

# **II B.TECH IV SEMESTER SYLLABUS**

## VECTOR CALCULUS AND PROBABILITY STATISTICS

IV Semester								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
A5BS06	BSC	L	T	P	C	CIA	SEE	Total
		3	0	--	3	30	70	100
<p><b>COURSE OBJECTIVES</b></p> <ol style="list-style-type: none"> <li>1. Evaluation of definite integrals using Beta and Gamma functions.</li> <li>2. Verification of vector integral theorems.</li> <li>3. The concepts of discrete and continuous random variables, probability distribution and density function.</li> <li>4. The concept of correlation and regression to find covariance.</li> <li>5. Evaluation of the given data for appropriate test of hypothesis and finding the variance</li> </ol>								
<b>UNIT-I</b>	<b>BETA GAMMA FUNCTIONS AND VECTOR DIFFERENTIATION</b>						<b>Classes: 10</b>	
<p>Beta- Gamma Functions and their Properties-Relation between them- Evaluation of improper integrals using Gamma and Beta functions.            Scalar and vector point functions - Gradient, divergence, curl and their related properties -Solenoidal and irrotational vector point functions - Scalar potential function - Laplacian operator</p>								
<b>UNIT-II</b>	<b>VECTOR INTEGRATION AND VECTOR INTEGRAL THEOREMS</b>						<b>Classes: 08</b>	
<p>Line integral - work done - surface integrals - volume integral - Vector integral theorems - Green's theorem in a plane - Stoke's theorem - Gauss divergence theorem (all theorem statements and their verification).</p>								
<b>UNIT-III</b>	<b>SINGLE RANDOM VARIABLES AND PROBABILITY DISTRIBUTIONS</b>						<b>Classes:08</b>	
<p>Basic definitions of probability, Random Variables – Discrete and Continuous. Probability distributions, mass function/ density function of a probability distribution- mathematical expectation, Mean, Variance. Binomial, Poisson &amp; Normal distributions and their Properties.</p>								
<b>UNIT-IV</b>	<b>CORRELATION &amp; REGRESSION AND SAMPLING DISTRIBUTIONS</b>						<b>Classes:07</b>	
<p>Coefficient of correlation, the rank correlation, Covariance of two random variables. Regression- Regression Coefficient, The lines of regression.</p> <p><b>Sampling:</b> Definitions of population, sampling, statistic, parameter. Types of sampling, Expected values of Sample mean and variance, sampling distribution, Standard error, Sampling distribution of means and sampling distribution of variance.</p> <p>Parameter estimation- Point estimation and interval estimation.</p>								
<b>UNIT-V</b>	<b>TESTING OF HYPOTHESIS</b>						<b>Classes:09</b>	

**Testing of hypothesis:** Null hypothesis, Alternate hypothesis, type I & type II errors – critical region, confidence interval, Level of significance. One sided test, two sided test,

**Large sample tests:**(i) Test of Equality of means of two samples equality of sample mean and population mean (cases of

known variance & unknown variance, equal and unequal variances)

(ii) Tests of significance of difference between sample S.D and population S.D.

(iii) Tests of significance difference between sample proportion and population proportion & difference between two sample proportions.

**SMALL SAMPLE TESTS:** Student t-distribution, its properties; Test of significance sample mean and population mean, difference between means of two small samples.

Snedecor's F- distribution and its properties. Test of equality of two population variances.

Chi-square distribution, it's properties, Chi-square test of goodness of fit.

#### Text Books:

1. Ervin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. B.S.Grewal, Higher Engineering Mathematics, Khanna publishers, 36<sup>th</sup> Edition, 2010.

3. Probability and Statistics for Engineers and Sciences by Jay L. Devore, Cengage Learning

#### Reference Books:

1. Fundamentals of Mathematical Statistics by S.C. Gupta & V.K. Kapoor, S. Chand
2. Introduction to Probability and Statistics for Engineers and Scientists by Sheldon M. Ross, Academic Press

#### Web References:

1. [https://www.efunda.com/math/math\\_home/math.cfm](https://www.efunda.com/math/math_home/math.cfm)
2. <https://www.ocw.mit.edu/resources/#Mathematics>
3. <https://www.sosmath.com/>
4. <https://www.mathworld.wolfram.com/>

#### E -Text Books:

1. <https://www.e-booksdirectory.com/details.php?ebook=10166>
2. <https://www.e-booksdirectory.com/details.php?ebook=10166>

#### COURSE OUTCOMES:

student should able to

1. Find Interpolating polynomial for the given tabular data.
2. Solve the first order ordinary differential equations using numerical techniques.
3. Evaluate the discrete and continuous random variables, mathematical expectation of mean and variance.
4. Apply the concepts of correlation and regression to find covariance and sampling distribution of mean and variance.
5. Evaluate the given data for appropriate test of hypothesis variance.

## PYTHON PROGRAMMING

IV Semester:								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
A5IT03	PCC	L	T	P	C	CIA	SEE	Total
		1	-	2	2	30	70	100
<b>COURSE OBJECTIVES:</b>								
1. Understand the basics and function of Python Programming Language. 2. Understand the string operation and sequences used in Python Programming Languages. 3. Understand the data structures used in Python Programming Languages. 4. Know the classes and objects in Python Programming Language. 5. Use the reusability concepts in Python Programming Language.								
<b>UNIT-I</b>	<b>INTRODUCTION TO PYTHON PROGRAMMING AND FUNCTIONS AND MODULES</b>						<b>Classes:</b>	
<p><b>Introduction to Python Programming:</b> Features of Python Language, Data Types, Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Shift Operators, Ternary operator, Membership Operators, Identity Operators, Expressions and order of evaluations. Illustrative examples on all the above operators, Expressions, Control Statements, and Standard I/O Operations: input, print, 'sep', 'end'.</p> <p><b>Functions and Modules:</b> Declaration and Definition Function Calling, Defining Functions, Recursive Functions, Modules, Packages in Python, Doc Strings, Built-in Functions.</p>								
<b>UNIT-II</b>	<b>STRINGS AND REGULAR EXPRESSIONS &amp; SEQUENCE</b>						<b>Classes:</b>	
<p><b>Strings and Regular Expressions:</b> String Operations, Built-in String Methods and Functions, Comparing Strings, functions in Regular Expression.</p> <p><b>Sequence:</b> List, Tuples, Dictionaries.</p>								
<b>UNIT-III</b>	<b>FILE HANDLIN AND IMPLEMENTATION OF CLASSES AND OBJECTS IN PYTHON</b>						<b>Classes:</b>	
<p><b>File Handling:</b> Introduction, File Path, Types of Files, Opening and Closing Files, Reading and Writing Files, File Positions, Renaming and Deleting Files, Directory Methods.</p> <p><b>Implementation of classes and objects in Python:</b></p> <p>Classes and Objects, Methods and Self Argument, The __init__ Method, Class Variables and Object Variables, The __del__ Method, Public and Private Data Members, Private Methods, Built-in Functions to Check, Get, Set and Delete Class Attributes, Garbage Collection (Destroying Objects).</p>								
<b>UNIT-IV</b>	<b>IMPLEMENTATION OF INHERITANCE IN PYTHON AND EXCEPTION HANDLING IN PYTHON</b>						<b>Classes:</b>	
<p><b>Implementation of Inheritance in Python:</b> Inheriting Classes in Python, Types of Inheritance, Composition/Containership, Abstract Classes and Interfaces, Meta class, Implementing Operator Overloading, Overriding Methods</p> <p><b>Exception Handling in Python:</b></p>								

Introduction, Exception hierarchy, Handling Exception, Multiple except Blocks and Multiple Exceptions, Finally Block.

**UNIT-V**

**PYTHON NUMPY, PYTHON PANDAS MATPLOTLIB**

**Classes:**

**Python NumPy:** Features of Numpy, NumPyndarray, Data Types, Functions of NumPy Array, Numpy Array Indexing, Mathematical Functions on Arrays in NumPy.

**Python Pandas:** Pandas Features, Install Pandas, Dataset in Pandas, Series, DataFrames, Panel, Manipulating the Datasets, Describing a Dataset, group by Function, Filtering, Missing Values in Pandas, Concatenating Data Frames

**Matplotlib:** *Formatting the style of plot, plotting with keyword strings, plotting with categorical variables, controlling line properties.*

**COURSE OUTCOMES:**

1. Apply control structures and functions in Program
2. Analyze various String handling functions and data structures
3. Apply the files and object orientation concepts
4. Solve the problems by using Inheritance and polymorphism
5. Illustrate programs on various python libraries such asnumpy, pandas and matplotlib

**AERODYNAMICS-I**

<b>IV Semester</b>								
<b>Course Code</b>	<b>Category</b>	<b>Hours / Week</b>			<b>Credits</b>	<b>Maximum Marks</b>		
<b>A5AE11</b>	<b>PCC</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>CIA</b>	<b>SEE</b>	<b>Total</b>
		3	-	-	3	30	70	100
<b>COURSE OBJECTIVES</b>								
<ol style="list-style-type: none"> <li>1 Understand the theoretical concepts underlying the development of lift, drag, and movement forces on aeronautical vehicle</li> <li>2 Understand the concept of superposition of elementary flows for linear incompressible flow</li> <li>3 Analyze the characteristics of airfoil and wing geometries and plan-form shapes to assist in determining aircraft performance</li> <li>4 Analyze the characteristics of wing geometries and plan-form shapes to assist in determining aircraft performance</li> <li>5 Be equipped to evaluate new lift-enhancement or drag-reduction devices and appreciate the directions and promise of upcoming developments in aerodynamic technology</li> </ol>								
<b>UNIT-I</b>	<b>BASICS OF AERODYNAMICS</b>						<b>Classes: 12</b>	
<p><b>NEW:</b> Review of Fluid flow parameters, Flow regimes, Wing and airfoil geometry, aerodynamic force and moments, estimation of lift, drag and pitching moment from the pressure distribution, aerodynamic centre, centre of pressure, types of drag.</p> <p>Governing Equations in integral and differential forms</p>								
<b>UNIT-II</b>	<b>ELEMENTARY FLOWS &amp; COMBINATION OF FLOWS</b>						<b>Classes: 12</b>	
<p>Scalar and vector fields (revision), Velocity Potential and Stream function for 2-D incompressible flow, Governing equation for irrotational incompressible flow- Laplace's equations, boundary conditions – Wall boundary and Free stream boundary</p> <p>Uniform flow, source flow, doublet flow and vortex flow, Combination of uniform flow with a Source and Sink, Doublet, non-lifting and lifting flow over a circular cylinder. Kutta- Joukowski theorem and Magnus Effect, D'Alembert's paradox.</p> <p>Assignment/Project submission: Program to plot pressure distribution over a non-rotating cylinder and a spinning cylinder</p>								
<b>UNIT-III</b>	<b>AIRFOIL CHARACTERISTICS &amp; THIN AIRFOIL THEORY</b>						<b>Classes: 12</b>	
<p>Introduction to airfoils- nomenclature, Types of Airfoils- NACA Series and their applications, Laminar flow airfoils, Low Reynolds number airfoils, Subsonic compressible flow past airfoils; Critical Mach number, drag divergence Mach number, supercritical airfoils, area rule.</p> <p><b>THIN AIRFOIL THEORY:</b> Vortex Filament, The vortex sheet, Kutta condition and Kelvin's circulation theorem. Classical thin airfoil theory: symmetric and cambered airfoil.</p> <p>Assignment/Project submission: Program to calculate lift over NACA 2412 at a given angle of attack using thin airfoil theory</p>								
<b>UNIT-IV</b>	<b>FINITE WING THEORY</b>						<b>Classes: 12</b>	
<p>Downwash, induced drag, Biot-Savart's law and Helmholtz's theorem. Prandtl's classical lifting line theory and fundamental equations. Elliptic and general lift distribution over finite unswept wings, effect of aspect ratio, taper and thickness to chord ratio, <b>Subsonic</b> flow past swept and delta wings.</p>								

Assignment/Project submission: Program to calculate lift over wing Prandtl's classical lifting line theory		
<b>UNIT-V</b>	<b>APPLIED AERODYNAMICS</b>	<b>Classes: 12</b>
Lift augmentation and Drag Reduction methods - Flaps, slats, slots, winglets, Leading edge root extensions, Large Eddy Breakup device, Co-flow jet, Cuffs and vortex generators Circulation control, strakes. Drag augmentation methods – spoilers, Air brakes. <b>Propellers:</b> Airscrew geometry, Froude Momentum Theory, Thrust Co-eff, Torque Co-eff, Power Co-eff, Efficiency, Activity factor, Blade element theory Assignment/Project submission: Prepare models for wings different flap positions, and leading edge devices		
<b>Text Books:</b>		
<ol style="list-style-type: none"> <li>1. Anderson J .D.(2011), Fundamental of Aerodynamics, 5<sup>th</sup> edition, McGraw-Hill International Edition, New York</li> <li>2. E. L. Houghton, P.W. Carpenter (2010), Aerodynamics for Engineering Students, 5<sup>th</sup> edition, Elsevier, New York.</li> </ol>		
<b>Reference Books:</b>		
<ol style="list-style-type: none"> <li>1. L. J. Clancy, Aerodynamics, 1/e, Shroff Publications, 2006</li> <li>2. J. J. Bertin and R. Cummings, Aerodynamics for Engineers, 6/e, Pearson, 2013.</li> <li>3. B. W. McCormick, Aerodynamics, Aeronautics and Flight Mechanics, 2/e, John Wiley and Sons, 1995</li> </ol>		
<b>Web References:</b>		
<a href="https://www.nasa.gov/audience/forstudents/k-4/stories/nasa-knows/what-is-aerodynamics-k4.html">https://www.nasa.gov/audience/forstudents/k-4/stories/nasa-knows/what-is-aerodynamics-k4.html</a>		
<b>E-Text Books:</b>		
Arnab Roy, A First Course on Aerodynamics		
<b>MOOC Course</b>		
<a href="https://nptel.ac.in/courses/101105059/">https://nptel.ac.in/courses/101105059/</a> <a href="https://www.edx.org/course/introduction-to-aerodynamics">https://www.edx.org/course/introduction-to-aerodynamics</a>		
<b>COURSE OUTCOMES</b>		
<ol style="list-style-type: none"> <li>1. Upon successful completion of this course, the student will have</li> <li>2. The student shall be able to determine the dimensional parameters Analyze Pressure distribution on airfoil, Estimation of lift, drag and pitching moment coefficient.</li> <li>3. The student shall be able to propose the combination of elementary flows to solve the real time problem theoretically.</li> <li>4. The student shall be able to solve wing section properties by using thin airfoil theory.</li> <li>5. The student shall be able to determine the flow around wing, circulation distribution, downwash distribution, wake and relationship between them.</li> <li>6. Apply the concept of aerodynamic theories to produce high lift and reduce drag..</li> </ol>		

**AEROSPACE VEHICLE STRUCTURES – I**

<b>IV Semester</b>								
<b>Course Code</b>	<b>Category</b>	<b>Hours / Week</b>			<b>Credits</b>	<b>Maximum Marks</b>		
<b>A5AE12</b>	<b>PCC</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>CIA</b>	<b>SEE</b>	<b>Total</b>
		3	-	-	3	30	70	100
<b>COURSE OBJECTIVES:</b>								
Upon the completion of course students should be able to understand.								
<ol style="list-style-type: none"> <li>1. Understanding the basic concepts of stresses and strains on the 3D elastic body</li> <li>2. Apply the degree of redundancy (DOR) for statically determinate and indeterminate beam structure.</li> <li>3. Evaluate the deflection and slope using energy methods</li> <li>4. Demonstrate the knowledge of the critical loading conditions of the columns.</li> <li>5. Summarize the direct application of concepts of shear flow for a closed thin walled section beam to aircraft structures</li> </ol>								
<b>UNIT-I</b>	<b>INTRODUCTION TO THEORY OF ELASTICITY</b>						<b>Classes: 12</b>	
Introduction To Aircraft Structural Components, Equilibrium and Compatibility conditions for elastic solids, 2D elasticity equations for plane stress, plane strain and generalized plane strain causes Airy's stress function. Simple problems in plane stress/plane strain stresses and strains on arbitrary planes and transformations.								
<b>UNIT-II</b>	<b>REDUNDANT STRUCTURES</b>						<b>Classes: 12</b>	
Indeterminate structure, order of redundancy, Introduction to redundant analysis, use of free body diagrams to explain compatibility and redundant analysis principles, moment area method analysis of various types of beams, three moment equation (Clapeyron theorem) of a continuous beams								
<b>UNIT-III</b>	<b>ENERGY PRINCIPLES AND THEORIES OF FAILURE</b>						<b>Classes: 12</b>	
Introduction to energy principle and methods. Principle of virtual Displacements and principle of Virtual Force Castiglano's theorems, maxwell's reciprocal theorem and unit load method.								
Introduction – Various theories of failure - Maximum Principal Stress Theory, Maximum Principal Strain Theory, Strain Energy and Shear Strain Energy Theory (Von Mises Theory) and fracture modes								
<b>UNIT-IV</b>	<b>STABILITY OF COLUMNS</b>						<b>Classes: 12</b>	
Stability of structural systems, Models of instability of columns. Euler's formula for critical loads of column, end conditions of a column, Slenderness ratio, Effect of boundary conditions on mode shapes and critical loads. Column with initial curvature, effect of eccentricity Long, Medium and short column ranges. Rankine and Johnson's formulae. Effect of intermediate supports. Concept of beam column.								
<b>UNIT-V</b>	<b>TORSION OF THIN WALLED CLOSED SECTION</b>						<b>Classes: 12</b>	
Bredt- Batho formula. Single and multi-cell closed box structures. Semi monocoque and monocoque structures. Approximate method for box beams. Shear flow in single and multicell monocoque and semi monocoque box beams subject to torsion.								
<b>Text Books:</b>								



1. Megson T. H. G (2012), Aircraft Structures for Engineering Students, 5<sup>th</sup> edition, Elsevier, New York.
2. Strength of Materials by R.K Rajput S.chand publishers.

**Reference Books:**

1. Irving Herman Shames, Clive L. Dym (2003), Energy and finite element methods structural analysis, McGraw Hill, New Delhi, India.
2. B. C. Punmia (2011), Theory of Structures, 13<sup>th</sup> edition, Laxmi Publications Ltd, Hyderabad.
3. Donaldson B. K (2008), Analysis of Aircraft Structures an introduction to Aeronautical Structures Analysis, 2<sup>nd</sup> edition, Cambridge University Press, USA.

**Web References:**

1. <https://cosmolearning.org/courses/introduction-aerospace-structures/>
2. <http://www.triumphgroup.com/business-units/aerospace-structures/>

**E-Text Books:**

Aircraft Structures (Dover Books on Aeronautical Engineering)  
Aircraft Structures - Federal Aviation Administration

**MOOC Course**

<https://www.edx.org/course/introduction-to-aerospace-structures-and-materials>

**COURSE OUTCOMES:**

This course uses lectures, assignments and home works to the students. The teaching methods include regular class work, Problem solving, technical quiz and seminars to enable the students:

1. Develop stress strain relationships for a three dimensional body,
2. Analyze indeterminate structures using various methods
3. Determine deflection and slopes using energy methods
4. Estimate buckling loads for different boundary conditions of the columns
5. Analyze the shear flow distribution in an aircraft structural components wings & fuselage

## AIRPLANE PERFORMANCE

IV Semester:								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
A5AE13	PCC	L	T	P	C	CIA	SEE	Total
		3	-	-	3	30	70	100
<p style="color: blue; margin: 0;"><b>COURSE OBJECTIVES:</b></p> <p>Upon the completion of course students should understand</p> <ol style="list-style-type: none"> <li>1. Demonstrate competence in evaluating lift and drag of airplanes, and installed thrust of their engines</li> <li>2. To familiarize with the concepts of Flight performance</li> <li>3. To understand the parameters effecting the performance</li> <li>4. To familiarize with the concept of Stability and control of Aircraft</li> <li>5. To familiarize with the concept of dynamic stability of Aircraft</li> <li>6. Ability to understand and apply the governing equations related to longitudinal and lateral static stability and control of an aircraft</li> <li>7. Effects of the aerodynamic design, center of gravity location and moments of inertia on static and dynamic stability and control of an aircraft</li> </ol>								
<b>UNIT-I</b>	<b>INTRODUCTION TO AIRCRAFT PERFORMANCE</b>					<b>Classes: 12</b>		
<p>The role and design mission of an aircraft specification of the performance requirements and mission profile. Importance of performance analysis, estimation and measurements .Scheduled performance and operational performance of aircraft. The international standard Atmosphere. Off - design atmosphere. Measurements of air data. Air data computers.</p>								
<b>UNIT-II</b>	<b>THE FORCE SYSTEM OF THE AIRCRAFT, CRUISE PERFORMANCE</b>					<b>Classes: 12</b>		
<p>The aircraft force system. The lift force, side force the drag force. Total airplane drag- drag estimation - drag reduction methods. The propulsive forces the thrust producing engine, power and specific fuel consumption with altitude and flight speed. The minimum drag speed, minimum power speed. Aerodynamic relationships for a parabolic drag polar.</p> <p>The maximum &amp; minimum speeds in level flight -Range and Endurance of aircraft with thrust producing engines and with power producing engines. Cruise techniques: constant angle of attack, constant Mach number, constant Mach number methods, comparison of performance. The effect alternative fuel flow laws, the effect of weight, altitude and temperature on cruise performance.</p>								
<b>UNIT-III</b>	<b>CLIMB AND DESCENT PERFORMANCE, AIRCRAFT MANEUVER PERFORMANCE</b>					<b>Classes: 12</b>		
<p>Importance of climb and descent performance- safety considerations. Climb and descent techniques, generalized performance analysis for thrust producing, power producing and mixed power plants, maximum climb gradient, climb rate. Energy height and specific excess power, energy methods for optimal climbs, minimum time climbs, minimum fuel climbs, Measurements of climb performance. Descent performance in aircraft operations. Effect of wind on climb and descent performance.</p>								
<b>UNIT-IV</b>	<b>TAKE-OFF AND LANDING PERFORMANCE PLANNING, AIRCRAFT PERFORMANCE MESUREMENTS AND DATA HANDLING</b>					<b>Classes: 12</b>		

Flight safety criteria. Performance classification civil. Flight plans, performance planning and fuel planning Estimation of take off distances. The effect on the take – off distance, of weight wind runway conditions, ground effect. Take off performance safety factors. Estimation of landing distances, the discontinued landing baulked landing air safety procedures and requirements on performance. Fuel planning fuel requirements trip fuel, fuel reserves, tankering. Purpose of performance measurements in flight. Flight testing Principle performance variables weight, altitude and ambient temperature (WAT).

**UNIT-V****THE APPLICATION OF PERFORMANCE DATA****Classes: 12**

The performance summary and fleet selection-the block performance,payload – range diagram. Route analysis and optimization. Operational analysis procedure. Operational performance data for flight planning, take off field performance runaway correction chart, aircraft datum performance (WAT) chart, determination of the maximum takeoff weight

**Text Books:**

1. Eshelby M. E (2000), *Aircraft performance: Theory and Practice*, AIAA Education Series, USA.
2. Brandt S. A. et al (2004), *Introduction to Aeronautics: A Design perspective*, 2nd edition, AIAA Education Series, USA.
3. Anderson J. D. (2011), *Aircraft Performance and Design*, international edition, McGraw Hill, New Delhi.

**Reference Books:**

1. Dole C. E. (2010), *Flight Theory and Aerodynamics; a practical Guide for Operational Safety*, Wiley India Ltd, New Delhi, India.
2. Mc Cormic B. W.( 2010), *Aerodynamics, Aeronautics and Flight Mechanics*, 2<sup>nd</sup> edition, Wiley India Ltd. India
3. Raymer D. P (2006), *Aircraft Design: A Conceptual Approach*, 4<sup>th</sup> Edition, AIAA Education Series, USA
4. Yethout (2003), *Introduction to Aircraft Flight Mechanics*, AIAA Education Series, USA

**Web References:**

<https://nptel.ac.in/courses/101106041/>

**E-Text Books:**

<https://soaneemrana.org/onewebmedia/MECHANICS%20OF%20FLIGHT%20BY%20A.C%20KERMODE.pdf>

**MOOC Course**

<https://nptel.ac.in/courses/101104062/>

**COURSE OUTCOMES:**

Students should be able to:

1. Compare and contrast between the performance parameters for civil transport and military aircrafts
2. Calculate the range and endurance of a fixed-wing aircraft with either a jet or a propeller-driven propulsion system in straight and level flight and analyze the various types of cruise techniques
3. Evaluate the performance of an aircraft during its climb and descend
4. Evaluate the factors effecting the take-off and landing performance of the aircraft
5. Apply flight mechanics analytical concepts and aircraft performance data to the preliminary design of a new aircraft to meet defined performance requirements

**AERODYNAMICS LAB****IV Semester:**

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		CIA	SEE	Total
A5AE14	PCC	-	-	3	2	30	70	100

**COURSE OBJECTIVES:**

The course should enable the student:

1. To understand and study the operation of subsonic wind tunnel.
2. To study experimentally the pressure distribution of circular, symmetric and cambered airfoil
3. To study Flow visualization studies in low speed flow over airfoil with different angle of incidence and over cylinder
4. To determine the drag coefficient for a Cylinder.
5. They can analyse the performance of axial and centrifugal compressors.

**LIST OF EXPERIMENTS**

1. Calibration of subsonic wind tunnel.
2. Pressure distribution over smooth and rough cylinder.
3. Pressure distribution over symmetric airfoils.
4. Pressure distribution over cambered airfoils
5. Flow visualization studies in low speed flows over sphere.
6. Flow over a flat plate at different angles of incidence.
7. Flow visualization studies in low speed flows over cylinders.
8. Flow visualization studies in low speed flows over airfoil with different angle of incidence.
9. Fluid flow studies using a blower.
10. Drags of different bodies.
11. Performance of Axial flow compressor.
12. Performance of Centrifugal flow compressor.

Note: Ten experiments should be performed.

**Reference Books:**

Anderson J .D.(2011), Fundamental of Aerodynamics, 5<sup>th</sup> edition, McGraw-Hill International Edition, New York

**Web References:**

<https://www.nasa.gov/audience/forstudents/k-4/stories/nasa-knows/what-is-aerodynamics->

**COURSE OUTCOMES:**

The students should be able to:

1. Illustrate the pressure distribution over different aerodynamic shapes
2. Analyze the air flow pattern over different aerodynamic bodies using visualization techniques
3. Estimate the efficiencies of axial and centrifugal compressor
4. Determine the efficiency and flow rate of blower
5. Asses the aerodynamic characteristics of different bodies

**INTRODUCTION TO IOT LAB**

<b>IV Semester:</b>								
<b>Course Code</b>	<b>Category</b>	<b>Hours / Week</b>			<b>Credit</b>	<b>Maximum Marks</b>		
		<b>L</b>	<b>T</b>	<b>P</b>		<b>CIA</b>	<b>SE</b>	<b>Total</b>
<b>A5EC01</b>	<b>ESC</b>	-	-	3	2	30	70	100
<b>COURSE OBJECTIVES:</b>								
The course should enable the student:								
<ol style="list-style-type: none"> <li>To develop basic programming skills through graphical programming</li> <li>To learn hardware interfacing and debugging techniques</li> <li>To design and develop android app</li> </ol>								
<b>LIST OF EXPERIMENTS</b>								
<b>Introduction to IOT</b>								
<ol style="list-style-type: none"> <li>Introduction to basic electronic components and digital electronic</li> <li>Introduction to sensors and Actuators</li> <li>Introduction to microcontroller</li> <li>Introduction to Arduino IDE</li> </ol>								
<b>EXPERIMENT PROGRAMS:</b>								
<ol style="list-style-type: none"> <li>Blinking of LED with different delays</li> <li>Digital I/O Interface [IR Sensor, PIR Sensor]</li> <li>Analog Interface [ADC, Temperature Sensor]</li> <li>Motor speed And Direction control</li> <li>Serial Communication</li> <li>Wireless Interface –Bluetooth &amp; Wi-Fi Technologies</li> <li>Wireless Control of wheeled robot</li> <li>Smart Home Android App Development</li> </ol>								
<b>Reference Books:</b>								
<ol style="list-style-type: none"> <li>Sylvia Libow Martinez, Gary S Stager, Invent To Learn: Making, Tinkering, and Engineering in the Classroom, Constructing Modern Knowledge Press, 2016</li> <li>Michael Margolis, Arduino Cookbook, Oreilly, 2011</li> </ol>								
<b>COURSE OUTCOMES:</b>								
The students should be able to:								
<ol style="list-style-type: none"> <li>Able to demonstrate various sensor interfacing using Visual Programming Language.</li> <li>Able to analyze various Physical Components.</li> <li>Able to demonstrate Wireless Control of Remote Devices.</li> <li>Able to design and develop Mobile Application which can interact with Sensors</li> </ol>								

## AIRCRAFT INTERIOR DESIGN LAB

<b>IV Semester:</b>								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
<b>A5AE16</b>	<b>PCC</b>	-	-	3	2	30	70	100
<b>COURSE OBJECTIVES:</b>								
<ol style="list-style-type: none"> <li>1. To design various Aircraft interior components in lab.</li> <li>2. To design various individual components, sub-assemblies and main assemblies in lab.</li> <li>3. Discuss the importance of design process and studying the different phases of designing process involved in the design.</li> <li>4. Understand the design of aircraft concepts.</li> <li>5. To design various aircraft components by using Catia software</li> </ol>								
<b>LIST OF EXPERIMENTS</b>								
<ol style="list-style-type: none"> <li>1 Aircraft Seating Design Arrangements (General Class &amp; Business Class) (2D)</li> <li>2 Aircraft Single Aisle Design(3D &amp; 2D)</li> <li>3 Aircraft Twin Aisle Design(3D &amp; 2D)</li> <li>4 Aircraft Seat Design (3D- Business Class)</li> <li>5 Aircraft Seat Design (3D- First Class)</li> <li>6 Design of Laptop Tray Sizing for Seating in Civil Aircrafts.</li> <li>7 Design of Window for Civil Aircraft</li> <li>8 Design of Wind Shield for Fighter Aircraft(Select any one airplane)</li> <li>9 Design of Wind shield for Passenger Aircraft(Select any one Airplane)</li> <li>10 Design of Arm rest cap height from surface in Civil Aircraft</li> <li>11 Design of Joystick(Spacing) in Fighter Aircraft</li> </ol>								
<b>Note:</b> Ten experiments should be performed.								
<b>Reference Books:</b>								
Basics in Catia V5 with Simulation by Ranjan Chikesh								
<b>Web References:</b>								
<a href="https://www.youtube.com/channel/UCKgl0VNNTtoH-xje5XlwBAhg">https://www.youtube.com/channel/UCKgl0VNNTtoH-xje5XlwBAhg</a>								
<b>COURSE OUTCOMES:</b>								
<ol style="list-style-type: none"> <li>1. Understand the importance of drawing and design process and phases involved in the design process</li> <li>2. Design various individual components, sub-assemblies and main assemblies in design lab</li> <li>3. Design various orthographic and isometric projections in drawing sheets</li> <li>4. Develop the basic concepts of aircraft interiors</li> <li>5. Design and develop aircraft interior components</li> </ol>								

## GENDER SENSATIZATION

IV Semester:								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
A5HS03	MC	L	T	P	C	CIE	SEE	Total
		-	--	2	Nil	30	70	100
<b>Contact Classes: 16</b>	<b>Tutorial Classes: Nil</b>	<b>Practical Classes: Nil</b>			<b>Total Classes: 4216</b>			
<b>COURSE OBJECTIVES:</b> <ol style="list-style-type: none"> <li>To provide a critical perspective on the socialization of men and women.</li> <li>To introduce students to information about some key biological aspects of genders. To expose the students to debates on the politics and economics of work.</li> <li>To help students reflect critically on gender violence.</li> <li>To expose students to more egalitarian interactions between men and women.</li> </ol>								
<b>UNIT-I</b>	<b>UNDERSTANDING GENDER</b>						<b>Classes: 03</b>	
<b>Gender:</b> Why Should We Study It? (Towards a World of Equals: Unit -1) <b>Socialization:</b> Making Women, Making Men (Towards a World of Equals: Unit -2) Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.								
<b>UNIT-II</b>	<b>GENDER AND BIOLOGY</b>						<b>Classes: 03</b>	
<b>Missing Women:</b> Sex Selection and Its Consequences (Towards a World of Equals: Unit -4) Declining Sex Ratio. Demographic Consequences. <b>Gender Spectrum:</b> Beyond the Binary (Towards a World of Equals: Unit -10) Two or Many? Struggles with Discrimination.								
<b>UNIT-III</b>	<b>GENDER AND LABOUR</b>						<b>Classes:03</b>	
<b>Housework:</b> the Invisible Labour (Towards a World of Equals: Unit -3) "My Mother doesn't Work." "Share the Load." <b>Women's Work:</b> Its Politics and Economics (Towards a World of Equals: Unit -7) Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions of Work.								
<b>UNIT-IV</b>	<b>ISSUES OF VIOLENCE</b>						<b>Classes:04</b>	
<b>Sexual Harassment:</b> Say No! (Towards a World of Equals: Unit -6) Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu". <b>Domestic Violence:</b> Speaking Out (Towards a World of Equals: Unit -8) Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading: New Forums for Justice. Thinking about Sexual Violence (Towards a World of Equals: Unit -11) Blaming the Victim-"I Fought for my Life...." - Additional Reading: The Caste Face of Violence.								
<b>UNIT-V</b>	<b>GENDER: CO - EXISTENCE</b>						<b>Classes:03</b>	
<b>Just Relationships:</b> Being Together as Equals (Towards a World of Equals: Unit -12) Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Additional Reading: Rosa Parks-The Brave Heart.								

**Text Books:**

All the five Units in the Textbook, "**Towards a World of Equals: A Bilingual Textbook on Gender**" written by A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu and published by **Telugu Akademi, Hyderabad, Telangana State** in the year **2015**.

**Reference Books:**

1. Menon, Nivedita. *Seeing like a Feminist*. New Delhi: Zubaan-Penguin Books, 2012
2. Abdulali Sohaila. "I Fought For My Life...and Won." Available online at:  
<http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdul/>

**Web references:**

1. <http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdul/>

**E-Text Books:**

Abdulali Sohaila. "*I Fought For My Life...and Won.*" Available online at:  
<http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdul/>

**COURSE OUTCOMES:**

1. Develop a better understanding of important issues related to gender in contemporary India.
2. Sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender
3. Attain a finer grasp of how gender discrimination works in our society and how to counter it
4. Men and Women students and professionals will be better equipped to work and live together as equals.
5. Develop a sense of appreciation of women in all walks of life