

# Noorul Islam Centre for Higher Education

(Deemed to be University u/s 3 of the UGC Act 1956)

Kumaracoil, Thuckalay, Kanyakumari District - 629 180

Accredited by NAAC with 'A' Grade

AE22 B.E AERONAUTICAL ENGINEERING



## Student Performance and Learning Outcomes

## AE22 B.E AERONAUTICAL ENGINEERING

Programme Outcome - PO	
PO-A	To apply the knowledge of mathematics, science and engineering.
PO-B	Ability to analyze, interpret and solve complex engineering problems.
PO-C	Ability to visualize and work on laboratory for multidisciplinary needs.
PO-D	Ability to integrate all the modes of analysis for accuracy solutions during arbitrary problems.
PO-E	Ability to demonstrate the skills using modern engineering tools and equipments.
PO-F	Ability to function on multidisciplinary teams.
PO-G	Graduates will be able to communicate effectively in both verbal and written form.
PO-H	Graduates will contribute to the needs of the society.
PO-I	Able to get broad education necessary to understand the impact of engineering solutions in Global economic and social content.
PO-J	Ability to demonstrate the knowledge of professional and ethical responsibilities.
PO-K	Graduates will achieve successful career in Global industry.
PO-L	Graduates will develop confidence for self-esteem and ability for lifelong learning.
PO-M	Ability to lead the future of Aeronautics.

PROGRAM SPECIFIC OUTCOMES (PSOs)	
PSO 1	The ability to analyze, design and implement the applications of Specific Aircraft systems for complex engineering problems for Structural , Propulsion , Fluid analysis and Heat transfer applications by applying the knowledge of Basic Sciences, Engineering, Mathematics and Engineering fundamentals.
PSO 2	The ability to adapt for rapid changes in Tools and Technology with an understanding of Societal and Ecological issues relevant to professional engineering practice through life-long learning.
PSO 3	Excellent adaptability to function in multi-disciplinary work environment, good interpersonal skills as a leader in a team in appreciation of professional ethics and societal responsibilities.

Sl.No	Subject Code	Subject Name
<b>SEMESTER II</b>		
1.	ME2205	ENGINEERING MECHANICS
2.	ME2201	ENGINEERING GRAPHICS
3.	AE2201	AIRCRAFT PRODUCTION TECHNOLOGY
4.	ME2102	ENGINEERING MATHEMATICS - II
5.	BS2103	ENVIRONMENTAL SCIENCE
6.	EG2102	TECHNICAL ENGLISH - II
7.	AE2271	AERO MODELLING LABORATORY
8.	ME2291	PRODUCTION PROCESS LABORATORY
<b>SEMESTER IV</b>		
9.	AE2204	AERODYNAMICS -I
10.	ME2224	MECHANICS OF MACHINES
11.	AE2206	AIRCRAFT SYSTEMS AND INSTRUMENTATION
12.	AE2205	AIRCRAFT STRUCTURES
13.	MA2203	NUMERICAL METHODS
14.	ME2207	ENGINEERING MATERIALS AND METTALURGY
15.	AE2274	AIRCRAFT SYSTEM,S LABORATORY
16.	ME2276	METALLURGY LABORATORY
17.	AE2273	AIRCRAFT STRUCTURES LABORATORY
<b>SEMESTER VI</b>		
18.	IT1212	CYBER SECURITY
19.	AE1212	AERO ACOUSTICS
20.	AE1213	PROPULSION -II
21.	EE12134	CONTROL ENGINEERING
22.	AE1214	HEAT TRANSFER
23.	AE1215	AIRCRAFT DESIGN
24.	AE1278	CAD & FEM LAB
25.	AE1279	AIRCRAFT DESIGN PROJECT -II
26.	AE1280	NAVIGATION & GUIDANCE LAB
27.	AE1281	PROPULSION LAB
<b>SEMESTER VIII</b>		
28.	AE12A6	AIRTRANSPORATATION AND AIRCRAFT MAINTENACE
29.	AE12C2	CRYOGENICS
30.	AE12B7	ROCKETS AND MISSILES
31.	AE12P5	MAIN PROJECT

### Course Outcomes

#### ME2205 - ENGINEERING MECHANICS

CO1	To apply mathematics and science to simple and practical problems in engineering
CO2	Ability to solve complex problems in reactions and internal forces in beams
CO3	Determination of centroid and moment of inertia of a different geometrical shape and understand its importance
CO4	Know the basics of friction and its importance through simple applications
CO5	Ability to analyze the problems on motion of particles and rigid bodies

#### ME2201 - ENGINEERING GRAPHICS

CO1	Familiarize with the fundamental standards applied in graphical and perform fundamental sketching of basic geometrical construction and multiple view of objects.
CO2	Project orthographic projection of points, line and plane surfaces
CO3	Understand and draw the projection of solids and its sections
CO4	Visualize and project isometric views
CO5	Understand and draw developments of different solids and project orthographic projections of various machine parts

#### AE2201 AIRCRAFT PRODUCTION TECHNOLOGY

CO1	Remembering and understating the basic elements of casting process with its different types.
CO2	Remembering and understanding the elements of various metals forming process towards aircraft structural parts.
CO3	Understand the various elements of machining process towards aircraft structural parts
CO4	Understand the elements of welding process with its different types towards aircraft structural parts.
CO5	Understand the elements of unconventional machining process with types towards aircraft structural applications.

#### MA2102 ENGINEERING MATHEMATICS – II

CO1	Understand the linear differential equation with constant and variable coefficients. To solve the Cauchy's and Legendre equations and solve the differential equations by variation of parameters
CO2	Know about functions of a complex variable, analytic functions, Cauchy's Riemann equations. To prove the properties of analytic functions. To find the analytic function and bilinear transformation.
CO3	Study about Cauchy's integral formula and Cauchy's integral theorem, Laurent's expansion. Know about singular point, Cauchy's integral theorem. To evaluate the integral by contour integration.
CO4	Know about gradient, divergence, curl, directional derivatives, irrotational and solenoidal vector field. To verify the vector integration by Green's theorem, Gauss divergence theorem and Stoke's theorem.
CO5	Obtain the Laplace transform of elementary functions. Transform of derivatives and integrals and periodic functions. To find the inverse Laplace transform using convolution theorem and solve the differential equations.

BS2103 ENVIRONMENTAL SCIENCE	
CO1	Remember and understand the environment and its resources
CO2	Understand the ecosystem and the various techniques to protect ecosystem
CO3	Analyze the causes of environmental pollution
CO4	Synthesize the role of engineer to protect the environment
CO5	Understand the human rights and the value education

EG2102 TECHNICAL ENGLISH – II	
CO1	The Students will be able to improve their vocabulary and use articles and prepositions effectively in sentences.
CO2	The students will be able to understand grammatical items like phrases and verbs, derivatives, relative pronouns etc. and thereby enhance their linguistic competence.
CO3	The students will be able to acquire the essentials of writing skills relating to resume writing, E-mail writing and also the essential components of essay writing.
CO4	The students will be able to learn the basics of letter writing and the formalities involved in writing formal and business letters.
CO5	The students will be able to learn English Phonemes such as vowels, Diphthongs, consonants, Stress and Intonation.

AE2271 AEROMODELING LAB	
CO1	Ability to acquire the knowledge of components & functions of aircraft
CO2	Identify and analysis the various component dimensions and functions
CO3	To analyze the configuration of aircraft components
CO4	To understand the actual aircraft and its functions
CO5	Analyze the various aircraft control surfaces.

ME2291 PRODUCTION PROCESS LAB	
CO1	Understand the elements in Lathe operation and apparatus.
CO2	Understand the element in matching process (Special Machines)
CO3	Apply the practical skill of making at different work using Lathe.
CO4	Apply the practical skills of making at different work using “special Machines”
CO5	Analyze the systematic bond between lathe and type and special machines, and aircraft parts.

AE2204 AERODYNAMCIS-I	
CO1	Apply the basic knowledge of engineering to basic aerodynamic and fluid mechanics
CO2	Ability to analyze the subsonic flows for engineering concepts
CO3	To apply the knowledge of engineering to understand airfoil and wing characteristics.
CO4	To apply the knowledge of aerodynamic sciences to understand incompressible flow over wings.
CO5	Ability to solve the complex engineering concepts and problems on viscous flows.

ME2224 Mechanics of Machines	
CO1	Ability to expose the different machines element and mechanics of machines.
CO2	Ability to design components or parts of mechanism.
CO3	Analyze and solve engineering problem relating to dynamics behavior of vibration.
CO4	Ability to analyze various gears and cam profile.
CO5	Ability to integrate all models of analysis for accuracy solution during arbitrary problems.

AE2206 Aircraft Systems And Instrumentation.	
CO1	Understand the basic concepts of aircraft control systems.
CO2	Ability to analyze the different systems used in aircraft operations.
CO3	To apply the knowledge of different systems used in aircraft engines.
CO4	Understand the different auxiliary systems used in the effective operations of aircrafts.
CO5	To understand the different instruments used in different kind of operations.

AE2205 – Aircraft Structures.	
CO1	Ability to analyze the different structural problems on beams and truss
CO2	Ability to solve complex problems on symmetric and un symmetric beams
CO3	To apply the knowledge of mathematics and engineering to solve shear flow in open and closed sections
CO4	Ability to analyze the safe load conditions on structures like wings and fuselages
CO5	Apply the engineering tools to get accurate solutions on a/c structural problems

MA2203-NUMERICAL METHODS	
CO1	Compute the solution of nonlinear equations using N.R method Fixed point iteration method. Solve a linear system of equation using direct iteration method.
CO2	Apply Interpolation for equal and unequal intervals using Newton's forward, backward divided difference and Lagrange's method.
CO3	Compute the derivatives of functions using numerical values for equal and unequal intervals. Evaluate numerical integration by using Trapezoidal Simpson's Gaussian Quadrature.
CO4	Solve the initial value problem of first order Ordinary Differential Equation by using single and multistep methods.
CO5	Find the finite difference solution of boundary value problem.

ME2207- ENGINEERING MATERIALS AND METTALURGY	
CO1	Apply the knowledge of Engineering to understand the basics of materials used in Engineering aspects.
CO2	Apply the basic knowledge of Heat treatments of Engineering materials and their metallurgical concepts.
CO3	Ability to analyze the concepts and applications of Non-metallic materials.
CO4	Ability to analyze the concepts of nano materials role in materials and metallurgy and their applications.

CO5	Understand about the materials mechanical properties and their testing procedures.
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AE2274 Aircraft Systems Laboratory	
CO1	Illustrate the operations of jacking up and levelling of aircraft with DGCA guidelines.
CO2	Demonstrate rigging and symmetry check on an aircraft
CO3	Report and analyses results for flow test, pressure test, functional test and brake torque load test.
CO4	Review, inspect and safely perform maintenance and troubleshooting on hydraulic systems as per airworthiness standards.
CO5	Review, inspect and safely perform maintenance and troubleshooting on fuel systems as per airworthiness standards.

ME2276 – Metallurgy Laboratory.	
CO1	Ability to acquire the knowledge of functioning of metallurgical microscope
CO2	Identify and analyze various engineering materials on basis of density
CO3	Ability to visualize the microstructures of steels
CO4	To analyze the effect of annealing and normalizing on properties of steel metallographic
CO5	Ability to analyze harden ability of steel by Jominey and quench test

AE2273 Aircraft structures Lab	
CO1	Compare the theoretical and experimental results of beam with various conditions.
CO2	To determine the elastic constant of photo elastic materials.
CO3	Investigate shear centre of closed and open section.
CO4	Analyze the theoretical and experimental result for axial loading on column member.
CO5	Describe and apply the fundamental concepts for analysis of thin wall aircraft structure.

IT1212- Cyber Security	
CO1	Ability to understand different types of networks and its design
CO2	Get an exposure to fundamental importance of security
CO3	Analyze different types of threats and security issues
CO4	Investigate the different protocols and principles towards security
CO5	Learn about investigation and laws against cyber crimes

AE1212 AERO ACOUSTICS	
CO1	Remembering the basic fundamental acoustical knowledge from physics point of view
CO2	Understand the elements of acoustic transmission
CO3	Understand the elements of various noise measurement techniques
CO4	Understand the principles in acoustic insulation
CO5	Understand the principles in control of noise and analyze its techniques.

AE1213 PROPULSION-II	
CO1	Apply the knowledge of engineering to understand the basics of aircraft gas turbines.
CO2	Ability to analyze the concepts of Ramjet & Scramjet engines.

CO3	Apply the knowledge of engineering to understand the fundamentals of rocket propulsion
CO4	Ability to analyze the concepts of chemical rocket
CO5	Understand about various advanced rocket propulsion techniques.

EE12A3 – Control Engineering	
CO1	Understand the fundamentals of Control Engineering
CO2	Determine and use models of physical system
CO3	Determine Time frequency and Domain Response
CO4	Determine the stability of the system
CO5	Apply Control stability into Aircraft

AE1214 Heat Transfer	
CO1	Ability to design components of heat transfer.
CO2	Ability to analysis of various types of heat transfer problem.
CO3	Ability to integrate all modes of heat transfer.
CO4	Able to state appropriate assumption propose mathematical model and select equation.
CO5	To apply the knowledge of thermodynamics.

AE1215 AIRCRAFT DESIGN	
CO1	To apply the knowledge of engineering to understand powerplant characteristics.
CO2	Apply the basic knowledge of aerodynamics to aircraft performance design.
CO3	Ability to analyze stability concepts to aircraft design.
CO4	Ability to solve the design problems on subsonic and supersonic airplanes
CO5	Ability to solve the structural design concepts to aircrafts.

AE1278 CAD & FEM LAB	
CO1	To understand the commands of AutoCadsosftwre& Analysis Software.
CO2	To apply the knowledge of engineering by drawing various Aircraft parts
CO3	To apply the knowledge of engineering by testing various types of beams
CO4	Ability to analyze the complete beam structure using Ansys Software.
CO5	Ability to analyze the behavior of beam structure by applying various loads.

AE1279 – Aircraft Design Project II.	
CO1	To understand the basic concepts, Gust and maneuverability envelopes and the design study of V-n diagram.
CO2	To apply the knowledge of structural layouts, and structural design study of the aircrafts.
CO3	Ability to analyze the load estimation of wings and fuselage.
CO4	Understanding the concepts of balancing and maneuvering loads on tail plane, aileron and rudder.
CO5	Understand the basic design concepts of wings, fuselage, and some components of aircraft and preparing the detailed design report using the software analysis.



AE1280 NAVIGATION & GUIDANCE LAB	
CO1	Ability to acquire the knowledge of 8085 microprocessor.
CO2	Understand the 8-bit & 16-bit data arithmetic and logical operation.
CO3	Understand how to feed the data through microprocessor to systems
CO4	Identify and analyze various mnemonics and opcodes for various operations.
CO5	Understand how aircraft flight control and data system works.

AE12A6 – Air Transportation and Aircraft Maintenance.	
CO1	To understand the basic concepts of airtransportation.
CO2	To apply the basic knowledge of airline economics in the field of airtransportation.
CO3	Identify and analysis the principles of airline scheduling.
CO4	To apply the concepts of aircraft maintenance reliability in airtransportation.
CO5	To analysis and apply the different technology used in aircraft maintenance.

AE12C2 CRYOGENICS	
CO1	Remembering the basics in general cryogenics.
CO2	Understand the various mechanical, thermal, electrical, magnetic properties of cryogenic materials.
CO3	Understand the working principle of various cryogenic-gases liquefaction system
CO4	Understand the working principle of refrigerators using gas, liquid, solid and a refrigerant.
CO5	Understand the elements in cryogenic storage and transfer systems.

AE12B7 ROCKETS & MISSILES	
CO1	To apply the knowledge of engineering to understand the basics rocket systems.
CO2	Ability to analyze the complete aerodynamics of rockets & missiles.
CO3	Ability to analyze the flight concepts of rockets in various gravitational fields.
CO4	Ability to analyze the rockets & Missile controls in various stages
CO5	Apply the basic knowledge of engineering to understand the materials used for rockets.

AE12P5 MAIN PROJECT	
CO1	Demonstrate a sound technical knowledge of their selected project topic.
CO2	Undertake problem identification, formulation and solution.
CO3	Design engineering solutions to complex problems utilising a systems approach.
CO4	Conduct an engineering project
CO5	Demonstrate the knowledge, skills and attitudes of a professional engineer.