

<b>Annexure No.</b>	<b>18 DA</b>
<b>SCAA Dated</b>	<b>29.02.2008</b>

**BHARATHIAR UNIVERSITY :: COIMBATORE – 641 046**  
**Allied Mathematics for SDE Candidates**  
**(For B. Sc - Physics major - 2007 – 2008 Batch and onwards)**

**Subject Description**

This course presents a study on theory of equations, matrices, trigonometry, Laplace transform and Fourier series.

**Goals:** To enable the students the basic concepts of theory of equations, matrices, solving differential equations using Laplace transform and Fourier series

**Objectives:** On completion of this course the students should gain knowledge about solving equations, solving first and second order differential equations using Laplace transforms, Fourier series which will be useful in their field of study.

**Unit I: Theory of Equations:**

Polynomial Equations with real coefficients irrational roots, complex roots - symmetric function of roots – Transformation of equations by increasing or decreasing roots by a constant – Reciprocal Equations - Newton’s method to find a root approximately.

**Unit II: Trigonometry, Laplace Transforms, Applications of Laplace transforms and Fourier Series:**

Expansion in Series – Expansion of  $\cos^n \theta$ ,  $\sin^n \theta$ , in a series of cosines and sines of multiples of  $\theta$  – Expansions of  $\cos n\theta$  and  $\sin n\theta$  in powers of sines and cosines - hyperbolic functions and inverse hyperbolic functions.

Definition – Laplace Transform of Standard functions – Linearity property – First shifting theorem – Transform of  $tf(t)$ ,  $f(t) / t$  and derivatives – Inverse Laplace transforms of standard functions.

Applications of Laplace transforms of differential equations of first and second order – Fourier series of functions in  $(0, 2\pi)$ .

**Unit III : Calculus**

Curvature – Radius of curvature – center of curvature – circle of curvature – Evaluation of double integrals - change of order of integration in double integrals- Application of double integral to find the area between curves.

Evaluation of triple integrals – Beta and Gamma functions – relations between them – Evaluation of multiple integrals using Beta and Gamma functions.

**Unit VI:**

Solving second order linear differential equations with constant coefficients whose R.H.S is of the form  $ve^{mx}$ , where  $v$  is any function of  $x$  - Linear equations with variable coefficients.

**Unit V:**

Formation of partial differential equations by elimination of arbitrary constants and functions - Definitions of general, particular and complete solutions - solving standard forms  $f(p, q) = 0$ ,  $f(x, p, q) = 0$ ,  $f(y, p, q) = 0$ ,  $f(z, p, q) = 0$ ,  $f(x, p) = f(y, q)$ ,  $z = px + qy + f(p, q)$  - Lagrange’s Differential equations  $Pp + Qq = R$ .

**Treatment as in**

Kandasamy. P, Thilagavathi. K “Allied Mathematics”, Volume I and II, S.Chand and Company Ltd, New Delhi, 2004.

**References:**

1. T.K. Manichavasagam Pillai and S.Narayanan, Trigonometry - Viswanathan Publishers and Printers Pvt. Ltd.
2. S. Narayan and T.K. Manicavachagam Pillay “Ancillary Mathematics”, Viswanathan Publishers and Printers Pvt. Ltd.