LOK JAGRUTI UNIVERSITY (LJU)

INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Artificial Intelligence and Data Science (705)

Bachelor of Engineering (B.E.) – Semester – I

Course Code:	**117051191**
Course Name:	**Mathematics - I**
Category of Course:	Basic Science Course (BSC)
Prerequisite Course:	---

Teaching Scheme				
Lecture (L)	**Tutorial (T)**	**Practical (P)**	**Credit**	**Total Hours**
4	**2**	**0**	**6**	**60**

Syllabus

Unit No.	Topic	Prerequisite Topic	Successive Topic	Teaching Hours
01	**Basic Algebra**			**2 (2%)**
	1.1 Indices	---	---	
	1.2 Surds	---	---	
	1.3 Expansions and factorization	---	---	
	1.4 Logarithm and Exponential Function with its Application	---	---	
02	**Trigonometry and Geometry**			**2 (3%)**
	2.1 Angles	---	---	
	2.2 Trigonometric functions of sum and difference of two angles	---	---	
	2.3 Law of sines and cosines	---	---	
03	**Basic Differentiation**			**3 (4%)**
	3.1 Basic differentiation by formulae	---	---	
	3.2 Product and quotient rule	---	---	
	3.3 Chain rule and composite function	---	---	
	3.4 Roll's theorem	Basic differentiation (017051191-Unit-3)	---	
	3.5 Lagrange's theorem	Basic differentiation (017051191-Unit-3)	---	
	3.6 Cauchy's mean value theorem	First and higher order partial derivatives (017051191-Unit-3)	---	
	3.7 Indeterminate forms and L'Hospital's rule	---	---	
04	**Partial Derivatives**			**6 (9%)**
	4.1 Functions of several variables	---	---	
	4.2 Geometric interpretation of partial derivatives	---	---	
	4.3 Limits and continuity of function of several variables	Basic differentiation (017051191-Unit-3)	---	
	4.4 First and higher order partial derivatives	---	---	
	4.5 Euler's theorem and modified Euler's theorem	Basic differentiation (017051191-Unit-3)	---	
	4.6 Total derivatives and chain rule	First and higher order partial derivatives (017051191-Unit-3)	---	
	4.7 Implicit function	---	---	
05	**Application of Partial Derivatives**			**4 (7%)**
	5.1 Tangent plane and normal line	First order partial derivatives(017051191-Unit-3)	---	
	5.2 Total differentiation and approximation		---	
	5.3 Extreme values	First and higher order partial derivatives(017051191-Unit-3)	---	
	5.4 Method of Lagrange multipliers.	---	---	
	5.5 Jacobian	First order partial derivatives(017051191-Unit-3)	---	
06	**Multiple Integral**			**15 (25%)**
	6.1 Basic integration by formulae	---	---	
	6.2 Integration by parts	---	---	
	6.3 Double integral over rectangles and general regions	Basic integration(017051191-Unit-3) Double integral over rectangles and general regions (017051191-Unit-7)	---	
	6.4 Change of order of integration	Basic integration(017051191-Unit-3) Double integral over rectangles and general regions (017051191-Unit-7)	---	
	6.5 Double integration in polar coordinates	Basic integration(017051191-Unit-3)	---	
	6.6 Change of variables in double integration by Jacobian	---	---	
	6.7 Triple integration	---	---	

	6.8 Area enclosed by plane curve using double integration	Double integral over rectangles and general regions, Double integration in polar coordinates (017051191-Unit-7)	---	
	6.9 Triple integration in cylindrical and spherical co-ordinates	Triple integration (017051191-Unit-7)	---	
07	**Vector Calculus-I**			**7 (13%)**
	7.1 Vector and its properties	---	---	
	7.2 Parametrization of curves	---	---	
	7.3 Arc length of curve in space	Basic integration (017051191-Unit-3) First order partial derivatives(017051191-Unit-3)	---	
	7.4 Gradient of a scalar point function and surface normal vector	---	Models: Linear Modeling (017052391-Unit -4), Stochastic Gradient Descent (017052391-Unit -4)	
	7.5 Directional derivatives	Gradient(017051191-Unit-9)	---	
	7.6 Divergence of vector field	First order partial derivatives(017051191-Unit-3)	---	
	7.7 Curl of vector field	---	---	
	7.8 Scalar potential function of conservative field	---	---	
08	**Vector Integral**			**7 (12%)**
	8.1 Line integral	Basic integration (017051191-Unit-3)	---	
	8.2 Work done	Line integral (017051191-Unit-10)	---	
	8.3 Circulation and Flux	Line integral (017051191-Unit-10)	---	
	8.4 Green's theorem in the plane (without proof)	Line integral (017051191-Unit-10), Double integral over rectangles and general regions (017051191-Unit-8)	---	
09	**Graph Theory**			**8 (15%)**
	9.1 Introduction to Graphs and Definitions	---	---	
	9.2 Path and Circuits	---	---	
	9.3 Cut Sets and Cut Vertices	---	---	
	9.4 Graph Representations and Matrix Theory			
	9.5 Graph Coloring, Chromatic Polynomial and Matching	---	---	
10	**Trees**			**6 (10%)**
	10.1 Mathematical Foundations of Trees	Carrier Generation (creation of EHP) and carrier recombination (017051192 -Unit-6.3)	---	
	10.2 Spanning Trees	---	---	

Proposed Theory + Practical Evaluation Scheme by Academicians (% Weightage Category Wise and it's Marks Distribution)					
L :	**4**	**T:**	**2**	**P:**	**0**
Note : In Theory Group, Total 4 Test (T1+T2+T3+T4) will be conducted for each subject. Each Test will be of 25 Marks. Each Test Syllabus Weightage: Range should be 20% - 30%					
Group (Theory or Practical)	**Group (Theory or Practical) Credit**	**Total Subject Credit**	**Category**	**% Weightage**	**Marks Weightage**
Theory	**6**	**6**	MCQ	15%	15
Theory			Theory Descriptive	5%	5
Theory			Formulas and Derivation	5%	5
Theory			Numerical	75%	75
Expected Theory %	**100%**		**Calculated Theory %**	**100%**	**100**
Practical	**0**		Individual Project	0%	0
Practical			Group Project	0%	0
Practical			Internal Practical Evaluation (IPE)	0%	0
Practical			Viva	0%	0
Practical			Seminar	0%	0
Expected Practical %	**0%**		**Calculated Practical %**	**0%**	**0**
Overall %	**100%**			**100%**	**100**

Course Outcome	
	Upon completion of the course students will be able to
CO1	To solve problems of differentiation, integration, trigonometry and some practical problems, such as constrained optimization problems and other problems involving Partial differentiation and to calculate directional derivatives and gradients.
CO2	Evaluate a double integral in polar coordinates and triple integral to find area and volume in rectangular coordinates, cylindrical coordinates, and spherical coordinates.
CO3	Apply gradient to solve problems involving normal vectors to level surfaces and to Explain the concept of a vector integration in a plane(2-dimensions) and in the space(3-dimensions).
CO4	To understand concepts of Graph theory in context of computer science and to solve problems related to nonlinear structures like Tree
Suggested Reference Books	
1	Calculus with Early Transcendental Functions, James Stewart, Cengage Learning.
2	Thomas' Calculus, Maurice D. Weir, Joel Hass, Frank R. Giordano, Pearson Education.
3	Higher Engineering Mathematics, B.S.Grewal, Khanna Publishers.
4	Advanced Engineering Mathematics, Erwin Kreysig, Wiley Publication.
5	Graph Theory with Applications to Engineering & Computer Science, Narsingh Deo, Dover Publications, INC.Mineola, New York

List of Open Source Software/Learning website	
1	http://nptel.ac.in/