



Course Syllabus
Gyanmanjari Diploma Engineering College
Semester-2

Subject : Applied Mechanics - DETME12203

Type of course: Minor

Prerequisite: Physics

Rationale: Applied mechanics is the branch of science concerned with the motion of any substance that can be experienced or perceived by humans without the help of instruments. In short, when mechanics concepts surpass being theoretical and are applied and executed, general mechanics becomes applied mechanics. It is this stark difference that makes applied mechanics an essential understanding for practical everyday life.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P		C	Theory Marks		Practical Marks		
			ESE		MSE	V	P	ALA	
4	-	2	5	60	30	10	20	30	150

Legends: CI-ClassRoom Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Sr. No	Course content	Hrs	% Weightage
1	<p>Fundamentals of mechanics :- Engineering mechanics definition, Statics & Dynamics, Kinetics & Kinematics, Importance of engineering mechanics. Fundamental principles of mechanics :- Newton’s first law of motion, Newton’s second law of motion, Newton’s third law of motion, Newton’s law of gravitation. Scalar and vector quantities: - Definition and examples, Difference between speed and velocity. Fundamental units and derived units, system of units like MKS, CGS etc. S.I system of units: - Explanation, Fundamental S.I units and Derived S.I units – its units and symbols. Conversion of units: - units of length and force Other definitions like space, time, motion, mass, rigid body, particle, deformable body.</p>	15	20%
2	<p>Force :- Force:-Definition of force, 1 Newton force, Characteristics and nature of force, Effects of force, representation of force by vector method& Bow’s notation method, Weight & mass and its difference, System of forces, Principle of superposition of forces, Principle of transmissibility of forces. Moment of a force :- Definition, measurement of moment of a force, S.I. unit, Geometrical meaning of moment of a force, Classification of moments according to direction of rotation, Sign convention. Couple – Definition, S.I. unit, Measurement of a couple, Properties of couple, Varignon’s principle of moments. Composition of forces: - Definition, Resultant force, Composition of forces definition and methods of composition of forces. Analytical methods: - Parallelogram law of forces, Method of resolution. Graphical methods: - Triangle law of forces, Polygon law of forces</p>	15	25%
3	<p>Equilibrium and Centre of gravity & Friction :- Equilibrium – Definition, Conditions of equilibrium for concurrent coplanar forces, Types of equilibrium. Lami’s theorem: - Statement & its examples. Free body diagram: - Definition and its explanation.</p>	20	35%

	<p>Types of beams: - Simply supported, Overhanging, Cantilever, Fixed, Continuous, Propelled cantilever beams.</p> <p>Types of loads: - Point load or concentrated load, Uniformly distributed load, Uniformly varying load.</p> <p>Types of supports: - Simple support, Hinged support, Roller support, Fixed support.</p> <p>Examples on simply supported beam, overhanging beam</p> <p>Centroid :- Definition, Definition of centre of gravity, Differentiation between centroid and centre of gravity, Centroid of standard shapes such as straight wire, wire ring, semicircular wire, quarter circular wire, arc of circle, rectangular or square, right angle triangle, trapezium, circle, semi circle, quarter circle, circular sector, cylinder, cone, sphere, hemisphere, etc., Axis of reference, Axis of symmetry.</p> <p>Friction :- Definition of friction, Limiting friction, Types of friction, Angle of friction, Coefficient of friction, Angle of repose, laws of friction, Examples.</p>		
4	<p>Simple lifting machines :-</p> <p>Definitions: - Simple machine, Compound machine, Lifting machine</p> <p>Technical terms: - Mechanical advantage, Velocity ratio, Input, Output, Efficiency, Ideal machine, Effort lost in friction, Friction load, Reversible machine, Non-reversible or self locking machine</p> <p>Condition for reversibility of machine, Law of machine, Maximum mechanical advantage, Maximum efficiency, Simple pulley and systems of pulley, Different simple machines and their velocity ratio.</p>	10	20%

Continuous Assessment (ALA):

Sr. No	Active Learning Activities	Marks
1	<p>Identify CG</p> <p>To determine the Centre of gravity of irregular plane and upload calculations on GMIU web portal</p>	10
2	<p>Identify Units</p> <p>Identify the units of appliances assigned by faculty and upload answers on GMIU web portal</p>	10

3	<p>Identify Mechanism</p> <p>Identify simple lifting machine or Mechanism nearby you and upload any three mechanism photographs on GMIU web portal</p>	10
Total		30

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom’s Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	30%	40%	20%	10%	-	-

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

Course Outcome:

After learning the course the students should be able to:	
CO1	Understand the basics of mechanics functions.
CO2	Identify the various force systems for given conditions by applying them with the help of mechanics.
CO3	Find the centroid and center of gravity of various components and to apply the principles of friction for useful purposes
CO4	Select the relevant simple lifting machine for given purposes

List of Practical

Sr. No	Descriptions	Unit No	Hrs
1	To calculate the resultant force by using law of parallelogram using analytical and graphical methods	2	02

2	To verify law of triangle using analytical and graphical methods	2	02
3	To calculate resultant force through polygon law of forces using analytical and graphical methods.	2	04
4	To calculate the value of unknown force through Lami's theorem	3	02
5	To calculate the support reactions of a simply supported beam using analytical and graphical methods	3	04
6	To calculate the problems based on Lami's theorem	3	04
7	To calculate the angle of repose for different surfaces like wood, glass, steel, plastic, wrought iron, etc	3	02
8	To calculate the coefficient of sliding friction for different surfaces like wood, glass, steel, plastic, wrought iron, etc	3	02
9	To calculate the theoretical and practical velocity ratios of any four simple lifting machines	4	04
10	To draw a graph of the law of machines for any two simple lifting machines.	4	04
		Total	30

Instructional Method:

The course delivery method will depend upon the requirement of content and the needs of students. The teacher, in addition to conventional teaching methods by black board, may also use any tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in the laboratory.

Reference Books:

- [1] Engineering Mechanics by R.S.Khurmi, S.Chand Publication, New Delhi
- [2] Engineering Mechanics by D. S. Kumar, S. K. Katariya & Sons, New Delhi
- [3] Applied Mechanics by Shah & Junnakar, Charotar Publication, Anand
- [4] Engineering Mechanics by D .S .Bedi, Khanna Publications, New Delhi