GOVERNMENT POLYTECHNIC,BARGRAH

DEPARTMENT OF ELECTRICAL ENGINEERING

LESION PLAN

ENGINEERING MECHANICS

PREPARED BY:

CHITTA RANJAN MEHER

ARUN KUMAR SAHU

LECTURE IN MECHANICA ENGINEERING (PTGF)

GOVERNMENT POLYTECHNIC, BARGARH

VISION

To be a reputed polytechnic institute imparting quality technical education to produce diploma engineers with dynamic personalities and innovative competencies in the state of Odisha.

MISSION

M1:- To offer the best and advanced lab facilities adhering to the curriculum to make future engineers.
M2:- To engage highly qualified and competent faculties to make the student acquire the skillful knowledge required.
M3:- To develop an excellent teaching learning environment leading to create the best institute.

DEPT OF ELECTRICAL ENGINEERING, G.P. BARGARH

VISION

To produce Electrical Engineering professionals who can contribute for socio-economic and technological development to meet global needs.

MISSION

M1:- To strengthen academic infrastructure leading to quality professional by using modern technical tools and technologies.

M2: - To impart innovative knowledge among the students and make more industry-institution programs to make them successful professionals for serving the society.

M3: - To provide a learning environment to improve problem solving abilities, leadership abilities, ethical responsibilities and lifelong learning.

PROGRAM EDUCATIONAL OBJECTIVE (PEO)

PEO1: - To obtain basic and advanced knowledge in Electrical Engineering for employment in public/private sector organizations.

PEO2: - To encourage the students for higher studies by acquiring knowledge in the basic and emerging areas of Electrical Engineering.

PEO3: - To become entrepreneurs to showcase innovative ideas.

PEO4:- To have a well-rounded education that includes excellent communication skills, working effectively on team-based projects, ethical and social responsibilities.

Th. 4. ENGINEERING MECHANICS
(2nd sem Common)

Theory: 4 Periods per Week — I.A : 20 Marks
Total Periods: 60 Periods — End Sem Exam : 80 Marks
Examination: 3 Hours — TOTAL MARKS : 100 Marks

Objective:

On completion of the subject, the student will be able to do:

1. Compute the force, moment & their application through solving of simple problems oncoplanar forces.
2. Understand the concept of equilibrium of rigid bodies.
3. Know the existence of friction & its applications through solution of problems on above.
4. Locate the C.G. & find M.I. of different geometrical figures.
5. Know the application of simple lifting machines.
6. Understand the principles of dynamics.

Topic wise distribution of periods

Sl. No.	Topics	Periods
1	Fundamentals of Engineering Mechanics	14
2	Equilibrium	08
3	Friction	10
4	Centroid & moment of Inertia	14
5	Simple Machines	08
6	Dynamics	06
	TOTAL	**60**

1. FUNDAMENTALS OF ENGINEERING MECHANICS

1.1 Fundamentals.

Definitions of Mechanics, Statics, Dynamics, Rigid Bodies,

1.2 Force

Force System.

Definition, Classification of force system according to plane & line of action. Characteristics of Force & effect of Force. Principles of Transmissibility & Principles of Superposition. Action & Reaction Forces & concept of Free Body Diagram.

1.3 Resolution of a Force.

Definition, Method of Resolution, Types of Component forces, Perpendicular components & non-perpendicular components.

1.4 Composition of Forces.

Definition, Resultant Force, Method of composition of forces, such as

1.4.1 Analytical Method such as Law of Parallelogram of forces & method ofresolution.

1.4.2. Graphical Method.

Introduction, Space diagram, Vector diagram, Polygon law of forces.

1.4.3 Resultant of concurrent, non-concurrent & parallel force system by Analytical& Graphical Method.

1.5 Moment of Force.

Definition, Geometrical meaning of moment of a force, measurement ofmoment of a force & its S.I units. Classification of moments according to

direction of rotation, sign convention, Law of moments, Varignon's Theorem,Couple – Definition, S.I. units, measurement of couple, properties of couple.

2. EQUILIBRIUM

2.1 Definition, condition of equilibrium, Analytical & Graphical conditions ofequilibrium for concurrent, non-concurrent & Free Body Diagram.

2.2 Lamia's Theorem – Statement, Application for solving various engineeringproblems.

3. FRICTION

3.1 Definition of friction, Frictional forces, Limiting frictional force, Coefficient ofFriction.

Angle of Friction & Repose, Laws of Friction, Advantages & Disadvantages ofFriction.

3.2 Equilibrium of bodies on level plane – Force applied on horizontal & inclined plane(up &down).

3.3 Ladder, Wedge Friction.

4. CENTROID & MOMENT OF INERTIA

4.1 Centroid – Definition, Moment of an area about an axis, centroid of geometrical figures such as squares, rectangles, triangles, circles, semicircles & quarter circles, centroid of composite figures.

4.2 Moment of Inertia – Definition, Parallel axis & Perpendicular axis Theorems. M.I. of plane lamina & different engineering sections.

5. SIMPLE MACHINES

5.1 Definition of simple machine, velocity ratio of simple and compound gear train, explain simple & compound lifting machine, define M.A, V.R. & Efficiency & State the relation between them, State Law of Machine, Reversibility of Machine, Self Locking Machine.

5.2 Study of simple machines – simple axle & wheel, single purchase crabwinch & double purchase crab winch, Worm & Worm Wheel, Screw Jack.

5.3 Types of hoisting machine like derricks etc, Their use and working principle.

No problems.

6. DYNAMICS

6.1 Kinematics & Kinetics, Principles of Dynamics, Newton's Laws of Motion, Motion of Particle acted upon by a constant force, Equations of motion, De- Alembert's Principle.

6.2 Work, Power, Energy & its Engineering Applications, Kinetic & Potential energy& its application.

Momentum & impulse, conservation of energy & linear momentum,collision of elastic bodies, and Coefficient of Restitution

AFTER COMPLETION OF THE COURSE THE STUDENTS WILL BE ABLE TO	
C102.1	Describe the fundamentals of Engineering Mechanics & explain Equilibrium
C102.2	Define Friction & discuss the equilibrium of bodies on level plane
C102.3	Understand the concept of centroid & Moment of Inertia
C102.4	Define & classify the types of simple machines.
C102.5	Implement the principles of dynamics.

SESSION :2023-2024 COURSE CODE:TH3 SEMSETER :3RD PERIOD/WEEK:4 TOTAL PERIOD :60		NAME OF THE FACULTY:MRS CHITTA RANJAN MEHER COURSE NAME :ELEMENT OF MECHANICAL ENGG DATE:01.08.2023 TO 30.11.2023
SL NO	DATE	TOPIC
1	16.08.2023	**FUNDAMENTAL OF ENGINEERING MECHANICS** Introduction of engineering mechanics.
2	17.08.2023	Definitions of Mechanics, Statics, Dynamics, Rigid Bodies,
3	18.08.2023	define Force ,System of force,
4	21.08.2023	Classification of force system according to plane & line of action..
5	23.08.2023	Characteristics of Force &effect ofForce.
6	24.08.2023	Principles of Transmissibility & Principles of Superposition.
7	24.08.2023	Action & Reaction Forces & concept ofFree Body Diagram..
8	25.08.2023	Resolution of a Force. Definition
9	28.08.2023	Method of Resolution, Types of Component forces
10	31.08.2023	Perpendicular components & non-perpendicularcomponents of force
11	01.09.2023	Composition of Forces. Definition, Resultant Force,
12	04.09.2023	Method of composition offorces,
13	07.09.2023	Analytical Method such as Law of Parallelogram of forces.
14	08.09.2023	method of resolution
15	11.09.2023	Graphical Method.
16	13.09.2023	Introduction, Space diagram, Vector diagram
17	14.09.2023	Polygon lawof forces. Resultant of concurrent
18	15.09.2023	Non-concurrent & parallel force system by Analytical & Graphical Method.
19	18.09.2023	Moment of Force.
20	21.09.2023	Definition, Geometrical meaning of moment of a force,
21	22.09.2023	Measurement of moment of force
22	25.09.2023	Classification of moments according to direction of rotation
23	27.09.2023	Sign convention, fo moment of force
24	28.09.2023	Law of moments, Varignon's Theorem,
25	29.09.2023	Couple – Definition, S.I. units, measurement ofcouple, properties of couple
26	04.10.2023	**EQUILIBRIUM** Definition, condition of equilibrium,
27	05.10.2023	Analytical & Graphical conditions of equilibrium for concurrent,
28	06.10.2023	non-concurrent & Free
29	09.10.2023	Body Diagram. Lamia's Theorem, Statement,

30	11.10.2023	Proof of free body diagram
31	12.10.2023	Problem on lamis theorem
32	13.10.2023	Problem on moment of force
33	16.10.2023	Problem on moment of force
34	18.10.2023	Application for solving various engineeringproblems.
35	19.10.2023	**FRICTION** Definition of friction, Frictional forces,
36	20.10.2023	Limiting frictional force
37	30.10.2023	Coefficient of Friction.
38	01.11.2023	Angle of Friction & Repose,
39	02.11.2023	Laws of Friction,
40	03.11.2023	Advantages & Disadvantages of Friction.
41	06.11.2023	, Equilibrium of bodies on level plane
42	08.11.2023	Force applied onhorizontal
43	09.11.2023	inclined plane (up &down)
44	10.11.2023	.Ladder, WedgeFriction.
45	13.11.2023	**CENTROID & MOMENT OF INERTIA** Centroid –Definition, Moment of an area about an axis,
46	15.11.2023	centroid ofgeometrical figures such as squares, rectangles,
47	16.11.2023	Triangles, circles, semicircles & quarter circles, centroidof composite figures.
48	17.11.2023	Definition, Parallel axis & Perpendicular axis Theorems.
49	22.11.2023	Moment of Inertia ,Definition, Parallel axis & Perpendicular axis Theorems.
50	23.11.2023	M.I. of plane lamina & different engineering sections.
51	29.11.2023	**SIMPLE MACHINES** Definition of simple machine,
52	30.11.2023	velocity ratio of simpleand compound gear train, explain simple &
53	01.12.2023	compoundlifting machine, define M.A, V.R. & Efficiency & State the relation between them,
54	04.12.2023	State Law of Machine, Reversibility of Machine, Self Locking Machine.
55	05.12.2023	Study of simple machines simple axle & wheel,
56	07.12.2023	single purchase crab winch &double purchase crab winch, Worm & Worm Wheel
57	08.12.2023	Screw Jack. Types of hoisting machine like derricks etc, Their use andworking principle. No problems.
58	11.12.2023	**DYNAMICS** Kinematics & Kinetics, Principles of Dynamics, Newton's Laws of Motion,
59	12.12.2023	Motion of Particle acted upon by a constant force, Equations of motion, De- Alembert's Principle.
60	14.12.2023	Work, Power, Energy & its Engineering Applications,Kinetic & Potential energy & its application.

61	15.12.2023	Momentum &impulse, conservation of energy &
62	16.12.2023	collision of elastic bodies, and Coefficient of Restitution linear momentum,
63	16.12.2023	collision of elastic bodies, andCoefficient of Restitution

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SIGNATURE OF HOD

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