

## **BMS-06 APPLIED COMPUTATIONAL METHODS**

**Course category** : Basic Sciences & Maths (BSM)

**Pre-requisite** : NIL

### **Subject**

**Contact hours/week** : Lecture: 3, Tutorial: 1, Practical: 2

**Number of Credits** : 5

**Course Assessment methods** : Continuous assessment through tutorials, attendance, home assignments, quizzes and One Minor tests and One Major Theory & Practical Examination

**Course Outcomes** : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. To find the root of a curve using Bisection, Regula falsi Newton's Method.
2. Use of moments and kurtosis to find the type of curve.
3. To interpolate a curve using Gauss, Newton's interpolation formula.
4. To find the derivative of a curve.
5. To find the area of a curve.

### **Topics Covered**

#### **UNIT-I**

9

**Numerical Methods:** Solution of algebraic and Transcendental equations, Bisection method, Method of False position (Regula-Falsi method) and Newton-Raphson method, Solution of linear simultaneous equations; Guass-Siedel method, Crout's method.

#### **UNIT-II**

9

**Interpolation and Numerical Integration:** Interpolation: Finite Differences, Difference operators, Newton's forward and backward interpolation formulae, Lagrange's formula for unequal intervals, Newton's divided difference formula for unequal intervals. Numerical Integration: Trapezoidal Rule, Simpson's one-third and three-eighth rules.

#### **UNIT-III**

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**Numerical Solution of Ordinary Differential Equations and Difference Equations:** Picard's method, Taylor's Series method, Euler's method, Modified Euler's method, Runge-Kutta method of order four. Difference equations and their solutions. Rules for finding the particular integral.

#### **UNIT-IV**

9

**Statistical Methods and Probability Distributions:** Frequency Distributions, mean, mode, median, standard deviation, Moments, Skewness, Kurtosis, Types and measurement of Skewness and Kurtosis. Correlation; Regression and regression lines. Binomial Distribution, Poisson's Distribution, Normal Distribution.

### **Experiments**

1. To implement Regula-Falsi method to find root of algebraic equation.
2. To implement Newton-Raphson method to find root of algebraic equation.
3. To implement Newton's Divided Difference formula to find value of a function at a point.
4. To implement Numerical Integration by using Simpson's one-third rule.
5. To implement numerical solution by using Runge-Kutta method of order four to find solution of differential equation.
6. To implement numerical solution of differential equation by Picard's method.
7. To implement numerical solution of differential equation by using Euler's method.
8. To estimate regression equation from sampled data and evaluate values of standard deviation, regression coefficient.

### **Books & References**

1. B.S. Grewal: Higher Engineering Mathematics; Khanna Publishers.
2. B.V. Ramana: Higher Engineering Mathematics, Tata Mc. Graw Hill Education Pvt. Ltd., New Delhi.
3. H.K. Dass and Rama Verma: Engineering Mathematics; S. Chand Publications.
4. N.P. Bali and Manish Goel: Engineering Mathematics; Laxmi Publications.



**OFFICE OF**  
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**The detail of the course 'Applied Computational Methods', offered for**  
**B.Tech. (CSE) 2<sup>nd</sup> year in the session 2016-17**

**Course Name:** APPLIED COMPUTATIONAL METHODS

**Course Code:** BAS-24/ BMS-06

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