Diploma 2nd Sem **Live** Classes New Schedule on App.

Engg. Mechanics By Gaurav sir	7:30 - 8:30 AM	**Monday - Thursday**
Applied Physics-II By Sachin sir	5:30 - 6:30 PM	**Monday - Saturday**
Mathematics - II By Gaurav sir	8:00 - 9:00 PM	**Monday - Saturday**
FEEE By Sujata Ma'am	7:00 - 7:45 PM	**Monday - Thursday**
IT System By Shubham sir	Coming Soon	▬
Environmental Science By Gaurav sir	Coming Soon	▬

Gtech Poly

NEW

Semester - II

Engineering Mechanics

SYLLABUS

STUDY AND EVALUATION SCHEME FOR ALL ENGINEERING AND TECHNOLOGY BRANCHES (Listed in Annexure -1)

SECOND SEMESTER:

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week				Credits (C) (L + T)+P = C	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
							INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		L	T	P	Total		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
2.1	Mathematics-II	3	1	-	4	4+0=4	40	-	40	60	3	-	-	60	100
2.2	Applied Physics-II	3	1	2	6	4+1=5	40	60	100	60	3	40	3	100	200
2.3	Introduction to IT Systems	2	-	4	6	2+2=4	40	60	100	60	3	40	3	100	200
2.4	Fundamentals of Electrical & Electronics Engineering	3	1	2	6	4+1=5	40	60	100	60	3	40	3	100	200
2.5	Engineering Mechanics	3	1	2	6	4+1=5	40	60	100	60	3	40	3	100	200
2.6	*Environmental Sciences	3	-	-	3	-	-	-	-	60	3	-	-	60	-
	# Student Centered Activities (SCA)	-	-	2	2	-	-	50	50	-	-	-	-	-	50
	Total	17	4	12	33	23	200	290	490	300		160		460	950

*Environmental Sciences will be an audit subject and non-credit. It is compulsory to pass the examination, but the marks will not be included in the division and percentage of obtained marks.

UNIT - I
Basics of Mechanics and Force System

Significance and relevance of mechanics, Applied mechanics, Statics, Dynamics. Space, time, mass, particle, flexible body and rigid body. Scalar and vector quantity, Units of measurement (SI units) Fundamental units and derived units.

Force - unit, representation as a vector and by Bow's notation, characteristics and effects of a force, Principle of transmissibility of force, Force system and its classification. Resolution of a force Orthogonal components of a force, moment of a force, Varignon's Theorem. Composition of forces Resultant, analytical method for determination of resultant for concurrent, non-concurrent and parallel co-planar force systems - Law of triangle, parallelogram and polygon of forces.

UNIT-II
Equilibrium

Equilibrium and Equilibrant, Free body and free body diagram, Analytical and graphical methods of analysing equilibrium. Lami's Theorem statement and explanation, Application for various engineering problems.

Beam- 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.

UNIT - III
Friction

Friction and its relevance in engineering, types and laws of friction, limiting equilibrium, limiting friction, co-efficient of friction, angle of friction, angle of repose, relation between co-efficient of friction and angle of friction. Equilibrium of bodies on level surface subjected to force parallel and inclined to plane. Equilibrium of bodies on inclined plane subjected to force parallel to the plane only.

UNIT-IV
Centroid and Moment of Inertia

Concept, definition and determination of Centroid of plain figures (square, rectangle, triangle, circle, semi-circle, quarter circle) and Centre of gravity of symmetrical solid bodies (Cube, cuboid, cone, cylinder, sphere, hemisphere).

Concept of moment of inertia, Radius of Gyration, Theorem of perpendicular and parallel axis theorem. Concept of Second moment of area of standard areas (Rectangle, Triangle and circle) and composite area (L,T,I section)

UNIT-V
Simple Lifting Machine

Simple lifting machine, load, effort, mechanical advantage, applications and advantages. Velocity ratio, efficiency of machines, law of machine. Ideal machine, friction in machine, maximum Mechanical advantage and efficiency, reversible and non-reversible machines, conditions for reversibility.

System of pulleys (first, second, third system of pulleys), determination of velocity ratio, mechanical advantage and efficiency. Working principle and application of wheel and axle,

Weston's Differential Pulley Block, simple screw jack, worm and worm wheel, single and double winch crab. Expression for their velocity ratio and field of their application [Simple problems on the above topics]

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	12	20
2	11	20
3	11	20
4	11	20
5	11	20
Total	56	100

UNIT

1 Basics of Mechanics and Force System
(यांत्रिकी और बल प्रणाली की मूल बातें)

UNIT - I
Basics of Mechanics and Force System

Significance and relevance of mechanics, Applied mechanics, Statics, Dynamics. Space, time, mass, particle, flexible body and rigid body. Scalar and vector quantity, Units of measurement (SI units) Fundamental units and derived units.

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TOPICS

1. Mechanics (यान्त्रिकी)
2. Applied Mechanics (अनुप्रयुक्त यांत्रिकी)
3. Utility of Mechanics (यांत्रिकी की उपयोगिता)
4. Significance and relevance of Mechanics (यांत्रिकी का महत्व एवं प्रासंगिकता)
5. Branches of Engineering Mechanics(इंजीनियरिंग यांत्रिकी की शाखाएँ)

   (a) स्थैतिकी (Statics)

   (b) गतिकी (Dynamics)- (i) शुद्ध गतिकी (Kinematics) (ii) बल गतिकी (Kinetics)

6. Some of the definitions of the idealizations used in engineering mechanics

   (i) Space, (ii) time, (iii) mass, (iv) particle,

   (v) flexible body and (vi) rigid body

7. Scalar and vector quantity (अदिश तथा सदिश राशि)

8. Units of measurement (माप की इकाइयां)

9. Force (बल)

10. Representation of force (बल का निरूपण)

 (i) as a vector (सदिश के रुप में)   (ii) by Bow's notation (बो के संकेत द्वारा)

11. Characteristics of force (बल के लक्षण)

12. Effects of force (बल के प्रभाव)

13. Principle of transmissibility of force (बलों के स्थानांतरणशीलता का सिद्धान्त)

14. Force system and its classification (बल निकाय तथा इसका वर्गीकरण)

15. Resolution of a force (बलों का वियोजन)

16. moment of a force (बल आघूर्ण)

17. Varignon's Theorem (वैरिग्नॉन प्रमेय)

18. Resultant Force (परिणामी बल)

19. Determination of resultant Force (परिणामी बल ज्ञात करना)

   (i) Analytical method (विश्लेषण विधि)

   (ii) Graphical Method (ग्राफीय विधि)

20. Law of triangle of forces (बलों के त्रिभुज का नियम)

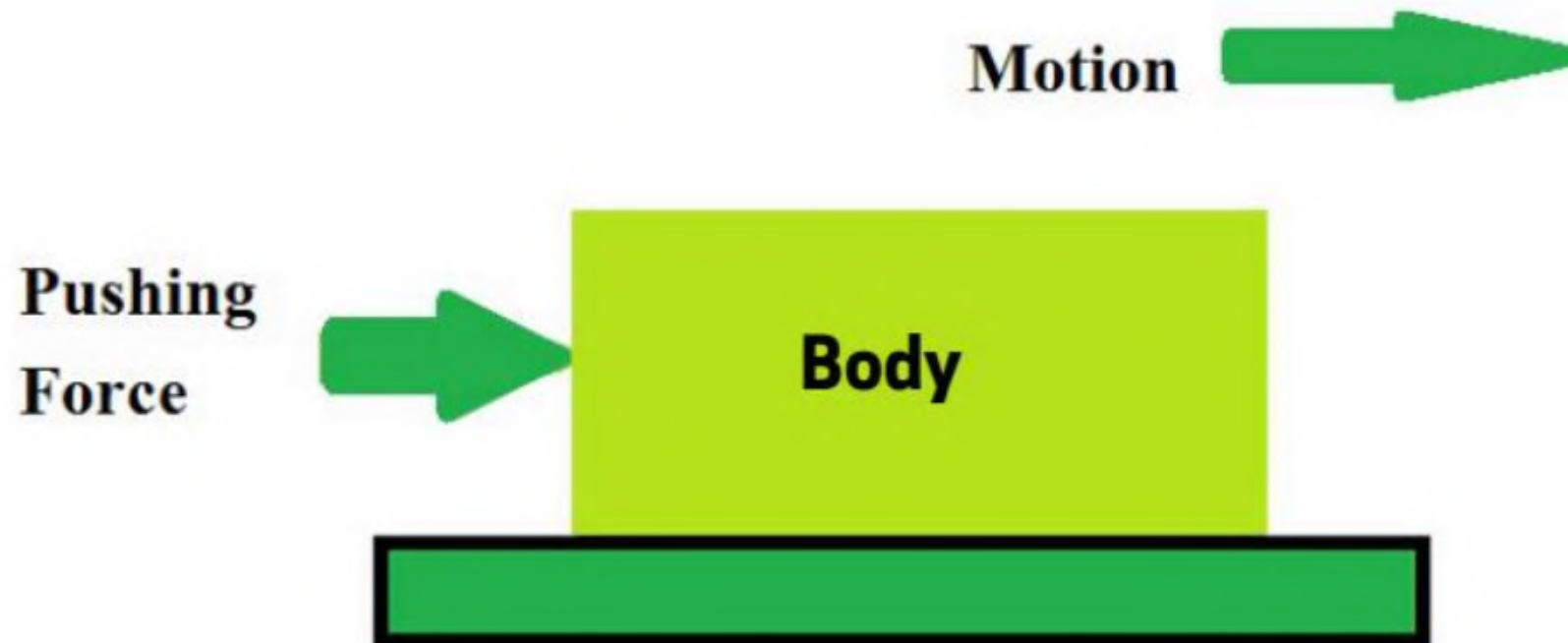21. Law of parallelogram of forces (बलों के समांतर चतुर्भुज का नियम)

22. Law of Polygon of forces (बल बहुभुज का नियम)

1. Mechanics (यान्त्रिकी)

- विज्ञान की वह शाखा जिसके अन्तर्गत वस्तुओं पर बलों का एवं उनके प्रभाव का अध्ययन विराम अथवा गति की अवस्था में किया जाता है, यांत्रिकी कहलाता हैं |

The Branch of Science which deals with study of Forces & their effects on bodies in the state of Rest or Motion, is called Mechanics.

Motion →

Pushing Force → **Body**

2. Applied Mechanics (अनुप्रयुक्त यांत्रिकी)

- अनुप्रयुक्त यांत्रिकी जिसे इंजीनियरिंग मैकेनिक्स के रूप में भी जाना जाता है, इंजीनियरिंग की वह शाखा है जो इंजीनियरिंग समस्याओं के समाधान के लिए लागू यांत्रिकी के नियमों एवं सिद्धान्तों से संबंधित है।

Applied mechanics also known as engineering mechanics is the branch of engineering which deals with the laws & principle of mechanics as applied to the solution of engineering problems.

3. Utility of Mechanics (यांत्रिकी की उपयोगिता)

- ✓ यांत्रिकी के सिद्धान्त, इंजीनियरिंग की समस्याओं को हल करने में प्रयोग किये जाते हैं।
  The principles of mechanics are used to solve engineering problems.

- ✓ यांत्रिकी के सिद्धान्तों का उपयोग, संरचना की सामर्थ्य (strength) तथा मशीन अभिकल्पन (Machine design) आदि में किया जाता है।
  Principles of mechanics are used in strength of structures and machine design etc.

- ✓ कैंची (Truss), ढाँचा (Frame) तथा मशीनी अंगों (Machining Parts) में उत्पन्न अज्ञात बलों (unknown forces) को ज्ञात करने में यांत्रिकी का उपयोग किया जाता है।
  Mechanics is used to determine the unknown forces exerted in trusses, frames and machining parts.

- वायुयान पर लगने वाले बलों का अध्ययन करने में यांत्रिकी का उपयोग किया जाता है।

  Mechanics is used to study the forces acting on an aircraft.

- दृढ़ पिण्ड (Rigid body) पर लगने वाले बाहरी बलों के अध्ययन करने में यांत्रिकी का उपयोग किया जाता है।

  Mechanics is used to study external forces acting on a rigid body.

4. Significance and relevance of Mechanics
(यांत्रिकी का महत्व एवं प्रासंगिकता)

✓ • विभिन्न संरचनाओं और मशीनों की योजना, डिजाइन और निर्माण में एक इंजीनियर के लिए इंजीनियरिंग यांत्रिकी का ज्ञान बहुत आवश्यक है।
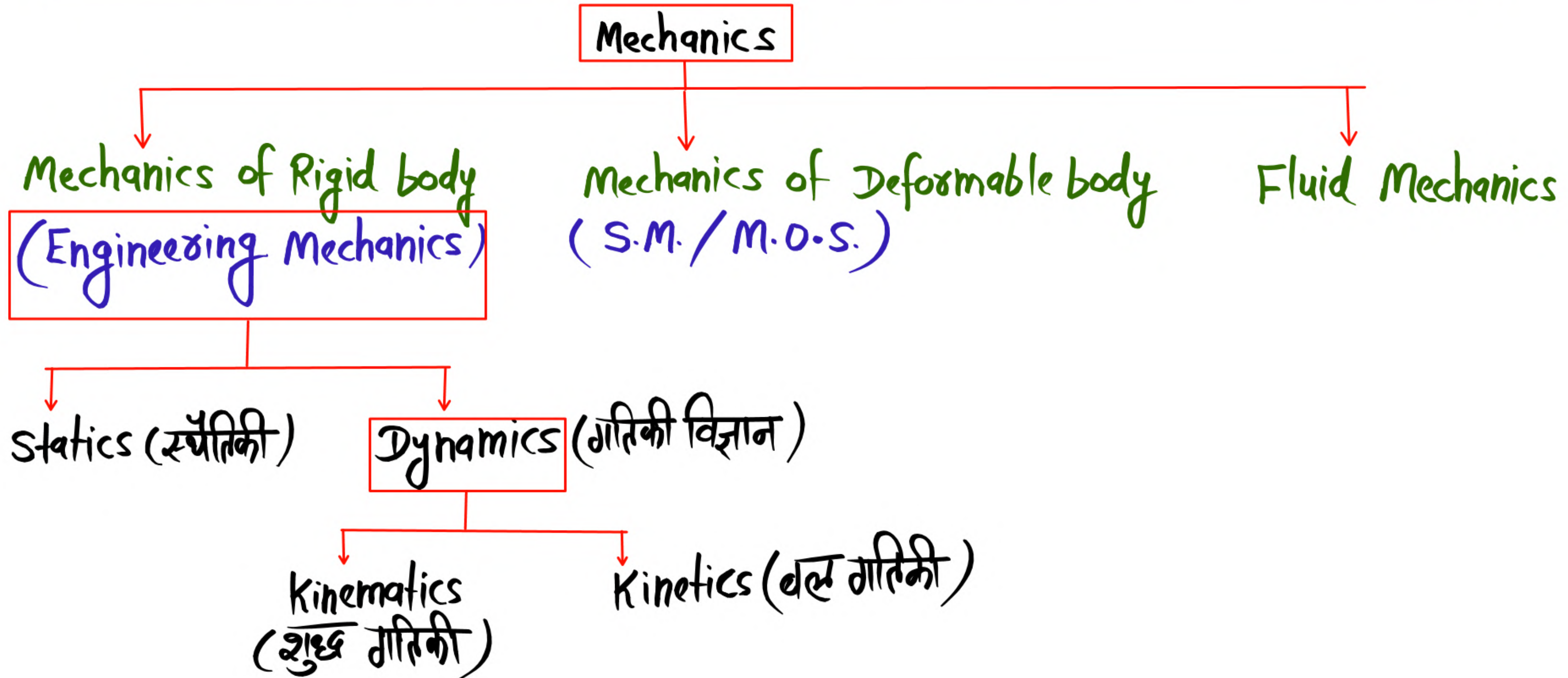
Knowledge of Engineering Mechanics is very essential for an engineer in planning, design and construction of various structures and Machines.

✓ • जैसे: भवन का निर्माण, पुल की डिजाइनिंग, ऑटोमोबाइल इंजीनियरिंग डिजाइन।

Eg: Construction of building, Designing of Bridge, Automobile Engineering design.

5. Branches of Engineering Mechanics(इंजीनियरिंग यांत्रिकी की शाखाएँ)

Mechanics

Mechanics of Rigid body
(Engineering Mechanics)

Mechanics of Deformable body
(S.M. / M.O.S.)

Fluid Mechanics

Statics (स्थैतिकी)

Dynamics (गतिकी विज्ञान)

Kinematics
(शुद्ध गतिकी)

Kinetics (बल गतिकी)

5. Branches of Engineering Mechanics(इंजीनियरिंग यांत्रिकी की शाखाएँ)