

# Applied Mathematics-I

<b>Class: F. E. (All Branches)</b>	<b>Semester: I</b>
Periods per week:	Evaluation System:
Lectures : 04	Theory paper(3 hours) : 100 marks
Tutorials : 01	Term work : 25 marks
	Total : 125 marks

Detailed Syllabus		Lectures/Week
1.1	<b>Module 1</b> <b>Complex numbers.</b> 1.1.1 Review of complex numbers. Cartesian, Polar and Exponential form of a complex number. 1.1.2 De Moivre's Theorem (without proof). Powers and roots of Exponential and Trigonometric functions. 1.1.3 Circular and Hyperbolic functions.	02 03 02
1.2	<b>Module 2</b> <b>Complex numbers and Successive differentiation.</b> 1.2.1 Inverse circular and Inverse Hyperbolic Functions. Logarithmic functions 1.2.2 Separation of real and imaginary parts of all types of functions. 1.2.3 Successive differentiation-nth derivative of standard functions- $e^{ax}$ , $(ax+b)^{-1}$ , $(ax+b)^m$ , $(ax+b)^{-m}$ , $\log(ax+b)$ , $\sin(ax+b)$ , $\cos(ax+b)$ , $e^{ax} \sin(bx+c)$ , $e^{ax} \cos(bx+c)$ . 1.2.4 Leibnitz's theorem (without proof) and problems.	03 02 01 02
1.3	<b>Module 3</b> <b>Partial differentiation</b> 1.3.1 Partial derivatives of first and higher order, total differential coefficients, total differentials, differentiation of composite and implicit functions. 1.3.2 Euler's theorem on Homogeneous function with two and three independent Variables (with proof), deductions from Euler's theorem.	
1.4	<b>Module 4</b> <b>Application of partial differentiation, Mean value theorems</b> 1.4.1 Errors and approximations, Maxima and Minima of a function of two independent variables. Lagrange's method of undetermined multipliers with one constraint. 1.4.2 Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem (all theorems without proof). Geometrical interpretation and problems	05 03

1.5	<p><b>Module 5</b> <b>Vector algebra &amp; Vector calculus</b></p> <p><b>1.3.1</b> Vector triple product and product of four vectors.</p> <p>1.3.2 Differentiation of a vector function of a single scalar variable. Theorems on derivatives (without proof). Curves in space concept of a tangent vector (without problems)</p> <p>1.3.3 Scalar point function and vector point function. Vector differential operator del. Gradient, Divergence and curl – definitions, Properties and problems. Applications- Normal, Directional derivatives, Solenoidal and Irrotational fields.</p>	03  03
1.6	<p><b>Module 6</b> <b>Infinite series, Expansion of functions and Indeterminate forms.</b></p> <p>1.6.1 Infinite series-Idea of convergence and divergence. D’Alembert’s ratio test, Cauchy’s root test.</p> <p>1.6.2 Taylor’s theorem (without proof). Taylor’s series and Maclaurin’s series (without proof), Expansion of standard series such as <math>e^x</math>, <math>\sin x, \cos x, \tan x, \sinh x, \cosh x, \tanh x, \log(1+x), \sin^{-1}x, \tan^{-1}x</math>, Binomial series, Expansion of functions in power series.</p> <p>1.6.3 Indeterminate forms - <math>\frac{0}{0}, \frac{\infty}{\infty}, 0 \times \infty, \infty - \infty, 0^0, \infty^0, 1^\infty</math>. L’ Hospital’s rule- problems involving series also.</p>	02  04  02
	<p><b>Recommended Books:</b></p> <ul style="list-style-type: none"> <li>• Higher Engineering Mathematics, Dr. B. S. Grewal, Khanna Publications.</li> <li>• A textbook of Applied Mathematics, P.N. and J. N. Wartikar, Volume 1 and 2, Pune Vidyarthi Griha.</li> <li>• Advanced Engineering Mathematics, Erwin Kreyszing, Wiley Eastern Limited, 8<sup>th</sup> Ed.</li> <li>• Engineering Mathematics I, G.V.Kumbhojkar, C.Jamnadas&amp;Co</li> <li>• Engineering Mathematics, T.Verraajan, Tata McGraw Hill</li> </ul>	

**Term Work**

**Marks**

1. Tutorials-Assignments covering the entire portion(5-6 problems)
2. Term work test

15

10  
25