Master of Technology
(Aerospace Structure and Design)

Program Outcomes (POs)

- PO1: An ability to independently carry out research / investigation and development work to solve practical problems.
- PO2: An ability to write and present a substantial technical report / document.
- PO3: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor.

Program Specific Outcomes (PSO)

- ✓ PSO 1: Graduates will possess skills in design, development and testing of aerospace structures.
- ✓ PSO 2: Graduates will become professionally competent to take up real time projects through aerospace industries.
- ✓ PSO 3: Graduates will become globally competitive by pursuing research in the area of avionics.

Department of Aerospace Engineering

Course Outcomes (COs)

2019 – 2021 Batch

Semester	Course Code	Course Name	Course Outcomes (COs)
I	19MTAS101	MATHEMATICS FOR AEROSPACE ENGINEERS	CO1 : Solve ordinary and partial differential equations using numerical techniques CO2 : Apply principles of matrix algebra to linear transformations. CO3 : Analyze the functions and signals using Fourier series and Fourier transforms CO4 : Apply the concept of Calculus on Complex functions
	19MTAS102	AEROSPACE STRUCTURES	CO1: The students who learn the basics can handle the design of modern aircraft design CO2: The research career aspiring students have introduction to sufficient novel concepts from the course and they can embark on innovating work touching the frontiers of science. CO3: Sufficient learning will be acquired by the students o the computational aspects of Structural Mechanics CO4: Students gain confidence not to get scared and consequently refrain from using the modern aspects of structural science.
	19MTAS103	INTRODUCTION TO AEROSPACE VEHICLES	CO1: To explain characteristics of airfoils, use of wind tunnel, basics if airplane stability, and Helicopters CO2: To identify the materials used for aircraft structure and its structural layout CO3: To explain working principles of different types of airbreathing propulsion systems and propulsion in helicopters. CO4: To explain major aircraft systems and aircraft navigational aids CO5: To explain forces on a body in a central force field, rocket propulsion, and typical launch vehicle configurations
	19MTAS104	AERODYNAMICS & FLIGHT MECHANICS	CO1: Modeling of bodies for aerodynamic analysis. CO2: Exposure to different airfoils, understating the influence of each of geometric parameter of the airfoil on aerodynamic forces & moments. CO3: Calculation of aircraft performance with specific reference to different speeds, range & endurance.
	19MTAS102L	AEROSPACE STRUCTURES LAB	CO1 : To measure the dimensions of various specimen by Vernier Caliper, Dial Gauge that finds applications in all the

			experiments. CO2 : To enable the students to understand the various theorems and calculations based on Strength of Materials and Aircraft Structures approach. CO3 : To study the fringe patterns of Stress and Strain using Photoelastic techniques. CO4 : To understand the concepts of Vibrations and Elastic Stability.
	19MTAS111	AIRCRAFT PROPULSION	CO1 :Understand the basic principles of propulsion systems. CO2 :Analyze the basic performance parameters of propulsion systems. CO3 :Describe the design of propulsion systems CO4 :Solve problems on design and performance of propulsion systems. CO5 :Explain the working principles of different components of propulsion systems.
	19MTAS112	FAILURE & RISK ANALYSIS OF AERO PROPULSION SYSTEMS	CO1: Suggest inspection and examination methods of aero- engine components CO2: Carry out basic failure analysis methodology CO3: Suggest risk mitigation methods
II	19MTAS201	INTRODUCTION TO FINITE ELEMENT METHODS	CO1: ability to handle complex structural problems such as those encountered in aerospace. CO2: logical approach the way FEM meshes are created for a given problem CO3: ability to debug and interpret the results. CO4: ability to embark on adding further capability to existing software.
	19MTAS202	INTRODUCTION TO AERO ELASTICITY	CO1 : Understanding of principles of vibration, elements of a vibrating system, classification of vibration , types of damping , free and forced vibration of undamped and damped single and two degree of freedom systems, principal coordinates, natural frequencies and mode shapes, normal modes, modal analysis etc. CO2 : Understanding of aeroelastic phenomenon and the multidisciplinary interactions involved, historical background, static aeroelastic phenomena like divergence, control effectiveness and reverasal , ability to model them, solution methods , extension to 3-D wings from 2-D airfoil models. CO3 : Understanding of dynamic aeroelastic phenomenon like flutter and ability to model and analyse them using

			simple two dimensional models and extension to 3-D flutter analysis.
	19MTAS203	FATIGUE AND FRACTURE	CO1: Students can solve and analyze the problems with crack like damages in the structural components CO2: Relate the Griffith and Irwin concepts to solve the stress singularities ahead of the crack tip CO3: Students with computational techniques concepts will be able to compute the fracture parameters and estimate the remaining life of the components CO4: Students should be able to apply the necessary NDT technique to detect crack like damages in the structures.
	19MTAS204L	WIND TUNNEL LAB	CO1 : Understanding fundamentals of design of different types of wind tunnels eg. Subsonic, transonic, supersonic and hypersonic, Blow down and suction types, open circuit and closed circuit; Aeronautical wind tunnel, water tunnel, environmental wind tunnels. CO2 : Ability to plan & conduct wind tunnel experiments. CO3 : Ability to collect and interpret wind tunnel data. CO4 : Ability to apply flow visualization techniques using wind tunnel
	19MTAS241	COMPUTATIONAL FLUID DYNAMICS	CO1: Define and derive the governing equations of fluid flow. CO 2: Solve partial differential equations using finite difference, finite volume and finite element method. CO 3: Learn different methods for solution of incompressible flows CO 4: Understand basics of turbulence modeling and compressible flow solvers
	19MTAS242	STRUCTURAL HEALTH MONITORING	CO1: The students undergoing this course will be able to enter research & development arena in safety related projects. CO2: The students will be useful in the development of

			most sought out software and hardware related to Digital Twin & IVHM. CO3: The transportation based industries and large installations need engineers who could design and maintain these novel concepts from safety angles.
	19MTAS251	BASICS OF HELICOPTER	CO1: Understand the basic concepts associated with rotary wing aerodynamics. CO2: Helicopter configurations based on various rotor classifications. CO3: Aerodynamics & performance of helicopter in Hover, climb, descent, forward flight and autorotation. CO4:Introduction to helicopter dynamics highlighting the interaction & coupling of aerodynamics and blade motions. CO5: Basic helicopter controls and mechanism for achieving these controls. CO6: Sources of vibration of helicopter. Isolation and or reduction of vibrations.
	19MTAS252	COMPOSITE STRUCTURES AND MATERIALS	CO1 : Understanding of different types of composite materials , their advantages , properties of constituent materials, definition of a composite structure CO2 : Analysis methods at micro and macro levels, failure analysis, classical laminate theory for laminated composites. CO3 : Manufacturing of fibre reinforced composite structures & quality assurance . CO4 : Design of laminated composite structures including joints, approach to optimization and aerospace applications .
III	19MTAS301	RESEARCH METHODOLOGY	CO1: Apply a range of quantitative and / or qualitative research techniques to business and management problems / issues CO2: Demonstrate knowledge and understanding of data analysis and interpretation in relation to the research process. CO3: Conceptualise the research process. CO4: Assess critically the following methods: literature

			study, case study, structured surveys, interviews, focus groups, participatory approaches, narrative analysis, scenario methodology and basic statistical methods. CO5: Develop necessary critical thinking skills in order to evaluate different research approaches utilised in the service industries
	19MTAS302	INTELLECTUAL PROPERTY RIGHTS	CO1: Students will have knowledge of Intellectual Property & Intellectual Property rights and their importance as an intangible asset. CO2: Students will understand different forms of Industrial Properties & Copyright with corresponding rights. CO3 :Students will have understanding of global and national IP policies and registration procedures. CO4: Students will understand Strategic management of IP, IP auditing and IP business wealth generation.
	19MTAS341	ELASTIC AND INELASTIC STABILITY OF STRUCTURES	CO1 : Calculate elastic and inelastic buckling of column, beam, plate, stiffened plates and shells through equilibrium method and approximation methods, design and analysis. useful in aerospace structures CO2 :Estimation of ultimate load and design margin for various typed of aircraft and space structures. CO3 : To understand buckling short and long columns, inelastic buckling for open sections like stiffeners of various cross sections T, I, Hat sections. CO4 : Ability to carry out post buckling behaviour of structures through energy method.
	19MTAS342	ANALYSIS AND DESIGN OF COMPOSITE STRUCTURES	CO1: Understanding of different types of composite materials , their advantages , properties of constituent materials, definition of a composite structure CO2: Analysis methods at micro and macro levels, classical laminate theory for laminated composites, failure analysis and failure criteria, hygrothermal effects on mechanical behavior and their assessment CO3: Design of laminated composite structures including joints, stiffened structures, co-cured and co-bonded structures and approach to optimization.