

Name of Faculty	:	Faculty of Engineering & Technology
Name of Program	:	Diploma Engineering (DE)
Course Code	:	1DCL01
Course Title	:	Engineering Mechanics
Type of Course	:	Basic Engineering
Year of Introduction	:	2023-24

Prerequisite	:	-
Course Objective	:	Use the principle of Engineering Mechanics to solve broad-based engineering related problems.
Course Outcomes	:	At the end of this course, students will be able to:
	CO1	Identify the force systems for given conditions by applying the basics of mechanics.
	CO2	Determine unknown force(s) of different engineering systems.
	CO3	Find the centroid and centre of gravity of various components in engineering Systems.
	CO4	Apply the principles of friction in various conditions for useful purposes.
	CO5	Select the eco-friendly relevant simple lifting machine(s) for given purposes.

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
L	T	P		Theory Marks		Practical Marks		Total Marks
			C	SEE	CIA	SEE	CIA	
3	0	2	4	70	30	30	20	150

Legends: L-Lecture; T-Tutorial/Teacher Guided Theory Practice; P - Practical, C - Credit, SEE - Semester End Examination, CIA - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content

Unit No.	Topics	Teaching Hours	Weightage	Mapping with CO
1	Introduction to Mechanics: Scalar & Vector Quantities – like force, pressure, velocity, acceleration Static & Dynamic – Kinetics & Kinematics MKS, CGS & SI units and its conversion along with FPI and Metric System, Laws/Principles of forces such as Principle of Superposition, Principle of transmissibility Composition & Resolution of Forces	04	10%	CO1
2	Composition and Resolution of Forces: Resolution of a force - Orthogonal components of a force, Equilibrium and Equilibrant, Free body and Free body diagram, conditions of equilibrium, Resultant of forces using analytical and graphical methods for the forces acting at a point: 1. Law of Parallelogram 2. Law of triangle 3. Law of Polygon, Lami's Theorem – statement and explanation, Application for various engineering problems.	08	10%	CO1 CO2
3	Moment and their Applications: Moment of a force, Varignon's Theorem, Couple, application, properties of couple, conditions of equilibrium, Resultant of force, Equilibrium forces and its position using analytical methods for the coplanar non - concurrent force system, Types of beam, supports (simple, hinged, roller and fixed) and loads acting on beam (vertical and inclined point load, uniformly distributed load, couple). Beam reaction for cantilever, simply supported beam with or without overhang – subjected to combination of Point load and uniformly distributed load, Beam reaction graphically for simply supported beam subjected to vertical point loads only.	08	25%	CO1 CO2
4	Centroid and Centre of Gravity: Difference between centroid and centre of gravity, First moment of area; to find Centroid – standard shapes of I, L, Channel & T sections, axis of symmetry First moment of mass; to find	08	25%	CO3

	C.G of standard solids sections , Axis of symmetry			
5	Friction: Concept and types of friction, , Laws of Friction , Angle of Friction , Angle of Repose, types of friction, Application of Lami's theory and theory of resolution of forces , examples on friction for a block resting on horizontal plane & on inclined plane	06	15%	CO4
6	Simple Lifting Machine: Concept, definition of Mechanical Advantage, Velocity Ratio of simple machine, Laws of Machines , reversible & non reversible machines and numerical. Velocity ratios of Simple wheel and axle.	08	15%	CO5

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	25	30	30	5	5	5

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Suggested List of Experiments/Tutorials

Sr. No.	Name of Experiment/Tutorial	Teaching Hours
1	Check and calculate resultant force through Law of Parallelogram using analytical and graphical methods.	2
2	Verify Law of Triangle using analytical and graphical methods.	2
3	Verify and calculate resultant force through Polygon Law of Forces using analytical and graphical methods.	4
4	Check and calculate the value of unknown force through Lami's Theorem.	4
5	Verify and calculate support reactions of a simply supported beam using analytical and graphical methods.	2
6	Study of centroid of a lamina having regular and irregular shapes.	4
7	Calculate angle of repose for different surfaces - Wood, Glass, Steel, plastic, wrought iron etc.	4
8	Calculate coefficient of sliding Friction for different surfaces - Wood, Glass, Steel, plastic, wrought iron etc.	2
9	Verify and calculate theoretical and practical velocity ratios of any four simple lifting machines.	2
10	Derive and draw a graph of law of machine for any two simple lifting machines and verify the effort required to lift a particular load. (Simple	2

	wheel and axle, Differential axle and wheel, simple screw jack, worm and worm wheel)	
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Major Equipment/ Instruments and Software Required

Sr. No.	Name of Major Equipment/ Instruments and Software
1	Apparatus for Law of Parallelogram, Lami's theorem & law of Polygon
2	Apparatus for determination of coefficient of friction
3	Simple wheel and axle and simple screw jack
4	Friction apparatus with scale on it, with wood, glass, steel, plastic surfaces, dish, string, weights

Suggested Learning Websites

Sr. No.	Name of Website:
11	Video Lectures on Applied Mechanics By Prof.SK. Gupta, Department of Applied Mechanics, IIT Delhi
2	www.tut.fi/.../InstituteofAppliedMechanicsandOptimization/TME-51
3	ocw.mit.edu Mechanics of Materials
4	www.me.ust.hk/.../ME106-applied%20mechanics-lecture%201.pdf

Reference Books :

Sr. No.	Name of Reference Books
1	Engineering Mechanics, R. S. Khurmi, S. Chand , New Delhi. (2019) ISBN: 978-93-5283-396-2
2	Engineering Mechanics, D. S. Kumar, S. K. Kataria & Sons, New Delhi (2021 reprint) ISBN: 978-93-5014-311-7
3	Applied Mechanics, H J Shah & Junarkar, CHAROTAR Publication