

**ALLIED MATHEMATICS PAPERS FOR OTHER BRANCHES OF B.Sc. DEGREE COURSES (For B. Sc Physics, Physics with Computer Application, Chemistry, Bio-Chemistry, Electronic Science, Geophysics and Computer Science, Bachelor of Computer Application (BCA) Major only)**

**SYLLABUS**

**Semester I - Allied Paper –I - Mathematics -I**

**(Effective from the Academic Year 2020-2021)**

**Learning outcomes:**

**Students gain knowledge about basic concepts of Algebra, Theory of Equations, Matrices, Trigonometry and Calculus.**

**.Unit 1**

Algebra And Numerical Methods:

Algebra: Summation of series - simple problems.

Numerical Methods: Operators  $E, \Delta, \nabla$ , difference tables- Newton-Raphson method- Newton's forward and backward interpolation formulae for equal intervals, Lagrange's interpolation formula.

Chapter 2, Section 2.1.3, 2.2, 2.2.1, 2.3, 2.3.3

Chapter 3, Section 3.4.1 and Chapter 5, Section 5.1 and 5.2.

**Unit 2**

Matrices: Symmetric, Skew-Symmetric, Orthogonal, Hermetian, Skew-Hermetian and Unitary matrices. Eigen values and Eigen-vectors, Cayley-Hamilton theorem (without proof) – verification- Computation of inverse of matrix using Cayley - Hamilton theorem.

Chapter 4, Section 4.1.1 to 4.1.6, 4.5, 4.5.2, 4.5.3.

**Unit 3**

Theory Of Equations: Polynomial equations with real coefficients, irrational roots, complex roots, symmetric functions of roots, transformation of equation by increasing or decreasing roots by a constant, reciprocal equation-simple problems.

Chapter 3, Section 3.1 to 3.4.1(omit section 3.2.1)

**Unit 4**

Trigonometry: Expansions of  $\sin(n\theta)$  and  $\cos(n\theta)$  in a series of powers of  $\sin\theta$  and  $\cos\theta$  - Expansions of  $\sin^n\theta$ ,  $\cos^n\theta$ ,  $\tan^n\theta$  in a series of sines, cosines and tangents of multiples of " $\theta$ " - Expansions of  $\sin\theta$ ,  $\cos\theta$  and  $\tan\theta$  in a series of powers of " $\theta$ " – Hyperbolic and inverse hyperbolic functions .

Chapter 6, Section 6.1 to 6.3.

## **Unit 5**

Differential Calculus: Successive differentiation,  $n^{\text{th}}$  derivatives, Leibnitz theorem (without proof) and applications, Jacobians, Curvature and radius of curvature in Cartesian co-ordinates, maxima and minima of functions of two variables- Simple problems

Chapter 1, Section 1.1 to 1.3.1 and 1.4.3.

### **Content and treatment as in**

Allied Mathematics, Volume I and II, by P. Duraipandian and S. Udayabaskaran, S. Chand Publications

### **Reference:-**

1. S. Narayanan and T.K. Manickavasagam Pillai – Ancillary Mathematics, S. Viswanathan Printers, 1986, Chennai.
2. Allied Mathematics by Dr. A. Singaravelu, Meenakshi Agency.

### **e-Resources:**

1. <http://www.themathpage.com>
2. <http://nptel.ac.in>

## Semester II - Allied Paper – II - Mathematics -II

### Learning outcomes:

Students gain knowledge about basic concepts of Differential Equations, Laplace Transforms, Vector Analysis and Calculus.

#### Unit 1

Integral Calculus: Bernoulli's formula – Reduction formulae-  $\int_0^{\pi/2} \sin^n x dx$ ,  $\int_0^{\pi/2} \cos^n x dx$ ,  $\int_0^{\pi/2} \sin^m x \cos^n x dx$  (m, n being positive integers), Fourier series for functions in  $(0, 2\pi)$ ,  $(-\pi, \pi)$ .  
Chapter 2: Section 2.7 & 2.9, Chapter 4: Section 4.1.

#### Unit 2

Differential Equations:

Ordinary Differential Equations: second order non-homogeneous differential equations with constant coefficients of the form  $ay'' + by' + cy = X$  where  $X$  is of the form  $e^{\alpha x} \cos \beta x$  and  $e^{\alpha x} \sin \beta x$  -Related problems only.

Partial Differential Equations: Formation, complete integrals and general integrals, four standard types and solving Lagrange's linear equation  $Pp + Qq = R$ .

Chapter 5: Section 5.2.1, Chapter 6: Section 6.1 to 6.4

#### Unit 3:

Laplace Transforms: Laplace transformations of standard functions and simple properties, inverse Laplace transforms, Application to solution of linear differential equations up to second order-simple problems.

Chapter 7: Section 7.1.1 to 7.1.4 & 7.2 to 7.3

#### Unit 4:

Vector Differentiation: Introduction, Scalar point functions, Vector point functions, Vector differential operator Gradient, Divergence, Curl, Solenoidal, irrotational, identities.

Chapter 8, Section 8.1 to 8.4.4

#### Unit 5:

Vector Integration: Line, surface and volume integrals, Gauss, Stoke's and Green's theorems (without proofs). Simple problems on these.

Chapter 8, Section 8.5 to 8.6.3.

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Allied Mathematics, Volume I and II, P. Duraipandian and S. Udayabaskaran, S. Chand Publications.

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