# SECOND YEAR 3<sup>rd</sup> SEMESTER PROPOSED SYLLABUS

Mathematics - III Code: BS-M 301 Contacts: 2L+1T Credits: 3 Total: 45

#### **Course Content:**

#### **Module I**

**Basic Probability:** Probability spaces, conditional probability, independence; Bayes theorem. Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Chebyshev's Inequality.

[8L]

#### Module II

**Continuous Probability Distributions:** Continuous random variables and their properties, distribution functions and densities, normal, exponential and gamma densities.

[4L]

### Module III

# **Laplace Transformation:** Definition and existence of LT, LT of elementary functions, First and second shifting properties, Change of scale property; LT of $\frac{f(t)}{t}$ , LT of $t^n f(t)$ , LT of derivatives

of f(t), L.T. of  $\int f(u)du$ . Evaluation of improper integrals using LT, Inverse LT: Definition and its properties; Convolution Theorem (statement only) and its application to the evaluation of inverse LT. [9L]

#### **Module IV**

**Fourier Transformation:** Fourier Transform of a function, Fourier Sine and Cosine Integral Theorem (statement only), Fourier Cosine & Sine Transforms. Fourier Cosine & Sine Transforms of elementary functions. Properties of Fourier Transform: Linearity, Shifting, Change of scale, Modulation, Examples. Fourier Transform of Derivatives, Examples. Convolution Theorem (statement only), Inverse of Fourier Transform, Solution of integration by inverse Fourier transform. Examples.

#### Module V

Approximation in numerical computation and Interpolation: Truncation and rounding errors, Fixed and floating-point arithmetic. Calculus of finite differences, Newton forward/backward interpolation, Lagrange's and Newton's divided difference Interpolation. [7L]

#### Module VI

**Numerical integration and Numerical solution of equations:** Trapezoidal rule, Simpson's 1/3 rule for Integration. Bisection method, Newton-Raphson method and Regular Falsi method algebric and transcendental equation. Euler's method, Runge-Kutta methods for ordinary differential equation.

[9L]

## Note: For each module minimum two case studies

**Text Books:** 

[8L]

- 1. AP Baisnab and Jas M-Elements of Probability and Statistics.
- 2. R. J. Beerends -Fourier and Laplace Transforms.
- 3. S. Ali Mollah-Numerical Analysis and Computational Procedures.
- 4. Balagurusamy-Numerical Methods.
- 5. C.Xavier: C Language and Numerical Methods.

## **Reference Books:**

- 1. D. C. Sanyal, K. Das: A Text Book of Numerical Analysis.
- 2. Dr. S.K. Sarkar & Dr. D.N. Ghosh: Numerical Methods and Programming.
- 3. HK Dass-Advanced Engineering Mathematics