APPLIED MATHEMATICS FOR MECHANICAL ENGINEERING –El 1
Semester I (Production Engineering)   SUB CODE: MEPR106-A
Teaching Scheme (Credits and Hours)

Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
					Hrs	Marks	Marks	Marks	Marks	
Hrs	Hrs	Hrs	Hrs							
3	0	0	3	3	3	70	30	20	00	120

LEARNING OBJECTIVES:
The objective of this course is
- To learn various concepts of advanced mathematics
- To have practical purview of various special casting techniques.

LESSON PLANNING

SR.NO	CHAPTER NO	DATE/WEEK	%WEIGTAGE
1	1	1st 2nd 3rd	20
2	2	4th 5th 6th	20
3	3	7th 8th 9th	20
4	4	10th 11th 12th	20
5	5	13th 14th 15th	20

Total hours (Theory): 45, Total hours (Practical):00, Total hours: 45

DETAILED SYLLABUS

Chap. No.	Topic
1	**FOURIER TRANSFORMS** Fourier Transforms, Complex, Sine and Cosine Transforms, Finite Fourier Transforms. Applications – One dimensional heat conduction problem, Laplace Equation, Poison Equation.
2	**CALCULUS OF VARIATIONS** Variation and its properties – Euler's equation – Functional dependent on first and higher order derivatives – Functional dependent on functions of several independent variables – Some applications – Direct methods – Ritz and Kantorovich methods.
3	**CONFORMAL MAPPING AND APPLICATIONS** The Schwarz – Christoffel transformation – Transformation of boundaries in parametric form – Physical applications – Application to fluid flow – Application to heat flow.
4	**SOLUTIONS OF LINEAR SYSTEMS OF EQUATIONS** Matrix transformations – Direct methods – Gaussian Elimination method, Gauss Jordan method, Factorization method. Iterative methods – Jacobi, Gauss Seidel and SOR methods.
5	**NUMERICAL SOLUTION OF PDE** Solution of Laplace's and Poission equation on a rectangular region by Liebmann's method – Diffusion equation by the explicit and Crank Nicholson – Implicit methods – Stability and Convergence criterion – Solution of wave equation by explicit scheme.

INSTRUCTIONAL METHOD AND PEDAGOGY (Continuous Internal Assessment (CIA) Scheme)
- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all units while conducting teaching & examination.
- Attendance is compulsory in lectures and Tutorial.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- One internal exam of 30 marks is conducted as a part of Mid semester evaluation.

STUDENTS LEARNING OUTCOMES:

At the end of the course

- The students will gain an experience in the implementation of mathematics in solving engineering problems.

REFERENCES

1. Sneddon,I.N., "Elements of partial differential equations", McGraw-Hill ,1986.
2. Spiegel, M.R., "Theory and problems of complex variables with an introduction to conformal mapping and its applications", Schaum's outline series, McGraw-Hill Book Co., 1987.
3. Sankara Rao, K., "Introduction to partial differential equations", Prentice–Hall of India, 1995.
4. Elsgolts, L., "Differential equation and calculus of variations", Mir Publishers, 1996.
5. Carnanan. B., Luther. H.A., and Wilkes, J.O., "Applied Numerical Methods", Wiley and Sons, 1976.