Course code: Course Title	Course Structure			Pre-Requisite
	L	T	P	
AE104: Engineering Mechanics	3	0	2	NIL

Course Objective: The course aims to give students practice in applying their knowledge of mathematics, science, and engineering in the vast area of "rigid body Mechanics" and make the students able to analyse the problems of truss and frictions. This course also provide the student with skills to analyse kinematics of particles and rigid bodies.

S. NO	Course Outcomes (CO)
CO1	Describe the basic laws and principles of mechanics
CO2	Analyze and solve simple problems in mechanics
CO3	Draw free body diagrams and determine the resultant of forces and/or moments
CO4	Determine the centroid and second moment of area of sections. Learn to draw shear force and bending moment diagrams

CO5	Solve problems in kinematic and dynamic systems

S. NO	Contents	Contact Hours
UNIT 1	Statics: Introduction, Important Vector quantities of Mechanics, Equivalent System of Forces. Moment of a force: Varignon's Theorem. Couple, Equivalent Couples, Equilibrium of Rigid Bodies, Free Body Diagram, Conditions of Rigid Bodies. (Solution of the problems by Vector method also.)	**7**
UNIT 2	Center of Gravity and Moment of Inertia: First and second moment of area and mass, radius of gyration, parallel axis theorem, product of inertia, rotation of axes and principal M. I., Thin plates, M.I. by direct method (integration), composite bodies. Virtual work and Energy method: Virtual Displacement, principle of virtual work, mechanical efficiency, work of a force/couple (springs etc.), Potential Energy and equilibrium, stability.	**7**
UNIT 3	Truss: Types, Solution of Simple plane trusses by analytical and graphical methods.	**7**
UNIT 4	Friction: Laws of dry friction, Friction Cone, Angle of Repose, Engineering Applications of friction e.g. Wedge, Belt & Pulley and Screw Jack etc. Shear Forces and Bending Moments in Different Beams. Dynamics.	**7**
UNIT 5	Kinematics of Particles: Rectilinear motion, plane curvilinear motion - rectangular coordinates, normal and tangential component. Kinetics of Particles: Equation of motion, rectilinear motion and curvilinear motion, work energy equation, conservation of energy, impulse and momentum conservation of momentum, impact of bodies, co-efficient of restitution, loss of energy during impact. Euler equations of motion and its application.	**7**
UNIT 6	Kinematics of Rigid Bodies: Concept of rigid body, type of rigid body motion, absolute motion, introduction to relative velocity, relative acceleration (Corioli's component excluded) and instantaneous center of velocity, Velocity and acceleration polygons for four bar mechanism and single slider mechanism. Kinetics of Rigid Bodies: Equation of motion, translatory motion and fixed axis rotation, application of work energy principles to rigid bodies conservation of energy.	**7**
	TOTAL	**42**

REFERENCES		
S.No.	**Name of Books/Authors/Publishers**	**Year of Publication / Reprint**

1	Mechanics for Engineers: Statics and Dynamics; Beer and Johnston, TataMcGraw hill Publishing Company Limited.	2013
2	Engineering Mechanics: I. H. Shames, Statics and dynamics, 4th Ed, PHI, 2002. ISBN-13: 978-0132791588	2002
3	Engineering Mechanics; S. S. Bhavikatti, New Age International Publishers.	2012
4	Engineering Mechanics; J. L. Meriam, L. G. Kraige, Vol I – Statics, Vol II – Dynamics, John Wiley, 6th edition.	2012

B. Tech. Mathematics and Computing

Course code: Course Title	Course Structure			Pre-Requisite
	L	T	P	
MC102: Complex Analysis	**3**	**1**	**0**	**NIL**

Course Objective: To acquaint the students with the knowledge of complex variables, contour integration, conformal mappings.

S. NO	Course Outcomes (CO)
CO1	Explain techniques of complex analysis in a comprehensible manner.
CO2	Identify the concepts and applications of complex analysis in mathematical modelling, physics and many other areas of mathematics especially applied scientific computing.
CO3	Apply appropriate complex analysis techniques in solving science and engineering related problems arising in various fields such as mechanical, electrical, and aerospace.
CO4	Describe use of techniques of complex analysis in applied mathematics and real-life applications.

S. NO	Contents	Contact Hours
UNIT 1	Algebra of complex numbers, the complex plane, polynomials, power series, radius of convergence, transcendental functions, Riemann Sphere, Stereographic Projection.	8

UNIT 2	Analytic functions, Cauchy-Riemann equations, Harmonic functions, Construction of analytic functions.	8
UNIT 3	Linear and bilinear Transformation, cross ratio and conformal mappings.	8
UNIT 4	Line integral in the Complex Plane, Cauchy's integral theorem, Cauchy's integral formula, Derivatives of Analytic functions, Morera's theorem, Cauchy's estimate, Liouville's theorem, Fundamental theorem of Algebra.	9
UNIT 5	Taylor Series and Laurent Series, Singularities, types of singularities, zeros and poles, Residues, Residue theorem and its applications to evaluate improper real integrals.	9
	TOTAL	**42**

REFERENCES

S.No.	Name of Books/Authors/Publishers	Year of Publication / Reprint
1	Functions of One Complex Variable; J. B. Conway, Springer	2012
2	Complex Analysis; J. Bak, D. J. Newman.	2017
3	Churchill and Brown, Complex Analysis with applications, Dennis G. Zill & Shanahan, Jones & Bartlett (student edition) 2nd Edition.	2009
4	Complex Variable; Schaum Series.	2009
5	Complex Analysis; A. Bourchtein, L. Bourchtein, Springer, 1st edition.	2021

B. Tech. Production and Industrial Engineering