RSET
RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY
(Autonomous)

RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

B.TECH. DEGREE PROGRAMME

FIRST SEMESTER

(2020 ADMISSIONS)

100908/CE900C	ENGINEERING MECHANICS

SYLLABUS

Rajagiri Valley, Kakkanad,
Kochi 682 039, Kerala, INDIA
www.rajagiritech.ac.in

COURSE CODE	COURSE NAME	L	T	P	CREDIT	YEAR OF INTRODUCTION
100908/CE900C	ENGINEERING MECHANICS	2	1	0	3	2020

1. **Preamble:** This course introduces students to some basic concepts of engineering mechanics. The course focuses on forces, centroids and moment of inertias and techniques to evaluate their effects on rigid bodies either at rest or in motion. It familiarizes students to the phenomenon of friction and its effects on rigid bodies. The course aims at introducing students to cognitive learning in applied mechanics and enhances their logical reasoning and analytical skills.

2. **Prerequisite:** Nil

3. **Syllabus**

Module 1

Introduction to Engineering Mechanics-statics-basic principles of statics-Parallelogram law, equilibrium law, principles of superposition and transmissibility, law of action and reaction(review) free body diagrams.

Concurrent coplanar forces- composition and resolution of forces-resultant and equilibrium equations – methods of projections – methods of moments – Varignon's Theorem of moments.

Module 2

Friction – sliding friction - Coulomb's laws of friction – analysis of single bodies – wedges, ladder analysis of connected bodies .

Parallel coplanar forces – couple - resultant of parallel forces – centre of parallel forces – equilibrium of parallel forces – Simple beam subject to concentrated vertical loads. General coplanar force system - resultant and equilibrium equations.

Module 3

Centroid of composite areas- – moment of inertia-parallel axis and perpendicular axis theorems. Polar moment of inertia,radius of gyration,mass moment of inertia-ring,cylinder and disc. Theorem of Pappus Guldinus(demonstration only)

Forces in space - vectorial representation of forces, moments and couples –resultant and equilibrium equations – concurrent forces in space (simple problems only)

Module 4

Dynamics – rectilinear translation - equations of kinematics (review)

kinetics – equation of motion – D'Alembert's principle. – motion on horizontal and inclined surfaces, motion of connected bodies. Impulse momentum equation and work energy equation (concepts only).

Curvilinear translation - equations of kinematics –projectile motion(review), kinetics – equation of motion. Moment of momentum and work energy equation (concepts only).

Module 5

Rotation – kinematics of rotation- equation of motion for a rigid body rotating about a fixed axis – rotation under a constant moment.

Plane motion of rigid body – instantaneous centre of rotation (concept only).

Simple harmonic motion – free vibration –degree of freedom- undamped free vibration of spring mass system-effect of damping (concept only)

4. Text Books

1. Timoshenko and Young, Engineering Mechanics, McGraw Hill Publishers
2. Shames, I. H., Engineering Mechanics - Statics and Dynamics, Prentice Hall of India.
3. R. C. Hibbeler and Ashok Gupta, Engineering Mechanics, Vol. I statics, Vol II Dynamics, Pearson Education.

5. Reference Books

1. Merriam J. L and Kraige L. G., Engineering Mechanics - Vols. 1 and 2, John Wiley.
2. Tayal A K, Engineering Mechanics – Statics and Dynamics, Umesh Publications
3. Bhavikkatti, S.S., Engineering Mechanics, New Age International Publishers
4. F.P.Beer abd E.R.Johnston (2011), Vector Mechanics for Engineers, Vol.I-Statics, Vol.II-Dynamics, 9th Ed, Tata McGraw Hill
5. Rajasekaran S and Sankarasubramanian G, Engineering Mechanics - Statics and Dynamics, Vikas Publishing House Pvt Ltd.

6. Course Outcomes:

After the completion of the course the student will be able to

CO1: Recall principles and theorems related to rigid body mechanics.

CO2: Identify and describe the components of system of forces acting on the rigid body

CO3: Apply the conditions of equilibrium to various practical problems involving different force system.

CO4: Choose appropriate theorems, principles or formulae to solve problems of mechanics.

CO5: Solve problems involving rigid bodies, applying the properties of distributed areas and masses.

7. Mapping of course outcomes with program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2										
CO2	3	3										
CO3	3	3										
CO4	3	3										
CO5	3	3										

8. Assessment Pattern (marginal changes can be made according to the question paper pattern):

Learning Objectives	Continuous Internal Evaluation (CIE)		End Semester Examination (ESE out of 100)
	Internal Examination 1 (25)	Internal Examination 2 (25)	
Remember	6	6	15
Understand	6	6	15
Apply	13	13	70

9. Mark Distribution

Total	CIE				ESE
	Attendance	Internal Examination	Assignment/Quiz/Course Project	Total	
150	10	25 (Average of two scores)	15	50	100

10. End Semester Examination Pattern

There will be two parts; Part A and Part B. Part A contains 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer any one. Each question will have 2 sub-divisions (7 marks each) and carry 14 marks.