SARDAR PATEL UNIVERSITY
Programme & Subject: M.Sc (Defence Science)
Semester: I
Syllabus with Effect from: June - 2014

Paper Code: PT01CDSC04	Total Credit: 4
Title Of Paper: Mathematical & Statistical Tools for Applied Science - I	

Unit	Description in Detail	Weightage (%)
I	A Calculus refresher- functions and their derivatives – derivative as rate of change – Higher Order Derivatives - Maxima and Minima – Integration - Partial Derivatives – Taylor series - Gradient, Divergence and Curl - Hessian- Maxima and Minima. Vectors in R^n and matrices- algebra of matrices- inverse of a matrix- determinant and trace- eigen values and eigen vectors- projections and orthogonal matrices.	25%
II	Ordinary differential equations- linear equations of first and second order – systems of linear differential equations- stability of solutions of linear systems of ODE- Legendre, Hermite and Bessel equations and polynomials. Partial differential equations of science and method of reparation of variables-Applications.	25%
III	Numerical Analysis- Newton Method for implicit equation $f(x) = 0$ – Eular's method and Rumge-Kutta method for ordinary differential equations – Methods of Elementary Error Analysis. Collection and classification of data- frequency table- graphical representations of data- measures of central tendancy: mean, median, mode- measures of dispersion: variance standard deviation, coefficient of variation.	25%
IV	Random Variables- probability- joint, marginal and conditional probability – discrete and continuous random variables – probability distribution functions- Expectation and Moments – Binomial, Poisson and Normal distributions- a compendium of some other distribution functions. Testing of hypotheses – goodness of fit tests- chi-square test- tests of significance- one sample tests for mean- z test and t-test – two sample tests for means and variance.	25%

Basic Text & Reference Books:-

> Introduction to Geochemical Modelling,Francis Albarede, , Cambridge University Press (Relevant Materials from Chapters : 1-4) 1995.
> Higher Engineering Mathematics (37th Edition), B. S. Gerwal, , Khanna Publishers
> Pisani and Purves – Statistics,Freedman, W.W. Norton & Co., 2011.