ME3T1   **NUMERICAL AND STATISTICAL METHODS**   **Credits: 3**

Lecture: 3 periods/week   **Internal assessment: 30 marks**
Tutorial: 1 period/week   **Semester End Examination: 70 marks**

Course Objectives:
- Students learn to find approximate root of algebraic and transcendental equations and get familiarity with interpolation. They get good exposure to numerical solution of Ordinary differential equation. Interpret ideas of random variables, population, sample ,sampling distributions. Demonstrate skills in test of hypothesis concerning mean, proportions, difference of means and proportions.

COURSE Outcomes: At the end of the course student will be able to

1. Find approximate root of algebraic and transcendental equations and apply different interpolating methods to calculate value of interpolating polynomial at given point.
2. Solve ordinary differential equations with given initial condition by Taylor's , Picard, Euler's, R.K methods.
3. Demonstrate basic principles of probability, and sample space, Baye's theorem, random variables and their distributions.
4. Comprehend the concept of population and sampling and able to determine mean, variance of sampling distribution of means. Also calculate point and interval estimations of means, proportions.
5. Analyze null hypothesis of parameters corresponding to mean, proportion for large and small samples.

UNIT - I :
SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS:
Introduction – Bisection method – Method of false position – Iteration method – Newton-Raphson's method
INTERPOLATION:
Introduction- Errors in polynomial interpolation – finite differences- forward differences-backward differences – central differences – Symbolic relations -Differences of a polynomial - Newton's formulae for interpolation – Interpolation with unevenly spaced points - Lagrange's Interpolation formula.

UNIT - II :
NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS:
Solution by Taylor's series method - Picard's Method of successive approximations - Euler's Method - Runge-Kutta Methods – Predictor - Corrector Methods - Milne Thompsons's method.

UNIT - III :
PROBABILITY:
Binomial sample space and events- probability – the axioms of probability- some elementary theorems- conditional probability- Baye's theorem.
RANDOM VARIABLES :
Discrete and continuous distributions – Distribution function.
DISTRIBUTIONS: Binomial, Poisson, Normal distribution – related properties.

UNIT - IV :
POPULATION AND SAMPLES:
Sampling distribution of mean with known and unknown variance, proportion, variances, Sampling distribution of sums and differences.
Estimation : Point and interval estimators for means, variances, proportions.

UNIT - V:
STATISTICAL HYPOTHESIS:
Errors of Type I and Type II errors. one tail, two-tail tests.Testing hypothesis concerning means, proportions and their differences using Z-test, t- test.

Learning Resources

Text Books:

1. A Textbook on Mathematical Methods - Himalaya Publishing House- V. Ravindranath, P. Vijayalaxmi- 1st Revised Edition: 2011.
2. Higher Engineering Mathematics – Khanna Publishers – B.S. Grewal – 42nd Edition: 2012, June.

3. Engineering Mathematics (Volume – II) - S. Chand - T. K. V. Iyengar, B. Krishna Gandhi, S. Ranganatham, M.V.S.S.N. Prasad- 9th Revised Edition: 2012.

4. A Text Book of Probability & Statistics –Lakshmi publications- P.Tirupati Rao

Reference Books:

1. Advanced Engineering Mathematics – Wiley – Erwin Kreyszig- 8th Edition:2006

2. A Text Book of Engineering Mathematics – Tata McGraw Hill - B. V. Ramana- 3rd Edition: 2008.