GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	ALL
Semester	II	Version	1.0.0.0
Effective from Academic Year	2026-27	Effective from the batch admitted in	July 2026
Course Code	2ESC1105	Course Name	Engineering Mechanics
Course Category	Engineering Science Courses (ESC)		

Teaching & Learning Scheme							Examination scheme (Marks)			
	L	TU	P	Total	SL	TSL		CE	SEE	Total
Credit	3	0	1	4	45	120	Theory	50	50	100
Hours (per week)	3	0	2	5			Practical	25	25	50

L: Lecture, TU: Tutorial, P: Practical/Lab., SL: Minimum Self-Learning or Term Work Hours per Semester, TSL: Minimum Total Teaching & Self-Learning Hours per Semester, CE: Continuous Evaluation, SEE: Semester End Examination.

Pre-requisites:

Basic knowledge of Mathematics and elementary Physics concepts such as units, vectors, and motion.

Course Outcomes

COs	Description
CO1	Apply the fundamental principles of engineering mechanics including kinematics, kinetics, laws of motion, units, and types of motion to solve basic engineering problems.
CO2	Analyze different force systems and conditions of equilibrium, and determine resultants, moments, couples, and frictional effects in engineering applications.
CO3	Compute the centroid, centre of gravity, and moments of inertia of simple and composite sections using standard methods and theorems.
CO4	Analyze simple lifting machines and statically determinate beams by evaluating machine parameters and constructing shear force and bending moment diagrams.

Theory Syllabus

Unit	Content	Hours
1	**Force systems and its resultants:** Introduction, Kinetics and Kinematics, Newton's law of motions, De-Alembert's Principle, Scalar and vector quantities, absolute and derived units, SI units. The science of mechanics, fundamental Principles, type of motion, Combined motion of rotation and translations, related problems. Fundamental concepts and principle, force system, resolution and composition of forces, resultant of concurrent force system, moment of a force, Varignon's theorem, resultant of parallel force system, couple and resultant of general force system, parallel axis theorem.	10
2	**Equilibrium and Friction:** Introduction, free body diagram, equilibrium of coplanar forces, equilibrium of two forces, three force principle, equilibrium of concurrent, parallel and general force system, Introduction, laws of coulomb friction, coefficient of friction, angle of friction, angle of repose, cone of friction, sliding and rolling friction, friction on inclined plane, ladder friction.	7
3	**Centre of Gravity and Moments of Inertia:** Definition of Centroid, Centre of gravity, Moment area method for finding out the centre of gravity for 1D, 2D and 3D problems, Composite sections, Pappus Guldinus theorems I & II, Concept of MI, methods for finding out MI, theorem of parallel axis and perpendicular axis, and related problems.	10
4	**Simple Lifting Machine:** Terminology, Conditions of reversibility of machines, Law of machine, method for finding out velocity ratio of simple wheel and axle, Differential wheel and axle, Single purchase	8

	crab winch, double purchase crab winch, simple screw jack, and differential screw jack, related problems.	
5	**Shear Force and Bending Moment in Beams:** Bending moment and shear forces, bending moment and shear force diagrams for statically determinate beams subjected to couples, connected forces, uniformly distributed loading, relation between bending moment, shear force, and rate of loading, point of contraflexure.	10
Practical and Self Learning Content		
Practical, assignments, quiz, and tutorials are based on the above syllabus.		
Text Books		
1	Engineering Mechanics :S. Ramamarutham, Dhanpatray Publishing House	
2	Mechanics of Solids :P. J. Shah, S.Chand Publication	
Reference Books		
1	Engineering Mechanics: A K Thayal, Umesh Publications	
2	Engineering Mechanics (Statics) Beer and Johnston, Tata-McGraw-Hill publications	
3	Applied Mechanics: Junarkar S. B and H.J.Shah,Charotar Publishing House Pvt Ltd.	
4	Mechanics of Solid: N. K. Arora, Books India Publications	
ICT/MOOCs Reference		
1	https://www.coursera.org/learn/engineering-mechanics-statics	
2	https://nptel.ac.in/courses/112106286	
3	https://onlinecourses.nptel.ac.in/noc21_me70/preview	

Mapping of COs, POs, and PSOs														
COs	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1	3	1	1	1	0	3	1	2	2	2	1
CO2	3	2	1	3	2	2	0	2	3	1	2	3	2	1
CO3	2	2	1	2	3	3	0	0	3	1	2	3	2	1
CO4	3	3	1	2	3	3	2	3	3	1	2	2	3	2

Bloom's Taxonomy Level				
Unit	**Unit Title**	**Aligned COs**	**Learning Hours**	**BTL Level**
1	Force systems and its resultants	CO1	10	N
2	Equilibrium And Friction	CO2	7	N
3	Centre of Gravity and Moments of Inertia	CO3	10	N
4	Simple Lifting Machine	CO4	8	N
5	Shear Forces and Bending Moment in Beams	CO4	10	E

Note:

- Version 1.0.0.0 (First Digit= New syllabus/Revision in Full Syllabus, Second Digit=Revision in Teaching Scheme, Third Digit=Revision in Exam Scheme, Forth Digit= Content Revision)
- 1 Hour Lecture = 1 Credit, 1 Hour Tutorial = 1 Credit, 2 Hours Practical = 1 Credit, 2 Hours Internship/Project/Seminar = 1 Credit
- As per NCrF/NEP 2020, Minimum Self-Learning or Term Work Hours per Semester should be calculated in such a way that 1 Credit should have minimum 30 Hours of Teaching and Self Learning Engagement per semester
- Bloom's Taxonomy Level (BTL) : R: Remember, U: Understand, A: Apply, N: Analyze, E: Evaluate, and C: Create