

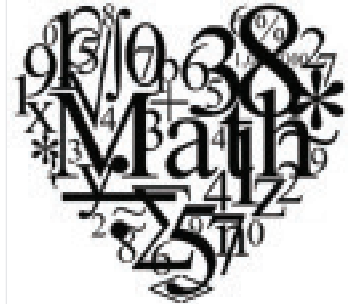
# 21HS109 ENGINEERING MATHEMATICS - II (C) CALCULUS AND NUMERICAL METHODS

Hours Per Week :

L	T	P	C
3	1	-	4

Total Hours :

L	T	P
45	15	-



[https://www.google.co.in/search?q=mathematics+pictures&source=Inms&tbn=isch&sa=X&ved=0ahUKEwiQ-837lvXiAhVPVH0KHe56CVEQ\\_AUIECgB#imgrc=zv9lvSgX1Sl6fM](https://www.google.co.in/search?q=mathematics+pictures&source=Inms&tbn=isch&sa=X&ved=0ahUKEwiQ-837lvXiAhVPVH0KHe56CVEQ_AUIECgB#imgrc=zv9lvSgX1Sl6fM)

## COURSE DESCRIPTION AND OBJECTIVES:

To provide students with solid foundation in Mathematical fundamentals such as numerical methods, interpolation, partial differentiation, vector differentiation, Fourier series required for different branches of engineering.

## COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes
1	Apply various numerical methods to the solve integrals and find the roots of a given equation.
2	Apply the concept of interpolation for interpreting data to estimate the value of function.
3	Apply the concepts of partial differentiation in engineering problems.
4	Apply the concepts of gradient, divergence and curl to a given function.
5	Apply the concept of Fourier series to expand various functions.

## SKILLS:

- ✓ Compute maxima and minima of a given function of two variables.
- ✓ Compute integration by appropriate numerical method.
- ✓ Determine the fourier and half range fourier series of a given function.

**ACTIVITIES:**

- o Interpret interpolation techniques to estimate the functional values.
- o Compute normal to the surface, angle between the surfaces and directional derivative
- o Write the fourier series of a given function.

**UNIT – I****L–9, T-3**

**NUMERICAL METHODS – I** : Numerical Integration: Trapezoidal rule, Simpson's 1/3 rule, Simpsons 3/8 rule; Solutions of algebraic and transcendental equations : Introduction, Bisection method, Iteration method, Newton-Raphson method.

**UNIT – II****L–9, T-3**

**INTERPOLATION** : Introduction, Finite differences, Forward differences, Backward differences, Newton's formulae for interpolation, Gauss forward and backward interpolation formulae; Interpolation with unevenly spaced points, Lagrange's interpolation formula.

**UNIT – III****L–9, T-3**

**PARTIAL DIFFERENTIATION AND APPLICATIONS**: Partial derivatives, Partial derivatives of higher order, Homogeneous function, Euler's theorem, Total differential coefficient.

Maxima and Minima of a function of two variables, Conditions for extreme values, Lagrange method of undetermined multipliers.

Jacobians - definition, properties, Jacobian of implicit functions.

**UNIT – IV****L–9, T-3**

**VECTOR DIFFERENTIATION**: Review of Vector Algebra (Not for testing); Vector Function, Differentiation, Scalar and Vector point functions, Gradient, Normal, Directional Derivate, Divergence, Curl, Vector identities.

**UNIT – V****L–9, T-3**

**FOURIER SERIES**: Periodic Functions, Fourier series, Dirichlet's conditions, Fourier series for discontinuous functions, Fourier series for function defined in two or more sub-ranges, Fourier series for even and odd functions, Half-range series, Change of interval and functions having arbitrary period.

**TEXT BOOKS:**

1. H. K. Dass and Er. Rajanish Verma, "Higher Engineering Mathematics", 3<sup>rd</sup> edition, S. Chand & Co., 2015.
2. B. S. Grewal, "Higher Engineering Mathematics", 44<sup>th</sup> edition, Khanna Publishers, 2018.

**REFERENCE BOOKS:**

1. John Bird, "Higher Engineering Mathematics", Routledge (Taylor & Francis Group), 2018.
2. Srimanta Pal and Subodh C. Bhunia, "Engineering Mathematics", Oxford Publications, 2015.
3. B. V. Ramana, "Advanced Engineering Mathematics", TMH Publishers, 2008.
4. N. P. Bali and K. L. Sai Prasad, "A Textbook of Engineering Mathematics I, II, III", Universal Science Press, 2018.
5. T. K.V. Iyengar et al., "Engineering Mathematics, I, II, III", S. Chand & Co., 2018.