



## ACADEMIC LESSION PLAN FOR WINTER 1<sup>ST</sup> SEMESTER - 2022.

Dept. Of Civil Engg., Govt. Polytechnic, Balasore.

Name of the Faculty: FRANKAN KUMAR BASA

### ENGINEERING MECHANICS

Course Code : TH-4

Theory : 4P/W

Total Periods : 60 P/SEM

Examination : 3 Hours

Sem : 1<sup>ST</sup> SEM Civil

Class Test : 20 Marks

End Semester Exam : 80marks

TOTAL MARKS : 100 Marks

Start : 15 /09/2022

WEEK	PERIOD	TOPIC
1st	1 <sup>st</sup>	Fundamentals. Definitions of Mechanics, Statics, Dynamics, Rigid Bodies, Mass, Weight, Length, Time, Scalar & Vector, Fundamental units. Derived units, S.I. units.
	2 <sup>nd</sup>	Force Definition of Force & its units, Representation of Force by vector, Characteristics of Force & effect of Force.
	3 <sup>rd</sup>	Principles of Transmissibility & Principles of Superposition. Action & Reaction Forces & concept of Free Body Diagram.
	4 <sup>th</sup>	Resolution of a Force. Definition, Method of Resolution, Types of Component forces, Perpendicular components & non-perpendicular components. Moment of Force.
2 <sup>nd</sup>	1 <sup>st</sup>	Definition, Geometrical meaning of moment of a force, measurement of moment of a force & its S.I units. Classification of moments according to direction of rotation, sign convention,.
	2 <sup>nd</sup>	Law of moments, Varignon's Theorem, Couple – Definition, S.I. units, measurement of couple, properties of couple
	3 <sup>rd</sup>	Force System. Definition, Classification of force system according to plane & line of action.
	4 <sup>th</sup>	Composition of Forces. Definition, Resultant Force,
3 <sup>rd</sup>	1 <sup>st</sup>	Method of composition of forces
	2 <sup>nd</sup>	Analytical Method such as Law of Parallelogram of forces & method of resolution.
	3 <sup>rd</sup>	Analytical Method such as Law of Parallelogram of forces & method of resolution.
	4 <sup>th</sup>	Graphical Method. Introduction,
4 <sup>th</sup>	1 <sup>st</sup>	Space diagram, Vector diagram, Polygon law of forces.
	2 <sup>nd</sup>	Resultant of concurrent, non-concurrent & parallel force system by Analytical & Graphical Method.
	3 <sup>rd</sup>	Definition, condition of equilibrium, Analytical
	4 <sup>th</sup>	Definition, condition of equilibrium & Graphical conditions of equilibrium for concurrent

5 <sup>th</sup>	1 <sup>st</sup>	Definition, condition of equilibrium, Analytical & Graphical conditions of non-concurrent
	2 <sup>nd</sup>	Free Body Diagram.
	3 <sup>rd</sup>	Lamia's Theorem–Statement, Application for solving various engineering problems
	4 <sup>th</sup>	Lamia's Theorem–Statement, Application for solving various engineering problems
6 <sup>th</sup>	1 <sup>st</sup>	Lamia's Theorem–Statement, Application for solving various engineering problems
	2 <sup>nd</sup>	Lamia's Theorem–Statement, Application for solving various engineering problems
	3 <sup>rd</sup>	Definition of friction,
	4 <sup>th</sup>	Frictional forces,
7 <sup>th</sup>	1 <sup>st</sup>	Limiting frictional force,
	2 <sup>nd</sup>	Coefficient of Friction.
	3 <sup>rd</sup>	Angle of Friction & Repose
	4 <sup>th</sup>	Laws of Friction,
8 <sup>th</sup>	1 <sup>st</sup>	Advantages & Disadvantages of Friction.
	2 <sup>nd</sup>	Equilibrium of bodies on level plane – Force applied on horizontal & inclined plane (up & down)..
	3 <sup>rd</sup>	Equilibrium of bodies on level plane – Force applied on horizontal & inclined plane (up & down)..
	4 <sup>th</sup>	Ladder, Wedge Friction
9 <sup>th</sup>	1 <sup>st</sup>	Centroid – Definition, Moment of an area about an axis,
	2 <sup>nd</sup>	Centroid of geometrical figures
	3 <sup>rd</sup>	Centroid squares,
	4 <sup>th</sup>	Centroid rectangles
10 <sup>th</sup>	1 <sup>st</sup>	Centroid triangles,
	2 <sup>nd</sup>	Centroid circles
	3 <sup>rd</sup>	Centroid semicircles
	4 <sup>th</sup>	Centroid quarter circles

11 <sup>th</sup>	1 <sup>st</sup>	Centroid of composite figures
	2 <sup>nd</sup>	Moment of Inertia – Definition,
	3 <sup>rd</sup>	Parallel axis
	4 <sup>th</sup>	Perpendicular axis
12 <sup>th</sup>	1 <sup>st</sup>	Theorems. M.I. of plane lamina & different engineering sections.
	2 <sup>nd</sup>	Theorems. M.I. of plane lamina & different engineering sections.
	3 <sup>rd</sup>	Definition of simple machine,
	4 <sup>th</sup>	Velocity ratio of simple
13 <sup>th</sup>	1 <sup>st</sup>	Compound gear train, explain simple & compound lifting machine,
	2 <sup>nd</sup>	Define M.A, V.R. & Efficiency & State the relation between them,
	3 <sup>rd</sup>	State Law of Machine, Reversibility of Machine, Self Locking Machine.,
	4 <sup>th</sup>	Study of simple machines – simple axle & wheel
14 <sup>th</sup>	1 <sup>st</sup>	Single purchase crab winch
	2 <sup>nd</sup>	Double purchase crab winch, Worm & Worm Wheel, Screw Jack.
	3 <sup>rd</sup>	Define Kinematics & Kinetics,
	4 <sup>th</sup>	State Principles of Dynamics, Newton's Laws of Motion,.
15 <sup>th</sup>	1 <sup>st</sup>	Motion of Particle acted upon by a constant force, Equations of motion, De-Alembert's Principle
	2 <sup>nd</sup>	Work, Power, Energy & its Engineering Applications, explain Kinetic & Potential energy & its application.
	3 <sup>rd</sup>	Define Momentum & impulse, explain conservation of energy & linear momentum,
	4 <sup>th</sup>	explain collision of elastic bodies, and define Coefficient of Restitution.