

## UNIVERSITY OF PETROLEUM &amp; ENERGY STUDIES, DEHRADUN

<b>Program</b>	<b>B.Tech (All SoCS Branches)</b>	<b>Semester</b>	<b>I</b>
<b>Course</b>	<b>Engineering Mathematics</b>	<b>Course Code</b>	<b>MATH 1036</b>

<b>Unit I: Matrices (5L)</b>		<b>References</b>
<b>Session 1-2:</b>	Linear independence/dependence of vectors, Rank of a matrix: Row echelon form, normal form	T1: 7.4, T2: 3.3.2
<b>Session 3:</b>	Consistency of system of linear equations and its solution	T1: 7.4, T2: 3.3.2 and T2: 3.4.3
<b>Session 4-5:</b>	Eigen values and Eigen vectors, Cayley-Hamilton theorem and its application to find power of matrix.	T1: 8.1, T2: 3.5, T2: 3.4.4, T2: 3.5.1 and T2: 3.4.5
<b>Unit II: Differential and Integral Calculus (12L)</b>		
<b>Session 6-8:</b>	Higher order derivatives, successive differentiation, Leibnitz's theorem.	T3: 2.1, 2.2
<b>Session 9-11:</b>	Introduction to partial differentiation, Euler's theorem, Jacobians, Maxima and minima.	T3: 3.2,3.7,3.8, 4.2, T2: 2.5
<b>Session 12-14:</b>	Double integrals, Change of order of integration	T3: 7.1, 7.3, T2: 2.6.1
<b>Session 15-17:</b>	Change of variables, Triple integrals, Applications of double and triple integrals (area, volume).	T3: 7.5, 7.6, T2: 2.6.3, T2: 2.6.2
<b>Unit III: Differential Equations (9L)</b>		
<b>Session 18-20:</b>	Linear differential equations with constant coefficients.	T3:9.3
<b>Session 21-22:</b>	Cauchy-Euler differential equation, Legendre linear differential equation.	T1:2.6, T3:9.6
<b>Session 23-24:</b>	Solution of second order differential equations when a part of complementary function is known, Solution of second order differential equations by reduction to normal form.	T3: 9.8

## UNIVERSITY OF PETROLEUM &amp; ENERGY STUDIES, DEHRADUN

<b>Program</b>	<b>B.Tech (All SoCS Branches)</b>	<b>Semester</b>	<b>I</b>
<b>Course</b>	<b>Engineering Mathematics</b>	<b>Course Code</b>	<b>MATH 1036</b>

<b>Session 25-26:</b>	Solution of second order differential equations by changing the independent variable, Solution of second order differential equation by variation of parameters.	T1:2.10, T3: 9.7
<b>Unit IV: Probability Distributions (5L)</b>		
<b>Session 27-38:</b>	Discrete and continuous random variables, Probability mass and probability density functions,	T1:22.5, T3:27.1
<b>Session 29-31:</b>	Probability distribution: Mean, Variance and Standard Deviation, Binomial distribution, Poisson distribution, Normal distribution.	T1:22.7, 22.8, T3: 27.4, 27.6
<b>Unit V: Numerical Methods (14L)</b>		
<b>Session 32-34:</b>	Bisection method, Regula Falsi method, Secant Method and Newton-Raphson method,	T3:32.2, 32.4
<b>Session 35-36:</b>	Gauss Elimination method, Gauss-Jacobi and Gauss-Seidel methods,	T1:18.1,
<b>Session 37-39:</b>	Finite difference operators, difference tables, Newton forward and backward interpolation formula, Newton divided difference method,	T1:17.3, T3:32.3,32.10
<b>Session 40-42:</b>	Numerical differentiation, Newton-Cotes integral formula, Trapezoidal rule, Simpson's 1/3 and Simpson's 3/8 Rules,	T1:17.5
<b>Session 43-45:</b>	Picard's method, Taylor's Series method, Euler's method and Modified Euler's method, Runge-Kutta fourth order method.	T1:19.1, T3:33.2

**Text Books:**

- T1. E. Kreyszig, Advanced Engineering Mathematics, Wiley Publications. ISBN: 9788126531356.  
 T2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, Narosa Publications. ISBN: 9788184875607.  
 T3. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill. ISBN: 9780071070089.  
 T4. S. C. Chapra and R. P. Canale, Numerical methods for engineers, Mc Graw Hill Education. ISBN: 9780073397924.