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Department of Mechanical Engineering	LP: ME22201
	Rev. No: 00
B.E/B.Tech/M.E/M.Tech : Mechanical Engineering Regulation: 2022	Date:
PG Specialisation : NA	28/03/2023
Sub. Code / Sub. Name : ME22201 – Engineering Mechanics	
Unit : 1	

Unit Syllabus: UNIT I - BASICS AND STATICS OF PARTICLES

Introduction - Units and Dimensions - Laws of Mechanics - Principle of transmissibility - Parallelogram and triangular Law of forces - Vectorial representation of forces - Vector operations of forces - additions, subtraction, dot product, cross product - Coplanar Forces - rectangular components - Equilibrium of a particle - Lami's theorem - Forces in space - Equilibrium of a particle in space - Equivalent systems of forces

Objective:

To understand the concept of equilibrium of particles

Session No *	Topics to be covered	Ref	Teaching Aids Ref. No
1	Introduction to Mechanics - Classification - Basic Concepts involved in Mechanics - Importance and types of Units and dimensions	1 – Pg.No : 3 to 10	BB & PPT
2	Explanation of Lami's theorem, Parallelogram and triangular Law of forces with application problems.	2 – Pg.No: 18 to 23	BB & PPT
3	Resolution of forces in scalar and vector approach with Problems, Equilibrium of particles	1 – Pg.No : 27 to 31	BB & PPT
4	Problems in Equilibrium of particles.	1 – Pg.No : 36 to 39	BB & PPT
5	*Tutorial – 1 (Activity based Assignment - Experimental learning)*	-	-
6	Demonstration of Free body diagram, Derivation of Equilibrium of a particle with coplanar concurrent forces and its practical application	1 – Pg.No: 159 to 162	BB & PPT
7	Problems related to Free body diagram	2 – Pg.No: 166 to 171	BB & PPT
8	Introduction to particles in space, Problems in noncoplanar concurrent forces using vector approach	1 – Pg.No: 45 to 58	BB & PPT
9	Application problems in noncoplanar concurrent forces, Equivalent system of forces	2 – Pg.No: 88 to 90	BB & PPT
10	*Tutorial – 2 (Quiz & Descriptive type – Participative learning)*	-	-

Content beyond syllabus covered (if any):

* Session duration: 50 minutes

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Sub. Code / Sub. Name: ME22201 – Engineering Mechanics

Unit : II

Unit Syllabus: STATICS OF RIGID BODIES AND ANALYSIS OF STRUCTURES

STATICS OF RIGID BODIES: External, Internal forces - moment of a force - varignon's theorem - moment of a couple - resolution of a force into a force and a couple - reduction of a system of forces - reactions at supports and connections - equilibrium of a two and three force bodies - case studies.

ANALYSIS OF STRUCTURES: Simple trusses - Method of joints, method of sections - joints under special loading conditions - space trusses - analysis of frames.

Objective:

To understand the concept of equilibrium of rigid bodies.

Session No *	Topics to be covered	Ref	Teaching Aids Ref. No
11	Explanation of Varignon's theorem, Establishment of Equivalent force and couple system and Single equivalent force system	1 – Pg.No: 83, 97 to 108	BB & PPT
12	Explanation of various types of supports and their reaction forces. Types of beams. Problems in beams under static loads.	1 – Pg.No: 162 to 164	BB & PPT
13	Establishment of Equilibrium conditions of a rigid body subjected to planar non-concurrent forces - Construction of Free body diagram	1 – Pg.No: 170 to 184	BB & PPT
14	Application problems in Coplanar Non-concurrent forces	2 – Pg.No: 110 to 112, 182 to 185	BB & PPT
15	*Tutorial – 3 (Quiz & Descriptive type – Participative learning)*	-	-
16	Introduction to Simple trusses, Problems in simple trusses using Method of Joints	1 – Pg.No: 286 to 296	BB & PPT
17	Problems in simple trusses using Method of Sections	1 – Pg.No: 304 to 308	BB & PPT
18	Application of trusses, Problems in trusses under special conditions	1 – Pg.No: 311 to 315	BB & PPT
19	Introduction to space trusses and frames.	1 – Pg.No: 316 to 318	BB & PPT
20	Tutorial – 4 *(Descriptive type – Participative learning)*	-	-
Content beyond syllabus covered (if any):			

* Session duration: 50 mins

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Sub. Code / Sub. Name: ME22201 – Engineering Mechanics

Unit : III

Unit Syllabus: CENTROID, CENTRE OF GRAVITY AND MOMENT OF INERTIA

Centroids of areas, composite areas, Theorems of Pappus and Guldinus- Parallel axis theorem and perpendicular axis theorem - determination of moment of inertia of plane figures, polar moment of inertia-radius of gyration - mass moment of inertia of simple solids.

Objective:

To understand the concept of first and second moment of area.

Session No *	Topics to be covered	Ref	Teaching Aids Ref. No
21	Introduction to properties of surfaces - Explanation of First moment of area - Determination of Centroid for rectangle, triangle and circular sections by integration method	2 – Pg.No: 331 to 346	BB & PPT
22	Determination of centroid for composite sections - Problems	2 – Pg.No: 350 to 354	BB & PPT
23	Problems in Composite section using standard formula, Introduction to Moment of Inertia.	1 – Pg.No: 473 to 475	BB & PPT
24	Pappus and Guldinus theorem, Parallel axis theorem and perpendicular axis theorems and its explanation	2 – Pg.No: 358,379,380	BB & PPT
25	*Tutorial – 5 (Activity based Assignment - Experimental learning)*	-	-
26	Determination of Moment of Inertia for T section, Hollow section by using standard formula - Radius of gyration	1 – Pg.No: 476 to 482	BB & PPT
27	Determination of Moment of Inertia for I section, Angled section by using standard formula		
28	Introduction to Polar Moment of Inertia with Problems	1 – Pg.No: 488 to 489	BB & PPT
29	Determination of Mass moment of Inertia for simple solids	1 – Pg.No: 512 to 520	BB & PPT
30	*Tutorial – 6 (Quiz & Descriptive type – Participative learning)*	-	-

Content beyond syllabus covered (if any):

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* Session duration: 50 mins

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Sub. Code / Sub. Name: ME22201 – Engineering Mechanics

Unit: IV

Unit Syllabus:

FRICTION: Laws of dry friction - angles of friction-coefficient of static and kinetic friction - wedges - surface contact friction - belt friction - journal bearings - axle friction - thrust bearings - disc friction - Point contact friction - wheel friction - rolling resistance - case studies

Objective:

To understand the concept of various types of frictions and applications

Session No *	Topics to be covered	Ref	Teaching Aids Ref. No
31	Introduction to Friction force -Explanation of Laws of Friction, Single body on horizontal and inclined plane under external forces	1 – Pg.No: 410 to 416	BB & PPT
32	Explanation of Two bodies in contact- Practical Examples		
33	Practical examples wedge friction and block friction	1 – Pg.No: 429, 430	BB & PPT
34	Calculation of ladder friction with problems	2 – Pg.No: 321 to 322	BB & PPT
35	*Tutorial – 9 (Descriptive type – Participative learning)*	-	-
36	Introduction to surface contact friction, Problems in simple belt friction	1 – Pg.No: 449	BB & PPT
37	Introduction to bearings, Journal bearing, thrust bearing, Disc friction and axle friction problems	1 – Pg.No: 439 , 440	BB & PPT
38	Problems in Wheel friction and Rolling resistance	1 – Pg.No: 442 to 445	BB & PPT
39	Application of friction Case studies with Problems	1 – Pg.No: 460 to 463	BB & PPT
40	*Tutorial – 10 (Descriptive type – Participative learning)*	-	-

Content beyond syllabus covered (if any):

* Session duration: 50 mins

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Sub. Code / Sub. Name: ME22201 – Engineering Mechanics

Unit: V

Unit Syllabus: DYNAMICS OF PARTICLES

KINEMATICS: Introduction-plane, rectilinear and rotary motion-time dependent motion - rectangular coordinates - projectile motion.

KINETICS: Equation of motion - rectilinear and rotary motion - Newton's II law - D'Alembert's principle - Energy - potential energy - kinetic energy - conservation of energy - work done by a force - work energy method.

IMPULSE AND MOMENTUM: Concept of conservation of momentum - Impulse-Momentum principle - Impact - Direct central impact, oblique central impact, impact of a moving train on the spring board.

Session No *	Topics to be covered	Ref	Teaching Aids Ref. No
41	Introduction to Kinematics, Explanation of Rectilinear motion, Displacement, Velocity, Acceleration and their relationships, Problems in rectilinear motion.	1 – Pg.No: 602 to 611	BB & PPT
42	Application Problems related to rectilinear and rotary motion	1 – Pg.No: 614 to 615	BB & PPT
43	Introduction to curvilinear motion, Problems in Projectile motion	1 – Pg.No: 641 to 660	BB & PPT
44	Introduction to Kinetics, Equation of Motion, Problems related to D'Alembert's Principle	1 – Pg.No: 692 to 703	BB & PPT
45	*Tutorial – 7 (Quiz & Descriptive type – Participative learning)*	-	-
46	Explanation of Potential energy, Kinetic energy, Work – Energy method with problems	1 – Pg.No: 756 to 768	BB & PPT
47	Problems based on Impulse – Momentum method	1 – Pg.No: 809 to 811	BB & PPT
48	Impact of elastic bodies, different types - Problems	1 – Pg.No: 821 to 830	BB & PPT
49	Impact of a moving train on the spring board – Problems	1 – Pg.No: 832 to 840	BB & PPT
50	*Tutorial – 8 (Descriptive type – Participative learning)*	-	-
Content beyond syllabus covered (if any):			

* Session duration: 50 mins

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Sub Code / Sub Name: **ME22201 – Engineering Mechanics**

ONLINE RESOURCES:

S.No	Topics	Online resources Link	Mapping
1	Newton's First law	https://youtu.be/5oi5j11FkQg	UNIT - 1
2	Free body diagram	https://youtu.be/4Bwwq1munB0	
3	Inertia and Mass	https://youtu.be/YbWjx3LUc0U	
4	Moment of force	https://youtu.be/22VGQM1jCn8	UNIT - 2
5	Torque and Moment difference	https://youtu.be/zXxrAJld9mo	
6	Centroid	https://youtu.be/nqg6VaK02JA	UNIT - 3
7	First Moment and Second Moment of Area	https://youtu.be/p27blDG-GiQ	
8	Area Moment of Inertia	https://youtu.be/Bls5KnQOWkY	
9	Static friction	https://youtu.be/9SMp-jnh8lg	UNIT - 4
10	Rolling friction	https://youtu.be/HRe90ySP38U	
11	Momentum	https://youtu.be/CEz3cpkno3Y	UNIT – 5
12	Distance and displacement	https://youtu.be/21BwUNDOQno	
13	Equation of motion	https://youtu.be/xViRvJxTu6k	

COURSE MATERIALS:

https://www.svce.ac.in/wp-content/uploads/2023/02/mech/ME18201-EM.pdf

TEXT BOOKS:

1. Beer F.P and Johnston Jr. E.R, "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", Nineth Edition, Tata McGraw-Hill Publishing Company, New Delhi, 2011.

2. Vela Murali, "Engineering Mechanics-Statics and Dynamics", Oxford University Press, 2018.

3. Hibbeller R.C and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", 11th Edition, Pearson Education, 2010.

4. Rajasekaran S and Sankarasubramanian G, "Engineering Mechanics Statics and Dynamics", 3rd Edition, Vikas Publishing House Pvt. Ltd., 2005.

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REFERENCES:

1. Bhavikatti S.S and Rajashekarappa, K.G, "Engineering Mechanics", New Age International (P) Limited Publishers, 2005.

2. Irving H. Shames and Krishna Mohana Rao G., "Engineering Mechanics - Statics and Dynamics", 4th Edition, Pearson Education, 2006.

3. Meriam J.L and Kraige L.G, "Engineering Mechanics - Statics - Volume 1, Dynamics Volume 2", Third Edition, John Wiley & Sons,1993.

	Prepared by	Approved by
Signature	1. *(signature)* 2. M. M *(signature)*	*(signature)*
Name	1. Dr. M. PREM ANANTH 2. M. MAHRSWARAN	S. RAMESH BABU
Designation	1. Asso. Professor 2. Asst. Professor	Prof & Head
Date	29/3/2023	29/3/2023
Remarks *:		
Remarks *:		

* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD