### **MATHEMATICAL TOPICS**

#### 1. Advanced Calculus

Infinite sequences and series. Differential of functions of one variable Improper Integrals Integral calculus and field calculus Double and Triple Integrals, Applications in Volume and Surface Area Calculations

#### 2. Algebra

*Linear and nonlinear systems ODE and PDE* 

#### 3. Complex Analysis and Transforms

Fourier Series Fourier Transform Laplace Transform

### 4. Statistics and Probability

*Basic Definitions and Concepts* (Population, Sample, Parameter, and Statistic; Random Experiments, Outcomes, and Events) *Probability Rules* (Sample Space and Events, Conditional Probability and Independence) *Random Variables and Probability Distributions* 

## **IT CURRICULUM - Fundamentals and Software Development**

- Computer Programming and Programming Languages I and II (C/C++) Basic Data Structures and Control Flow Functions and Operators and Memory Management Structures and Classes
   Object Operators (Language)
- 2. Object-Oriented Programming (Java)
- 3. Algorithms and Data Structures (C/C++) Sorting and Searching Algorithms Linear and Non-Linear Data Structures Graph Algorithms
- 4. Databases (SQL MySQL) SQL Language Query Optimization Regular Expressions in SQL
  5. Software for A dwared Calculus (MATL AB, Mathematica, or Butha)

5.Software for Advanced Calculus (MATLAB, Mathematica, or Python)

# PHYSICS

# 1. Electricity and Magnetism

A. Electric Charges and Fields, Gauss's Law, Electric Potential, Direct current circuits (resistance, Ohm and Kirchhoff's laws, etc)

B. Magnetic Forces and Fields, Biot-Savart law, Ampere's Law, Electromagnetic Induction-Faraday's law,

C. Alternating-Current Circuits

D. Applications

## 2. Electromagnetic Waves

- A. Maxwell's equations
- B. Plane electromagnetic waves
- C. Poynting vector. Energy
- D. Electromagnetic spectrum

#### 3. Optics

- A. Nature of light
- B. Interference and diffraction
- C Reflection, Refraction, and Dispersion