***KARIM CITY COLLEGE***

***DEPARTMENT OF PHYSICS***

**GIST OF THE PORTIONS OF THE SYLLABUS COVERED BY**

**PROF. MD. ZAFFIRUL HAQUE.**

**SEMESTER - 1**

**SESSION :- 2017 – 2018**

**Calculus**:

1. Taylor and binomial series. First Order Differential Equations and Integrating Factor.
2. Second Order Differential equations: Homogeneous Equations with constant coefficients.

 Wronskian and general solution.

1. Statement of existence and Uniqueness Theorem for Initial Value Problems. Particular Integral for typical source terms like polynomials, exponential, sine, cosine etc and their combinations.
2. Calculus of multivariable functions: Partial derivatives, exact and inexact differentials.

 Integrating factor, with simple illustration. Constrained Maximization using Lagrange

 Multipliers.

**Vector Calculus**:

1. Recapitulation of vectors: Properties of vectors under rotations. Scalar product and its

 invariance under rotations. Vector product, Scalar triple product and their geometrical

 interpretation. Scalar and Vector fields.

1. Gradient of a scalar field and its geometrical interpretation. Divergence and curl of a vector field. Del and Laplacian operators. Vector identities.
2. Vector Integration: Line, surface and volume integrals of Vector fields. Flux of a vector field.
3. Gauss' divergence theorem, Green's and Stokes Theorems and their applications . Dirac Delta function and its properties.

**Orthogonal Curvilinear Coordinates:**

1. Orthogonal Curvilinear Coordinates. Expression for Gradient, Divergence, Curl and

 Laplacian in orthogonal curvilinear co-ordinates.

1. Derivation of Gradient, Divergence, Curl and Laplacian in Cartesian, Spherical and Cylindrical Coordinate Systems.