

Diamond Harbour Women's University  
Department of Mathematics  
Syllabus  
Paper 305 (Pure Mathematics)  
**SEMESTER SYSTEM COURSE STRUCTURE**  
**(CHOICE BASED CREDITSYSTEM)**  
**3<sup>rd</sup> Semester PG**

**305 is based on the choices of the students of Other Department(s)**

**1. Algebra:**

**25**

Group theory; properties of group, symmetry group, cyclic group, quotient group, group homomorphism and isomorphism, Cauchy's Theorem, Sylow's Theorems.

Ring theory; properties of ring, ideal, quotient ring, ring homomorphism, integral domain, Euclidean domain, Unique Factorization domain, polynomial ring and field, Few applications of Group and Ring.

Permutations and combinations; Binomial coefficients and Pascal's Triangle. Basic counting principle, The Pigeonhole Principle and its applications.

**2. Real Analysis:**

**25**

Real number system and its structure, infimum, supremum, Dedekind cuts. Sequences and series of real numbers, subsequences, monotone sequences, limit inferior, limit superior, convergence of sequences and series, Cauchy criterion, root and ratio tests for the convergence of series, absolute and conditional convergence.

Functions of several variables, directional derivative, partial derivative, total derivative, Jacobian, chain rule and mean value theorems, higher derivatives, interchange of the order of differentiation, Taylor's theorem, extremum problems.

Metric spaces, open sets, closed sets, limit points, convergence, completeness, spaces of continuous functions.

Diamond Harbour Women's University  
Department of Mathematics  
Syllabus  
Paper 306 (Applied Mathematics)

**SEMESTER SYSTEM COURSE STRUCTURE  
(CHOICE BASED CREDITS SYSTEM)**

**3<sup>rd</sup> Semester PG**

**306 is based on the choices of the students of Other Department(s)**

**1. Numerical Analysis & Partial Differential Equation:** 15  
Lagrange's and Newton's interpolation. Bisection, Newton-Raphson methods. Linear equations: Gauss elimination method, Gauss-Seidal method. Integration by trapezoidal and Simpson 1/3 methods. Solution of ordinary differential equation by Euler's method, Runge-Kutta methods. Solution of partial differential equation: Finite Element Method.

**2. Classification of second order partial differential equations. Solution of three Fundamental equations: Laplace, Wave and Diffusion Equation. Solution of Neumann and Dirichlet problems, Green's function.** 10

**3. Fluid Mechanics** 25

**Kinematics (equation of Continuity):** Lagrangian and Eulerian Method, Stream Line, Boundary Surface, Equation of Continuity and its applications.

**Equations of Motion:** Equation of Motion, Pressure Equation, Bernoulli's Equation, Kelvin's circulation Theorem, equation of energy, d'Alembert's paradox.

**Two-dimensional Motion:** Sources, Sinks and Doublets, Complex potential, Blasius Theorem.

**Waves:** wave motion, Stationary waves and progressive waves, Energy of waves, Waves at the common surface of two liquid, Group velocities, Applications.

**Vortex Motion:** Properties of vortex filaments, Image of vortex w.r.t. plane and circular cylinder, Kirchhoff vortex theorem, Karman's vortex sheet.