derivatives and Integrals of Functions, Derivatives and Integrals of LTs. LT of Unit Step function, Dirac Delta function, Periodic Functions. Convolution Theorem. Inverse LT. Application of Laplace Transforms to 2nd order Differential	16 lectures	1 st -27 th APRIL	Discussion of last year papers and clarification of doubts Revision of Syllabus Home register Checking

Equations: Coupled differential equations of 1st order. Solution of heat flow along semi infinite bar using Laplace transform. Dirac delta function: Definition and properties. Representation of Dirac delta function as a Fourier Integral. Laplace and Fourier Transform of Dirac delta function.			
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References for Theory:

Essential Readings:

1. Mathematical Methods for Physics and Engineers, K.F Riley, M.P. Hobson and S. J. Bence, 3rd ed., 2006, Cambridge University Press
2. Complex Variables and Applications, J.W.Brown& R.V.Churchill, 7th Ed. 2003, Tata McGraw-Hill.
3. Laplace Transform: Schaum's Outline, M.R> Spiegel, McGraw HillEducation.
4. Complex Variables: Schaum's Outline, McGraw Hill Education (2009).
5. Fourier Analysis and Its Applications (Wadsworth and Brooks/Cole Mathematics Series), Gerald B. Folland, Thomson Brooks/Cole (1992).

Additional Readings:

1. Mathematics for Physicists, P.Dennery and A.Krzywicki, 1967, Dover Publications.
2. Complex Variables, A.S.Fokas & M.J.Ablowitz, 8th Ed., 2011, Cambridge Univ. Press.
3. Mathematical Physics with Applications, Problems and Solutions, V. Balakrishnan, Ane Books (2017).
4. Fourier Analysis with Applications to Boundary Value Problems: : Schaum Outline Series, M. R Spiegel, McGraw Hill Education (1974).
5. Fourier Transform and its Applications, 2nd Ed., Ronald New Bold Bracewell, McGraw Hill (1978).