

## **PHAR 114 Mathematics**

**[60 hours]**

### **Unit-1: Differentiation (16 hrs)**

Limits of functions, indeterminate forms, theorem on limits of algebraic, trigonometric, exponential & logarithmic functions; continuity of a function; graphs of discontinuity function; definition of differential coefficient, differentiation of standard functions, including function of a function (Chain rule). Differentiation of implicit functions, logarithmic differentiation, parametric differentiation, successive differentiation.

### **Unit-2: Integration (10 hrs)**

Integration as inverse of differentiation, indefinite integrals of standard forms, integration by parts, substitution and partial fractions, formal evaluation of definite integrals.

### **Unit-3: Calculus (8 hrs)**

Notation of limit and continuity of a function, derivatives of composite, implicit, parametric, inverse circular, hyperbolic functions, logarithmic differentiation, derivative of a function with reference to another function, application of differentiation, partial differentiation, computation of the first and second order partial derivatives.

### **Unit-4: Differential equations (16 hrs)**

Revision of integral calculus, definition and formation of differential equations, equations of first order and first degree, variable separable, homogeneous and linear differential equations and equations reducible to such types, linear differential equations of order greater than one with constant coefficients, applications of differential equations, complementary function and particular integral, simultaneous linear differential equations, pharmaceutical applications.

### **Unit-5: Laplace transforms (10 hrs)**

Definition, transforms of elementary functions, properties of linearity and shifting, inverse Laplace transforms, transforms of derivatives, solution of ordinary and simultaneous differential equations. (12 hrs)

### **Books Recommended**

1. A Textbook of Mathematics for XI-XII Students, NCERT Publications, Vol. I-IV
2. Grewal B S, Higher Engineering Mathematics, Khanna Publishers, New Delhi.
3. Schaum, Differential Equations, McGraw-Hill Singapore
4. Prasad Gorakh Text book on differential calculus, Pothishala Pvt. Ltd., Allahabad.
5. Narayan Shanti, Differential calculus, Shyam Lal Charitable Trust, New Delhi.
6. Prasad Gorakh Text book on integral calculus, Pothishala Pvt. Ltd., Allahabad.