

INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI
PROFORMA FOR NEW COURSE

1.	Title of the Course	Mathematical Methods for Basic Sciences II
2.	Course Number	ID6101
3.	Status of the Course	Elective
4.	Structure of Credits	3 – 0 – 0 – 3
5.	Offered to	PG
6.	New Course/ Modification to	New
7.	To be offered by	Prof. P. C. Deshmukh
8.	To take effect from	July 2018
9.	Prerequisite	CoT (Consent of Teacher)
10.	Whether approved by the Program	Yes
11.	Course Objective: To provide a few advanced mathematical techniques to post-graduate/PhD students in Physics and Chemistry.	
12.	<p>Course Content:</p> <p>Integral transforms: Laplace transforms and Fourier transforms. Applications in Spectroscopy and Quantum Mechanics.</p> <p>Complex functions. Cauchy-Riemann conditions. Power series. Cauchy's integral theorem. Conformal mapping. Singularities: poles, essential singularities. Residue theorem. Contour integration and examples. Analytic continuation. Multiple-valued functions, branch points and branch cut integration. Coulomb functions. Applications of the Lambert W function to solve problems in quantum mechanics.</p> <p>Probability theory. Probability distributions and probability densities. Standard discrete and continuous probability distributions. Moments and generating functions. Central Limit Theorem.</p> <p>Group theory: Elements of group theory. Molecular Point Groups. Proof of the Great Orthogonality Theorem. Character Tables. Continuous groups. Rotation groups. SO(3), SU(2) and SO(4).</p>	
13.	<p>Text Book:</p> <ol style="list-style-type: none"> 1. G. Arfken and H. J. Weber, <i>Mathematical Methods for Physicists</i>, 7th Edition, Academic Press, Indian Edition (2012). 2. M. Boas, <i>Mathematical Methods in Physical Sciences</i>, 3rd Edition, John Wiley, International Edition (2006). 3. K. F. Riley, M. P. Hobson, <i>Foundation Mathematics for the Physical Sciences</i>, Cambridge University Press (2011). 	
14.	<p>References:</p> <ol style="list-style-type: none"> 1. M. Tinkham, <i>Group Theory and Quantum Mechanics</i>, Dover (2003). 	