



ANNASAHEB DANGE COLLEGE OF ENGINEERING AND TECHNOLOGY, ASHTA

AN AUTONOMOUS INSTITUTE

(Affiliated to Shivaji University, Kolhapur)

SECOND REVISION CURRICULUM

BACHELOR OF TECHNOLOGY IN

AERONAUTICAL ENGINEERING



Annasahab Dange College of Engineering and Technology Ashta
Department of Aeronautical Engineering
Teaching and Evaluation Scheme



S. Y. B. Tech Semester IV

Course Code	Course Name	Teaching Scheme			Credits	THEORY						PRACTICAL						GRAND TOTAL			
		L	T	P		ISE		MSE+ESE		Total	Min	ISE		MSE + ESE		Total	Min				
						Max	Min	MSE	ESE			Min	Max	Min	Max				Min		
2AEPFC211	Low Speed Aerodynamics	2	1	2	4	40	16	30	30	24	100	40	50	20	-	-	50	20	150		
2AEPFC212	Aircraft Structures	2	1	2	4	40	16	30	30	24	100	40	50	20	-	-	50	20	150		
2AEPFC213	Airbreathing Propulsion	2	1	2	4	40	16	30	30	24	100	40	50	20	-	-	50	20	150		
2AEPFE2**	Professional Elective - I	2	-	-	2	50	20	-	-	-	50	20	-	-	-	-	-	-	50		
2AEVVS218	Grid Generation using HyperMesh	-	-	2	1	-	-	-	-	-	-	-	25	10	25	10	50	20	50		
2AEVVS219	Professional and Business Communication	-	-	2	1	-	-	-	-	-	-	-	25	10	25	10	50	20	50		
2AAEEL220	Innovation/Prototype	-	-	2	1	-	-	-	-	-	-	-	25	10	25	10	50	20	50		
2AEHS221	Psychology	1	1	-	2	-	-	-	-	-	-	-	50	20	-	-	50	20	50		
2AECC223	Apptitude and Reasoning Part - II	-	-	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50		
2*****	Minor Stream Course I	2	-	-	2	40	16	30	30	24	100	40	-	-	-	-	-	-	100		
			11	4	14																
			Total Contact Hours/Week			22															850

Professional Elective - I	
2AEPFE214	Introduction to Finite Element Analysis
2AEPFE215	Introduction to Computational Fluid Dynamics
2AEPFE216	Introduction to Unmanned Aerial Vehicles
2AEPFE217	Introduction to Aircraft Maintenance

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DOCUMENT NUMBER: ADCET/ACAD/5, Rev:00, 01/01/2020



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DEPARTMENT OF AERONAUTICAL ENGINEERING



Course Details:

Class	S.Y B.Tech., Sem - IV
Course Code and Course Name	2AEPC211 - Low Speed Aerodynamics
Prerequisite	2AEPC203 - Fluid Mechanics
Teaching Scheme: Lecture/Tutorial/Practical	02/01/02
Credits	04
Evaluation Scheme : ISE/MSE/ESE	40/30/30

Course Objectives:

1. Provide students with a fundamental understanding of the physical principles governing low speed aerodynamics and propellers, enabling them to analyze and predict their performance.
2. Effectively communicate technical concepts related to low speed aerodynamics and propellers in written and oral presentations, and Present analysis results and conclusions clearly and concisely

Course Outcomes (CO's):

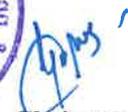
After successful completion of this course, the student will be able to,

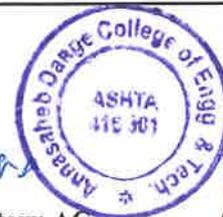
2AEPC211_1	Define, illustrate and explain the key terms related to aerodynamics, propellers, wing design parameters and propeller design variables and Explain the effect of airfoil and wing geometry on lift, drag, and pitching moment.
2AEPC211_2	Analyze ideal flow over a circular cylinder, including understanding D'Alembert's paradox and the Magnus effect and Compare real and ideal flow over smooth and rough cylinders.
2AEPC211_3	Demonstrate the use of Kutta-Joukowski theorem and methods like superposition, thin airfoil theory, source and vortex methods for airfoil analysis and Analyze potential flow over lifting wings using lifting line theory, vortex lattice method, slender body theory, and panel method.
2AEPC211_4	Analyze the effect of subsonic compressible flow on airfoils and wings: critical Mach number, drag divergence Mach number, supercritical airfoils, sweepback influence, area rule and Apply Prandtl-Glauert compressibility corrections.
2AEPC211_5	Calculate boundary layer thickness, displacement thickness, momentum thickness, energy thickness, and shape parameter, and Analyze boundary layer growth over a flat plate, understanding critical Reynolds number and Blasius solution.
2AEPC211_6	Apply Froude's momentum theory and blade element theory to predict propeller performance and Analyze common propeller types and their characteristics.


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Course Contents:

Unit 1	Introduction to Aerodynamics	04 + 02 + 04
Flow regimes (Reynolds Number and Mach No), Airfoils, Wings and their nomenclature, Lift, Drag and Pitching moment coefficients, Center of pressure and Aerodynamic center. Flow over cylinder and aerofoil.		
Unit 2	Potential Flow Theory	04 + 02 + 04
Streamline, stream function, irrotational flow, potential function, Equipotential lines, Elementary flows and their combinations. D'Alembert's paradox, Magnus effect, Kutta Joukowski's theorem, starting vortex, Kutta condition, real flow over a smooth and rough cylinder.		
Unit 3	Aerofoil Theory	05 + 02 + 04
Scalar and vector fields, velocity potential, line, surface and volume integrals, Green's lemma and Stoke's theorem, Kelvin's theorem, Circulation and lift generation, Kutta-Joukowski theorem. Method of superposition, thin airfoil theory, source, and vortex methods.		
Unit 4	Subsonic Wing Theory	04 + 02 + 04
Vortex filament, Biot and Savart law, bound vortex and trailing vortex, horseshoe vortex, Potential flow over lifting wing, lifting line theory and its limitations, vortex lattice method, slender body theory, panel method. Subsonic compressible flow past airfoils, Critical Mach number, drag divergence Mach number, supercritical airfoils, effect of sweep, area rule. Prandtl-Glauert compressibility corrections.		
Unit 5	Boundary Layer Theory	04 + 02 + 04
Boundary layer and boundary layer thickness, displacement thickness, momentum thickness, energy thickness, shape parameter, boundary layer equations for a steady, two-dimensional incompressible flow, boundary layer growth over a flat plate, critical Reynolds number, Blasius solution, basics of turbulent flow.		
Unit 6	Propeller Theory	04 + 02 + 04
Propeller Nomenclature, Tip Speed and Helical Motion, Thrust and Torque, Forces Acting on a Propeller, Propeller Design Variables, Types of Propellers, Froude's Momentum Theory, Blade Element Theory		

Text Books:

Sl.No	Title	Authors	Publisher	Edition	Year
1	<u>Fundamentals of Aerodynamics</u>	John Anderson	McGrawHill	07th	2024
2	<u>Aerodynamics for Engineering students</u>	Steven H. Collicott, Daniel T. Valentine, E. L. Houghton, P. W. Carpenter	Butterworth-Heinemann	07th	2016

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Sl.No	Title	Authors	Publisher	Edition	Year
3	<u>Theoretical Aerodynamics</u>	Ethirajan Rathakrishnan	John Wiley	01st	2013

Reference Books:

Sl.No	Title	Author	Publisher	Edition	Year
1	<u>Low-Speed Aerodynamics</u>	Joseph Katz Allen Plotkin	Cambridge University Press	2nd	2012
2	<u>Aerodynamics, Aeronautics, and Flight Mechanics</u>	Barnes W. McCormick	John Wiley & Sons	2nd	1994
3	<u>Fluid Mechanics</u>	Frank M. White Henry Xue	McGrawHill	9th	2022

Reference Papers:

- Liu, Tianshu, Shizhao Wang, Hao Liu, and Guowei He. "Engineering perspective on bird flight: Scaling, geometry, kinematics and aerodynamics." *Progress in Aerospace Sciences* (2023): 100933.
- Shyy, Wei, Hikaru Aono, Satish Kumar Chimakurthi, Pat Trizila, C-K. Kang, Carlos ES Cesnik, and Hao Liu. "Recent progress in flapping wing aerodynamics and aeroelasticity." *Progress in Aerospace Sciences* 46, no. 7 (2010): 284-327.
- Gennaretti, Massimo, and Riccardo Giansante. "Kutta–Joukowski theorem for unsteady linear aerodynamics." *AIAA Journal* 60, no. 10 (2022): 5779-5790.
- Conlan-Smith, Cian, Néstor Ramos-García, Ole Sigmund, and Casper Schousboe Andreasen. "Aerodynamic shape optimization of aircraft wings using panel methods." *AIAA Journal* 58, no. 9 (2020): 3765-3776.
- Su, Yumin, Mitsuhsa Ikehata, and Hisashi Kai. "A numerical method for designing a three-dimensional wing based on the surface panel method." *Journal of the Society of naval architects of Japan* 1997, no. 182 (1997): 39-47.
- Russo, Lorenzo, Renato Tognaccini, and Luciano Demasi. "Box wing and induced drag: compressibility effects in subsonic and transonic regimes." *AIAA Journal* 58, no. 6 (2020): 2398-2413.
- Quadrio, Maurizio, Alessandro Chiarini, Jacopo Banchetti, Davide Gatti, Antonio Memmolo, and Sergio Pirozzoli. "Drag reduction on a transonic airfoil." *Journal of Fluid Mechanics* 942 (2022): R2.
- Finnigan, John, Keith Ayotte, Ian Harman, Gabriel Katul, Holly Oldroyd, Edward Patton, Davide Poggi, Andrew Ross, and Peter Taylor. "Boundary-layer flow over complex topography." *Boundary-Layer Meteorology* 177 (2020): 247-313.
- Hövelmann, Andreas, Andreas Winkler, Stephan M. Hitzel, Kai Richter, and Michael Werner. "Analysis of vortex flow phenomena on generic delta wing planforms at transonic speeds." In *New Results in Numerical and Experimental Fluid Mechanics XII: Contributions to the 21st STAB/DGLR Symposium, Darmstadt, Germany, 2018*, pp. 307-316. Springer International Publishing, 2020.
- Wald, Quentin R. "The aerodynamics of propellers." *Progress in Aerospace Sciences* 42, no. 2 (2006): 85-128.

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Assessment Modes:

Sl. No	Method/Technique	Course Outcomes						Marks		Weight age
		1	2	3	4	5	6	Max	Min	
1	ISE : ABA	<input checked="" type="checkbox"/>	20	16	40 %					
2	ISE : TA	<input checked="" type="checkbox"/>	20							
3	ISE : PA	<input checked="" type="checkbox"/>	50	20						
4	MSE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	30	24	60 %
5	ESE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	30		

- ISE - In-Semester Examination, MSE - Mid-Semester Examination, ESE - End-Semester Examination
- ABA - Activity Based Assessment, TA - Tutorial Assessment, PA - Practical Assessment

CO's - PO's & PSO's Mapping: (Low - 1, Medium - 2, High -3, No Correlation - "-")

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	-	-	-	-	-	-	-	-	2	-	-	-	-
2	3	2	-	-	2	-	-	-	3	3	-	-	2	2
3	3	2	-	-	2	-	-	-	3	3	-	-	2	2
4	3	2	2	-	2	-	-	-	3	3	-	-	3	3
5	3	2	2	1	2	-	-	-	3	3	-	-	3	3
6	3	2	2	1	2	-	-	-	3	3	-	-	3	3
Avg	3	2	2	1	2	-	-	-	3	3	-	-	3	3

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Course Details:

Class	S.Y B.Tech., Sem - IV
Course Code and Course Name	2AEPC212 - Aircraft Structures
Prerequisite	2AEPC202 - Solid Mechanics
Teaching Scheme: Lecture/Tutorial/Practical	02/01/02
Credits	04
Evaluation Scheme : ISE/MSE/ESE	40/30/30

Course Objectives:

1. To equip students with the knowledge and skills necessary to contribute to the design, analysis of aircraft structures.
2. To develop students problem-solving and analytical skills by presenting them with real-world aircraft structural challenges.

Course Outcomes (CO's):

After successful completion of this course, the student will be able to,

2AEPC212_1	Interpret the behavior of aircraft structural component cross-sections and sketch the bending stress distribution under bending loads, including the evaluation of section moduli, product of inertia, and centroidal axes.
2AEPC212_2	Explain shear flow and its role in structural stability and load transfer in wing spars and box beams, including the determination of shear flow distribution and calculation of shear center location.
2AEPC212_3	Develop critical thinking, problem-solving, and analytical skills through the application of structural idealization in stress analysis concepts to real-world engineering problems related to wing and fuselage structures.
2AEPC212_4	Fabricate and Evaluate laminated thin-walled composite structures including understanding the behavior of open and closed sections which is influenced by the geometry and material properties.

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Course Contents:

Unit 1	Unsymmetrical bending of beams	04 + 02 + 02
Loads on Aircrafts - Symmetrical bending, Anticlastic bending - Unsymmetrical bending - Calculation of Non-homogenous section properties - Generalized 'K' method – Position of Neutral axis - Principal axes for beam cross section - Direct stress on thin walled section.		
Unit 2	Shear of thin walled beams	05 + 02 + 04
Shear flow and shear center of thin walled open section beams – Symmetrical and Unsymmetrical thin walled beam cross section - Shear flow distribution in Channel section using any programming language.		
Unit 3	Box beams	04 + 02 + 04
Multicell structure subjected to torque - Shear and Torsion of thin walled box beam structures - Shear center of box beam using any programming language.		
Unit 4	Structural Idealization	05+ 02 + 02
Structural Idealization – Shear flow and shear center of Symmetrical and Unsymmetrical beam cross section – Beams with variable stringer areas - Tapered wing spars - Tension field beam.		
Unit 5	Stress Analysis of wing and fuselage	04 + 02 + 04
Bending of a fuselage - Torsion of a fuselage – Shear of fuselage - Bending of wing – Torsion of wing – Stresses on experimental model.		
Unit 6	Thin walled composite beams in Aircraft Structural components	04 + 02 + 04
Bending of unsymmetrical composite beam cross section - Shear of composite beam cross section - Application of composite in Aeronautical Industries - Fabrication of composite laminate - Material properties.		

Text Books:

Sl.No	Title	Author	Publisher	Edition	Year
1	Aircraft Structures for Engineering Students	Megson, T.M.G	Elsevier	5th	2012
2	Analysis of Aircraft Structures – An Introduction	Donaldson, B.K	McGraw-Hill	2nd	2012

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Reference Books:

Sl.No	Title	Author	Publisher	Edition	Year
1	Aircraft Structures	D.J. Peery	McGraw Hill	2nd	1995
2	Analysis and Design of Flight Vehicle Structure	E.F. Bruhn	Tristate Offset Co	-	1980

Assessment Modes:

Sl. No	Method/ Technique	Course Outcomes						Marks		Weightage
		1	2	3	4	5	6	Max	Min	
1	ISE : ABA	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	20	16	40 %
2	ISE : TA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	20		
3	ISE : PA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	50		
4	MSE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	30	24	60 %
5	ESE	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	30		

- ISE - In-Semester Examination, MSE - Mid-Semester Examination, ESE - End-Semester Examination
- ABA - Activity Based Assessment, TA - Tutorial Assessment, PA - Practical Assessment

CO's - PO's & PSO's Mapping: (Low - 1, Medium - 2, High -3, No Correlation - "-")

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	1	2	2	-	-	-	3	3	-	-	1	-
2	3	2	1	2	2	-	-	-	3	1	-	-	-	-
3	3	2	1	1	2	-	-	-	3	-	-	1	2	-
4	3	2	-	-	-	-	-	-	3	3	-	1	2	2
Avg	3	2	1	1	2	-	-	-	3	2	-	1	2	2

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Course Details:

Class	S.Y B.Tech., Sem - IV
Course Code and Course Name	2AEPC213 - Air Breathing Propulsion
Prerequisite	2AEPC204 - Applied Thermodynamics
Teaching Scheme: Lecture/Tutorial/Practical	02/01/02
Credits	04
Evaluation Scheme : ISE/MSE/ESE	40/30/30

Course Objectives:

1. To gain in-depth knowledge of various types of air breathing engines working principles, advantages, and limitations of each type of propulsion systems.
2. To learn about the analysis of flow phenomenon and estimation of thrust developed by aircraft engines.
3. To apply the fundamental thermodynamic concepts in jet engine combustion chambers, compressors and turbines.

Course Outcomes (CO's):

After successful completion of this course, the student will be able to,

2AEPC212_1	Identify the various components of an IC engine and GT Engine and working principles.
2AEPC212_2	Choose the types of diffusers and nozzles for different types of engines using flow measurement procedures.
2AEPC212_3	Derive force conservation equation (Thrust Equation) to estimate the forces produced by aircraft propulsion systems
2AEPC212_4	Apply ideal and actual cycle analysis to a gas turbine engine to relate thrust and fuel burn to component performance parameters.
2AEPC212_5	Analyze engine performance data by performing performance analysis of airbreathing engines with the parameters of thrust calculations, specific fuel consumption, thermal efficiency, and propulsive efficiency.
2AEPC212_6	Calculate the performance of various compressor and turbine by using velocity triangle

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Course Contents:

Unit 1	Principles of Air Breathing Engines	04 + 02 + 02
Gas turbine engine - Construction, working, Brayton Cycle, Thrust equation - Factors affecting thrust, Methods of thrust augmentation, After burner Characteristics of turboprop, turbofan, and turbojet-Performance characteristics; Working Principle of RAM jet, SCRAM Jet.		
Unit 2	Jet Engine Intakes	04 + 02 + 04
Internal flow and Stall in subsonic inlets - Major features of external flow near a subsonic inlet - Relation between minimum area ratio and external deceleration ratio - Diffuser performance - Supersonic inlets - Starting problem on supersonic inlets - Shock swallowing by area variation.		
Unit 3	Compressors	05 + 02 + 04
Principle operation of centrifugal and axial compressor – Work done and pressure rise – velocity diagrams – degree of reaction – performance parameters axial flow compressors– stage efficiency.		
Unit 4	Combustion Chamber	04+ 02 + 02
Classification of combustion chambers - Important factors affecting combustion chamber design - Combustion process - Combustion chamber performance - Effect of operating variables on performance - Flame tube cooling - Flame stabilization - Use of flame holders.		
Unit 5	Turbines	04 + 02 + 04
Principle of operation of axial flow turbines– Work done and pressure rise – Velocity diagrams – degree of reaction – performance parameters of axial flow turbine– turbine blade cooling methods – stage efficiency calculations.		
Unit 6	Engine Exhaust and Nozzles	05 + 02 + 04
L: Theory of flow in isentropic nozzles - Convergent nozzles and nozzle choking - Nozzle throat conditions - Nozzle efficiency - Losses in nozzles - Over expanded and under expanded nozzles - Ejector and variable area nozzles - Interaction of nozzle flow with adjacent surfaces - Thrust reversal.		

Text Books:

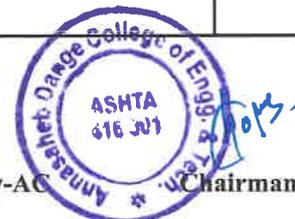
Sl.No	Title	Author	Publisher	Edition	Year
1	Gas Turbine	V.Ganesan	MC Graw Hill	3rd	2016
2	Aircraft Propulsion	Saeed Farokhi	Wiley	2nd	2014
3	Aircraft Propulsion and Gas Turbine Engines	Ahmed F. El-Sayed	CRC Press	2nd	2017

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Reference Books:

Sl.No	Title	Author	Publisher	Edition	Year
1	Elements of Propulsion: Gas Turbines and Rockets	Jack D. Mattingly (Author), Keith Boyer	American Institute of Aeronautics & Astronautics; Second edition	2nd	2017
2	Gas Turbine Theory	H. Cohen , G.F.C. Rogers, Paul Straznicky, H.I.H. Saravanamuttoo, Andrew Nix	Pearson	7th	2017
3	Mechanics and Thermodynamics of Propulsion	Philip Hill, Carl Peterson	Pearson	2nd	2009

Sl.No	Source/Platform	Link to contents
1	NPTEL - IC engines and Gas turbines	https://nptel.ac.in/courses/112103262
2	MIT Opencourseware - Introduction to propulsion systems	https://ocw.mit.edu/courses/16-50-introduction-to-propulsion-systems-spring-2012/
3	The Gas turbine Handbook	https://www.academia.edu/8075953/Gas_Turbine_Handbook_Principles_and_Practices
4	Purdue school of Aeronautics and Astronautics	https://engineering.purdue.edu/~propulsi/propulsion/
5	NPTEL - Introduction to Airbreathing propulsion	https://nptel.ac.in/courses/101104084

List of Equipments

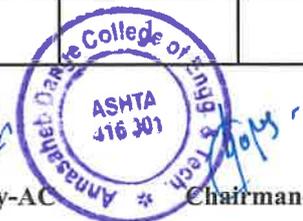
Sl.No	Equipment	Specification	Quantity	Experiment No
1	Reciprocating Engine	Multi cylinder	1	1
2	Gas Turbine Engine.	Turbo Jet		2

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3	IC Engine Performance Measurement setup	Four Stroke, Diesel Engine	1	3
4	Free Jet and Wall Jet flow measurement setup	Subsonic	1	4,5
5	Propeller performance measurement setup	Subsonic	1	6
6	Ansys Workbench	2023R2	30	7,8

Assessment Modes:

Sl. No	Method/ Technique	Course Outcomes						Marks		Weightage
		1	2	3	4	5	6	Max	Min	
1	ISE : ABA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	20	16	40 %
2	ISE : TA	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	20		
3	ISE : PA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	50		
4	MSE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	30	24	60 %
5	ESE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	30		

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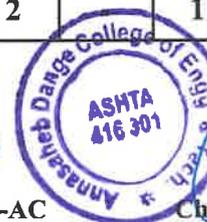
CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	2	1	-	-	-	-	-	3	1	-	1	1	1
2	2	2	1	-	-	-	-	-	3	2	-	-	2	2
3	3	2	1	1	2	-	-	-	3	-	-	1	2	-
4	3	2	2	1	2	-	-	-	3	3	-	-	1	2
5	3	2	2	-	2	-	-	-	3	3	-	-	2	3
6	3	2	2	1	2	-	-	-	3	3	-	-	2	3
Avg	3	2	2	1	1	-	-	-	3	2	-	1	2	2

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Course Details:

Class	S.Y B.Tech., Sem - IV
Course Code and Course Name	2AEPE214 - Introduction to Finite Element Analysis
Prerequisite	2AEPC202 - Solid Mechanics
Teaching Scheme: Lecture/Tutorial/Practical	02/00/00
Credits	02
Evaluation Scheme : ISE/MSE/ESE	50/00/00

Course Objectives:

1. To learn and apply finite element solutions to structural, thermal, dynamic problems to develop the knowledge and skills needed to effectively evaluate finite element analyses.
2. To learn the theory and characteristics of finite elements that represent engineering structures.

Course Outcomes (CO's):

After successful completion of this course, the student will be able to,

2AEPE214_1	Develop a solid foundation in the principles and concepts of Finite Element Analysis in engineering design and to recognize the limitations and assumptions inherent in FEA.
2AEPE214_2	Apply FEA techniques to the design and analysis of engineering structures and components with selection of appropriate modeling techniques based on design requirements.
2AEPE214_3	Use FEA software for mesh generation, analysis, and post-processing for various engineering problems.
2AEPE214_4	Develop critical thinking skills in identification and analysis of errors in FEA results.
2AEPE214_5	Interpret and validate results through comparison with analytical solutions or experimental data.

Course Contents:

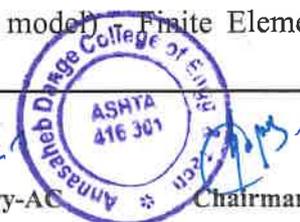
Unit 1	Introduction to Finite Element Analysis	06
FEA for design Engineers - Objective & limitation - Past, Present and Future of FEA - Formulation and selection of method to solve any engineering problem (Mathematical model) - Finite Element model - Formulation of FE equations - Errors in FEA results.		

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Unit 2	Concept of the Finite Element Model & Errors Analysis	07
General steps of the finite element analysis - Discretization - Approximation of Errors - Various measures of errors - Convergence process & problems - Exercise on tensile strip with a circular hole, L-shaped bracket.		
Unit 3	Finite Element Mesh and Modeling	06
Meshing technique - Mesh compatibility - Meshing problems - Exercise on Beam in bending, Hollow cantilever bracket. Modeling steps - Modeling techniques - Exercise on Cantilever bracket with Anti-symmetry boundary conditions, Shaft in torsion, Pin supported link.		
Unit 4	Analysis & Post Processing Techniques	07
Nonlinear Analysis - Modal Analysis - Buckling Analysis - Dynamic Analysis - Exercise on slender cantilever beam in bending, Round membrane under pressure, Tuning fork, Unsupported and Hinge supported beam, Beam in compression. Validation & Check Accuracy of the Result - How to View Results - Interpretation of Results and Design Modifications, CAE Reports.		

Text Books:

Sl.No	Title	Author	Publisher	Edition	Year
1	Finite Element Analysis for Design Engineers	Paul M. Kurowski	SAE International	-	2004
2	Introduction to Finite Element Method	J N Reddy	Tata Mc Graw Hill	2nd	-

Reference Books:

Sl.No	Title	Author	Publisher	Edition	Year
1	Fundamentals of Finite Element Analysis	David Hutton	McGraw Hill	-	2017
2	A First Course in the Finite Element Method	Daryl L. Logan	Thomson	4th	-

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Assessment Modes:

Sl. No	Method/ Technique	Course Outcomes					Marks		Weightage
		1	2	3	4	5	Max	Min	
1	ISE : ABA	<input checked="" type="checkbox"/>	25	20	50 %				
2	ISE : PA	<input checked="" type="checkbox"/>	25		50 %				

- ISE - In-Semester Examination, MSE - Mid-Semester Examination, ESE - End-Semester Examination
- ABA - Activity Based Assessment, TA - Tutorial Assessment, PA - Practical Assessment

CO's - PO's & PSO's Mapping: (Low - 1, Medium - 2, High -3, No Correlation - "-")

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	1	1	-	-	3	-	-	1	-	2	-	-	-	2
2	2	1	1	-	3	-	-	1	-	3	-	-	2	2
3	2	2	1	-	3	-	-	1	-	3	-	-	2	-
4	2	1	-	-	3	-	-	1	-	-	-	1	-	-
5	3	2	-	2	3	-	-	1	-	3	-	1	-	-
Avg	2	1	1	2	3	-	-	1	-	3	-	1	2	2

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Course Details:

Class	S.Y B.Tech., Sem - IV
Course Code and Course Name	2AEPE215 - Introduction to Computational Fluid Dynamics
Prerequisite	2AEPC203 - Fluid Mechanics
Teaching Scheme: Lecture/Tutorial/Practical	02/00/00
Credits	02
Evaluation Scheme : ISE/MSE/ESE	50/00/00

Course Objectives:

1. To develop proficiency in grid generation techniques, turbulence models to effectively model, analyze, and preprocess data for aerodynamics simulations relevant to job roles in Aerospace engineering.
2. To train students to proficiently with modern software tools for mesh generation, analysis, and pre-processing specifically tailored for addressing aerodynamics problems to enhance their job opportunities

Course Outcomes (CO's):

After successful completion of this course, the student will be able to,

2AEPE215_1	Develop a solid foundation in the principles and familiarize with the governing equations, concepts of Computational fluid dynamics
2AEPE215_2	Choose appropriate turbulence modeling and grid generation for the analysis of fluid flow problems with selection of appropriate boundary conditions.
2AEPE215_3	Use modern tools for mesh generation, analysis, and pre-processing for various engineering and Aerodynamics problems.
2AEPE215_4	Analyze and Validate simulation results against experimental data and gain proficiency in post-processing, using visualization tools to interpret and communicate simulation results effectively.

Course Contents:

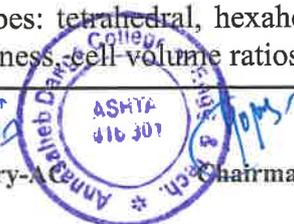
Unit 1	Introduction to CFD	06
Governing Equations- Continuity , Momentum and Energy equations, CFD Terminology,		
Unit 2	Meshing	07
Different types of meshes: structured, unstructured, hybrid. Element types: tetrahedral, hexahedral, prism, wedge, etc., Mesh quality metrics and their importance: aspect ratio, skewness, cell volume ratios, etc.		

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Impact of mesh quality on CFD accuracy and solution convergence		
Unit 3	Pre - Processing	06
Boundary Conditions:Defining the inlet, outlet, wall, and symmetry boundary conditions.Specifying appropriate boundary conditions for temperature, pressure, velocity, and other relevant parameters.		
Unit 4	Solver & Post - Processing	07
steady-state or transient analysis ,solver settings like turbulence models, discretization schemes, and convergence criteria. Post Processing :Visualization Contours plots, Vector fields, Report generation: simulation results, including tables, charts, and image, Validation and Comparison of experimental results, Errors and Uncertainty		

Text Books:

Sl.No	Title	Author	Publisher	Edition	Year
1	Computational Fluid Dynamics: The Basics with Applications	John D. Anderson	McGraw-Hill	Second Edition	1995
2	An Introduction to Computational Fluid Dynamics	H K Versteeg and W Malalasekera	pearson Prentice hall	Second Edition	2007

Reference Books:

Sl.No	Title	Author	Publisher	Edition	Year
1	Computational Fluid Dynamics: principles and Applications	J. Blazek	ELSEVIER	Second Edition	2001
2	Computational Fluid Dynamics:An Introduction	John F. Wendt	Springer	Third Edition	2009

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Assessment Modes:

Sl. No	Method/ Technique	Course Outcomes				Marks		Weightage
		1	2	3	4	Max	Min	
1	ISE : ABA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	25	20	50 %
2	ISE : PA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	25		50 %

- ISE - In-Semester Examination, MSE - Mid-Semester Examination, ESE - End-Semester Examination
- ABA - Activity Based Assessment, TA - Tutorial Assessment, PA - Practical Assessment

CO's - PO's & PSO's Mapping: (Low - 1, Medium - 2, High -3, No Correlation - "-")

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
2	2	2	2	2	2	-	-	1	-	-	-	-	-	-
3	2	2		2	2	2	-	1	-	-	-	-	2	-
4	2	-	-	2	2	-	-	1	2	2	-	2	2	2
Avg	2	2	2	2	2	2	-	1	2	2	-	2	2	2

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Course Details:

Class	S.Y B.Tech., Sem - IV
Course Code and Course Name	2AEPE216 - Introduction to Unmanned Aerial Vehicles
Prerequisite	NIL
Teaching Scheme: Lecture/Tutorial/Practical	02/00/00
Credits	02
Evaluation Scheme : ISE/MSE/ESE	50/00/00

Course Objectives:

1. Equip students with a solid understanding of UAV fundamentals, including classifications, applications, and payloads, emphasizing the basic parts, specifications, and varied uses of UAVs.
2. Foster a mastery of DGCA rules, regulations, and guidelines governing UAVs, covering categories based on weight, type certification, and the regulatory processes for registration, certification, and pilot licensing.
3. Explore the practical applications of UAVs in industrial engineering, addressing the specific needs in areas such as powerline and telecom structure inspection, radiation measurement, and envisioning future engineering applications, ensuring students are well-prepared for the evolving landscape of UAV technology.

Course Outcomes (CO's):

After successful completion of this course, the student will be able to,

2AEPE216_1	Explain the Drone rules, regulations, guidelines of DGCA and various systems which applicable in drone industry & technology by using the current active gazettes of indian government & scientific research journals knowledge
2AEPE216_2	Classify and experiment the category, class, assembly & manufacturing techniques, testing & operating methods and its industrial applications aligned with drone technology by the active government gazette or scientific articles / book data
2AEPE216_3	Identify the sensors and MEMS to the drone for various flying conditions/ applications by using drone's application details

Course Contents:

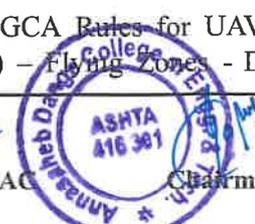
Unit 1	Introduction to UAV, DGCA Rules, Regulation & Guidelines	06
Motivation - Types of UAV – Characteristics – Fixed Wing – Rotary Wing – Flapping Wing – Basic Parts of UAV – Specifications – Applications – Pay loads of UAV Drone Categories Based on All-up weight – Type Certification of UAVs - DGCA Rules for UAV Registration, Certification and Pilot Licensing - Remote Pilot Training Organization (RPTO) – Flying Zones - Drone Training		

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Circulars & Certification Scheme of Unmanned Aircraft Systems		
Unit 2	Industrial and Future Engineering Applications of UAVs	07
Need of UAVs for Industrial Applications - Development of UAVs for Powerline Inspection - Telecom Structure Inspection and Radiation Measurement – Bridge and Heritage Structure Inspection – Collection of Seaweeds using UAV – Future Engineering Applications of UAVs.		
Unit 3	Introduction to Avionics for UAV	06
Types of missions - Mandatory sensors - Control of UAVs based on mandatory sensors - Role of sensors in Drones - Mission specific sensors - Category based sensors - Additional equipment & sensors		
Unit 4	Design, Assembly & Ground Testing for Drones	07
Design of Quadcopter – Selection of Sub Systems - Airframe Assembly – Integration of Electronic Systems Introduction to Ground Control Station – Flight Simulation – Autonomous Flight Path Planning – Testing of Quadcopter		

Text Books:

Sl.No	Title	Author	Publisher	Edition	Year
1	Unmanned aircraft systems: UAVS design, development and deployment	Austin, R.	John Wiley & Sons.	1st	2011
2	Introduction to UAV systems	Fahlstrom P, Gleason T	Wiley, UK	4th	2012
3	Build your own quadcopter	Norris D	McGraw-Hill Education, New York	1st	2014

Reference Books:

Sl.No	Title	Author	Publisher	Edition	Year
1	Handbook of unmanned aerial vehicles	Valavanis K. P. Vachtsevanos, G. J., eds	Springer reference	1st	2015
2	A first course in aerial robots and drones	Sebbane, Y. B.	CRC Press	1st	2022

Online Reference Materials:

Sl.No	Source/Platform	Link to contents
1	Swayam	https://onlinecourses.swayam2.ac.in/nt24_ed12/preview

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Sl.No	Source/Platform	Link to contents
2	Digital Sky Platform	https://www.dgca.gov.in/digigov-portal/jsp/dgca/homePage/viewPDF.jsp?page=InventoryList/headerblock/drones/Drone%20Rules%202021.pdf

Assessment Modes:

Sl.No	Method/Technique	CO's			Marks		Weightage
		1	2	3	Max	Min	
1	ISE : ABA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	25	20	50 %
2	ISE : PA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	25		50 %

CO's - PO's & PSO's Mapping: (Low - 1, Medium - 2, High -3, No Correlation - "-")

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	2	1	1	-	3	3	3	-	3	-	3	2	1
2	3	3	2	3	1	-	1	-	3	3	3	1	2	-
3	2	2	1	-	-	-	-	-	-	-	-	2	-	-
Avg	2	2	1	2	1	3	2	3	3	3	3	2	2	1

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Course Details:

Class	S.Y B.Tech., Sem - IV
Course Code and Course Name	2AEPE217 - Introduction to Aircraft Maintenance
Prerequisite	NIL
Teaching Scheme: Lecture/Tutorial/Practical	02/00/00
Credits	02
Evaluation Scheme : ISE/MSE/ESE	50/00/00

Course Objectives:

1. To familiarize students with the fundamental concepts and components of aircraft maintenance, ensuring they can identify and describe the main components of an aircraft and understand their functions.
2. To emphasize the importance of safety procedures and regulations in aircraft maintenance, enabling students to articulate the significance of adhering to safety protocols and regulations to ensure safety and reliability in aircraft operations.
3. To provide students with a comprehensive understanding of aircraft systems, including hydraulic, pneumatic, powerplant, and electrical systems, equipping them with the knowledge and skills to identify, explain, and troubleshoot system components and operations effectively.

Course Outcomes (CO's):

After successful completion of this course, the student will be able to,

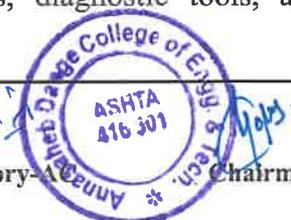
2AEPE217_1	Identify and describe the main components of an aircraft and their functions, ensuring accuracy, when presented with visual aids, diagrams, and aircraft models
2AEPE217_2	Articulate the importance of aircraft maintenance in ensuring safety and reliability and demonstrate understanding by adhering to safety procedures with 100% compliance during practical demonstrations, based on case studies and real-life examples.
2AEPE217_3	Accurately identify and explain the functions of the components of hydraulic and pneumatic systems during a practical assessment, when provided with hydraulic and pneumatic system schematics, diagrams, and real components
2AEPE217_4	Demonstrate proficiency in identifying and explaining the operation principles of key power plant components with accuracy, when presented with detailed illustrations, models, and interactive simulations of aircraft powerplant systems.
2AEPE217_5	Effectively diagnose and rectify electrical system faults within specified timeframes when given access to aircraft electrical system schematics, diagnostic tools, and simulated troubleshooting scenarios.

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Course Contents:

Unit 1	Basic of Aircraft Structure and Safety	06
Introduction to the importance of aircraft maintenance in ensuring safety and reliability, Overview of the main components of an aircraft and their functions. Introduction to aircraft materials and construction methods. Discussion on the importance of understanding aircraft structures for maintenance purposes. Safety procedures and regulations in aircraft maintenance		
Unit 2	Aircraft Control System, Hydraulic and pneumatic Systems	07
Conventional control system, its components, Power-assisted control system, Fly by wire system Components of hydraulic and pneumatic systems, Its operation functions and utility		
Unit 3	Aircraft Power plant, Starting Systems, and Electrical Systems	06
Introduction to aircraft powerplant components. Basics of aircraft engine operation, Engine maintenance procedures, and safety precautions. Starting systems for piston engine and jet engine aircraft Understanding aircraft electrical components and circuits. Maintenance and troubleshooting of aircraft electrical systems		
Unit 4	Troubleshooting and Diagnostics	07
Procedural Maintenance Routines and Comprehensive Documentation Management, Use of diagnostic tools and equipment,		

Text Books:

Sl.No	Title	Author	Publisher	Edition	Year
1	Aircraft Maintenance and Repair	Michael Kroes, William Watkins	McGraw-Hill Education	7th	2018
2	"Aviation Maintenance Technician Handbook: General"	FAA	Aviation Supplies & Academics	1st	2012

Reference Books:

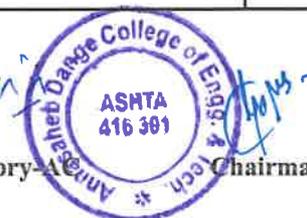
Sl.No	Title	Author	Publisher	Edition	Year
1	Introduction to Aircraft Maintenance	J J Daley	McGraw-Hill Education	3rd	2003
2	Aircraft Maintenance and Repair with Study Guide	Michael Kroes, William Watkins	McGraw-Hill Education	6th	2013

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Assessment Modes:

Sl. No	Method/ Technique	Course Outcomes					Marks		Weightage
		1	2	3	4	5	Max	Min	
1	ISE : ABA	<input checked="" type="checkbox"/>	25	20	50 %				
2	ISE : PA	<input checked="" type="checkbox"/>	25		50 %				

- ISE - In-Semester Examination, MSE - Mid-Semester Examination, ESE - End-Semester Examination
- ABA - Activity Based Assessment, TA - Tutorial Assessment, PA - Practical Assessment

CO's - PO's & PSO's Mapping: (Low - 1, Medium - 2, High -3, No Correlation - "-")

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	1	1		1				2	1		1	2	
2	2	2	1	1	1	1	1	1	2	1	1	1	2	2
3	2	1	1		1				1	1		1	2	
4	2	1	1		1				1	1		1	2	
5	2	1	1	1	1				2	1	1	1	2	
Avg	2	1	2	1	1	1	2	2						

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Course Details:

Class	S.Y B.Tech., Sem - IV
Course Code and Course Name	2AEVS218 - Grid Generation using HyperMesh
Prerequisite	2AEVS206 - Parametric Modeling and Assembly
Teaching Scheme: Lecture/Tutorial/Practical	00/00/02
Credits	01
Evaluation Scheme : ISE/ESE	25/25

Course Objectives:

1. Explain the importance of meshing in FEA and understand different mesh types (tetrahedral, hexahedral, etc.).
2. Master basic meshing tools and techniques in HyperMesh, including geometry selection, element sizing, and meshing methods (automatic, manual, etc.)

Course Outcomes (CO's):

After successful completion of this course, the student will be able to,

2AEVS218_1	Independently generate high-quality meshes for various geometries using HyperMesh.
2AEVS218_2	Choose the appropriate meshing techniques based on the specific FEA application.
2AEVS218_3	Apply advanced meshing techniques for complex geometries and optimize meshes for efficiency and accuracy.
2AEVS218_4	Evaluate the quality of meshes using built-in tools and visual inspection.
2AEVS218_5	Use mesh controls to refine specific areas of the mesh for improved accuracy.

List of Experiments:

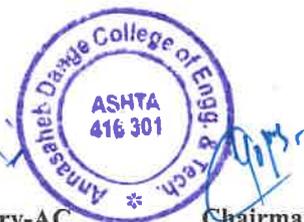
Sl.No	Title of the Exercises
1	<p>Introduction:</p> <ul style="list-style-type: none"> ● Overview of Finite Element Analysis (FEA) and the role of meshing ● Introduction to HyperMesh as a pre-processing tool for FEA ● User interface and basic navigation

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Sl.No	Title of the Exercises
2	Geometry Preparation: <ul style="list-style-type: none"> ● Geometry Clean-up ● Importing and Repairing CAD Geometry ● Generating a Midsurface ● Simplifying Geometry
3	1D Meshing: <ul style="list-style-type: none"> ● Creating beams and rods ● Assigning material properties
4	2D Meshing: <ul style="list-style-type: none"> ● Shell meshing techniques (quads, tris, mapped meshing) ● Setting element size and quality parameters ● Mesh refinement and cleanup
5	3D Meshing: <ul style="list-style-type: none"> ● Tetrahedral and hexahedral meshing techniques ● Automatic and manual meshing ● Advanced meshing options (sweeping, morphing) ● Mesh quality checks and improvement

Online Reference Materials:

Sl.No	Source/Platform	Link to contents
1	Altair HyperMesh	https://2021.help.altair.com/2021/hwdesktop/hm/topics/tutorials/hm/meshing_r.htm
2	Skill-Lync	https://skill-lync.com/student-projects/3d-meshing-using-hypermesh-3
3	IFS Academy	https://ifsacademy.org/assets/images/pdf/Finite-Element-Analysis-using-Hypermesh-AN-SYS.pdf

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Assessment Modes:

Sl.No	Method/Technique	CO's				Marks		Weightage
		1	2	3	4	Max	Min	
1	ISE : PA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	15	10	50%
2	ISE : VCC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10		
4	ESE : OE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	15	10	50%
5	ESE : PE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10		

- ISE - In-Semester Examination, ESE - End-Semester Examination
- PA - Pactical Assessment, VCC - Vocational Course Certification
- OE - Oral Examination, PE - Practical Examination

CO's - PO's & PSO's Mapping: (Low - 1, Medium - 2, High -3, No Correlation - "-")

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	1	-	-	-	3	-	-	1	1	3	-	-	2	-
2	1	-	-	-	3	-	-	1	1	3	-	-	2	-
3	1	-	-	-	3	-	-	1	3	3	-	3	2	-
4	1	-	-	-	3	-	-	-	-	3	-	-	2	-
5	1	-	-	-	3	-	-	-	-	3	-	-	2	-
Avg	1	-	-	-	3	-	-	1	2	3	-	3	2	-

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Course Details:

Class	S.Y B.Tech., Sem - IV
Course Code and Course Name	2AEVS219 - Professional and Business Communication
Prerequisite	NIL
Teaching Scheme: Lecture/Tutorial/Practical	00/00/02
Credits	01
Evaluation Scheme : ISE/MSE/ESE	25/00/25

Course Objectives:

1. The student should able to use the professional documentation tools/platforms
2. The students should able to create and enhance the professional documents and able to communicate effectively as per the business/ industrial requirements
3. The Students should efficiently able to be use digital platform/ tools for verbal and non-verbal communication
4. To deliver content through Assessment Based Learning for providing industrial exposure to the students

Course Outcomes (CO's):

After successful completion of this course, the student will be able to,

2AEVS219_1	Prepare the technical documentation for verbal, nonverbal communications using modern digital platform in engineering discipline
2AEVS219_2	Automize the use of appropriate tools for classification clustering, segregation of data sets to prepare visual document/file for project/business contents
2AEVS219_3	Perform a survey for various societal, environmental issues, engineering data using an online platform
2AEVS219_4	Create multimedia presentations to disseminate/present the informations collected using appropriate tools/software with professionalism

List of Experiments:

Sl.No	Title of the Exercises
1	Organizing tasks/events and managing using Google Calendar
2	Formulating a professional body/content in Email
3	Managing, Storing and Organizing the files and documents in Cloud based Storage Service
4	Create and enhance the document using Google Docs for Report writing
5	Create and enhance the document using Google Sheets for Project management/Bill of materials

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Sl.No	Title of the Exercises
6	Create and enhance the Presentation using Google Slides
7	Conduct and organize the professional online meeting using online platform with host management
8	Generate the online form to collect data/ information regarding project/ survey
9	Apply advanced formatting tools to perform tabulation, calculations and visualize data using Google Sheets
10	Use all tools for preparing a manuscript in view for technical journal publication
11	Design a professional poster/brochure/flier for an event/product/business using designing platform
12	Make a promotion/advertisement video for an event using video editing tool
13	Using AI Tools/Online Tools for professional documentation

Online Reference Materials:

Sl.No	Source/Platform	Link to contents
1	Google Cloud Skills Boost	https://cloud.google.com/learn/training/workspace
2	Udemy	https://www.udemy.com/share/1068fG/
3	Udemy	https://www.udemy.com/share/101YRg/

Assessment Modes:

Sl.No	Method/Technique	CO's				Marks		Weightage
		1	2	3	4	Max	Min	
1	ISE : PA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	15	10	50%
2	ISE : VCC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10		
4	ESE : OE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	15	10	50%
5	ESE : PE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10		

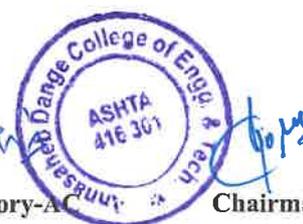
- ISE - In-Semester Examination, ESE - End-Semester Examination
- PA - Pactical Assessment, VCC - Vocational Course Certification
- OE - Oral Examination, PE - Practical Examination

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CO's - PO's & PSO's Mapping: (Low - 1, Medium - 2, High -3, No Correlation - "-")

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	-	-	2	-	1	-	-	3	3	3	-	3	-	-
2	-	-	2	1	1	-	-	3	3	3	-	3	-	-
3	-	-	2	-	1	-	-	3	3	1	-	3	-	-
4	-	-	1	1	1	-	-	3	3	3	-	3	-	-
Avg	-	-	2	1	1	-	-	3	3	3	-	3	-	-

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Course Details:

Class	S.Y B.Tech., Sem - IV
Course Code and Course Name	2AEEL220 - Innovation/Prototype
Prerequisite	NIL
Teaching Scheme: Lecture/Tutorial/Practical	01/01/00
Credits	02
Evaluation Scheme : ISE/MSE/ESE	50/00/00

Course Objectives:

1. To develop students' understanding of the **innovation process**, from **idea generation** to **prototyping and testing**.
2. To develop students **critical thinking and problem-solving skills** to identify and address challenges in innovative ways.
3. To create awareness among students on **IPR Filing and Startup Policies**.

Course Outcomes (CO's):

After successful completion of this course, the student will be able to,

2AEEL220_1	Understand the innovation process, from idea generation to prototyping and testing and the role of prototyping in the innovation process and its different techniques and tools.
2AEEL220_2	Apply the critical thinking and problem-solving skills to identify and address challenges in innovative ways.
2AEEL220_3	Use the skills to prototype ideas quickly and efficiently, using a variety of methods and materials
2AEEL220_4	Develop an innovative mindset and become more open to new ideas and approaches.
2AEEL220_5	Foster a collaborative spirit and be able to work effectively in teams.

Course Contents:

1. Introduction to Innovation
2. Methodologies for building an Innovation Framework
3. Introduction to Prototyping
4. Prototyping Tools and Techniques
5. Introduction to Product Life Cycle
6. Product Development Cost Estimation
7. Business Plan Preparation
8. Introduction to IPR
9. IPR Filing for an Innovation
10. Startup Policies and Opportunities

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**Course Execution:**

Week 1 : Course Orientation to all students

Week 2 : Identifying Innovative Problems (Students & Faculty)

Week 3 : Final Allotment of Innovative Problems to Students and Faculty Mentors

Week 4 : Assessment on Innovativeness

Week 5 : Brainstorming on Prototyping

Week 6 : Prototyping Stage 1

Week 7 : Prototyping Stage 2

Week 8 : Assessment on Prototyping

Week 9 : Product Cost Estimation

Week 10 : Business Plan for Product

Week 11 : IPR Filing

Week 12 : Assessment on Commercialization of the Innovation

Assessment Modes:

Sl.No	Method/Technique	CO's					Marks		Weightage
		1	2	3	4	5	Max	Min	
1	ISE : CAS	<input checked="" type="checkbox"/>	25	10	50 %				
2	ESE : POE	<input checked="" type="checkbox"/>	25	10	50 %				

- ISE - In-Semester Examination, CAS - Continuous Assessment
- ESE - End-Semester Examination, POE - Practical Oral Examination

CO's - PO's & PSO's Mapping: (Low - 1, Medium - 2, High -3, No Correlation - "-")

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	-	-	2	3	3	-	3	-	-	-	-	-
2	3	3	2	1	2	3	3	3	3	-	3	-	2	3
3	-	-	-	-	3	-	-	-	3	-	3	-	2	3
4	3	3	2	1	-	3	3	3	3	-	3	3	2	3
5	-	-	-	-	-	-	-	-	-	3	-	-	-	-
Avg	3	3	2	1	2	3	3	3	3	3	3	3	2	3

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**Course Details:**

Class	S.Y B.Tech., Sem - IV
Course Code and Course Name	2AEHS221 - Psychology
Prerequisite	NIL
Teaching Scheme: Lecture/Tutorial/Practical	01/01/00
Credits	02
Evaluation Scheme : ISE/MSE/ESE	50/00/00

Course Objectives:

1. To develop students' psychological ability to handle the emotions, time and manage stress levels.
2. To create awareness among students on procrastination and stress management.

Course Outcomes (CO's):

After successful completion of this course, the student will be able to,

2AEHS221_1	Identify types of emotions, domains of emotional intelligence and their effects on individual and group behavior for fostering empathy and positive relationships.
2AEHS221_2	Explain human behavior, cognition, and emotions by psychological theories in real-life scenarios and contexts.
2AEHS221_3	Discuss effective time management strategies to overcome time-related challenges.
2AEHS221_4	Interpret psychological factors that contribute procrastination to recognize the situational triggers.
2AEHS221_5	Apply the A-B-C model to manage stress for well-being.

Course Contents:

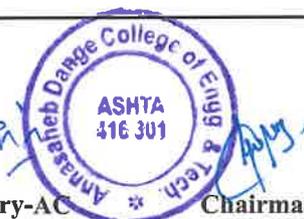
Unit 1	Psychology	02
Definition of Psychology, Different fields of Psychology, Introduction and Need of psychology		
Unit 2	Emotional Intelligence (EI) - Part I	04
Role of Emotions, Types of Emotions, Emotions/ stress and performance		
Unit 3	Emotional Intelligence (EI) - Part II	06
.Definition of Emotional Intelligence, Key signs of emotional Intelligence, How EI helps students, Marshmallow Experiment, Five domains of Emotional Intelligence		

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Unit 4	Time Management	04
Definition of Time Management, Need and importance of Time management for an individual, Effective steps/strategies of Time Management, Obstacles of Time Management		
Unit 5	Procrastination	05
.Definition of Procrastination, Types of Procrastination excuses , How to work on excuses, Why Do People Procrastinate?, Procrastination Cycle, Challenging Your assumptions, techniques to beat Procrastination		
Unit 6	Stress Management	05
Definition of Stress, A-B-C model for Stress, Identifying Stressful Thoughts and identifying cognitive distortions, Restructuring, Behavioral Coping Strategies		

Text Books:

Sl.No	Title	Author	Publisher	Edition	Year
1	Organizational Behavior- An Evidence-Based Approach	Fred Luthan	McGraw-Hill/Irwin	12th	2011
2	Essentials of Organizational Behavior	Stephen P. Robbins Timothy A. Judge Katherine E. Breward	Pearson	-	2018
3	Essentials of organizational Behavior	Stephen P. Robbins	Prentice Hall	7th	2002
4	Understanding and Managing Organizational Behavior	Jennifer M. George Gareth R. Jones	Pearson	6th	2012
5	Emotional Intelligence at Work A Professional Guide	Dalip Singh	Response Books A division of Sage Publications	3rd	2006

Assessment Modes:

Sl.No	Method/Technique	CO's				Marks		Weightage
		1	2	3	4	Max	Min	
1	ISE : CAS	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	50	20	100 %

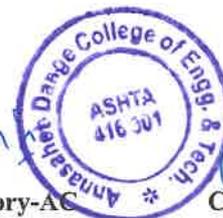
- ISE - In-Semester Examination, CAS - Continuous Assessment

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CO's - PO's & PSO's Mapping: (Low - 1, Medium - 2, High -3, No Correlation - "--")

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	-	-	-	-	-	-	-	-	1	2	-	-	-	-
2	-	-	-	-	-	-	-	1	1	2	-	-	-	-
3	-	-	-	-	-	-	-	-	1	2	-	-	-	-
4	-	-	-	-	-	-	-	-	1	2	-	-	-	-
Avg	-	-	-	-	-	-	-	1	1	2	-	-	-	-

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**Course Details:**

Class	S.Y B.Tech., Sem - IV
Course Code and Course Name	2AECC223 - Aptitude and Reasoning Part II
Prerequisite	2AECC210 - Aptitude and Reasoning Part I
Teaching Scheme: Lecture/Tutorial/Practical	00/00/02
Credits	01
Evaluation Scheme : ISE/MSE/ESE	50/00/00

Course Objectives:

1. To develop students quantitative reasoning skills, such as the ability to solve mathematical problems, interpret data and make predictions.
2. To prepare students for various competitive examinations and job interviews that require aptitude and reasoning skills.

Course Outcomes (CO's):

After successful completion of this course, the student will be able to,

2AEAV201_1	Solve problems based on HCF, LCM, Interest, Clock, Cubes and Puzzles
2AEAV201_2	Solve problems based on Coding and Decoding, Seating Arrangements and Venn diagrams.
2AEAV2011_3	Solve problems based on Ratio Proportion, Partnership, Allegation, Divisibility and Number Theory
2AEAV201_4	Demonstrate presentations using concepts delivered on confidence building and time management skills.

Course Contents:

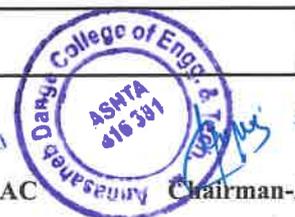
Unit 1	HCF LCM, Simple Interest, Compound Interest	4
Unit 2	Coding- Decoding, Seating Arrangement Venn Diagrams	4
Unit 3	Clocks, Cubes, Puzzles,	4
Unit 4	Ratio Proportion, Partnership	4
Unit 5	Confidence Building, Time Management	4
Unit 6	Allegation, Divisibility and Number Theory	4
	Self-Study Module	6

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Text Books:

Sl.No	Title	Author	Publisher	Edition	Year
1	R.S. Agarwal (Quantitative aptitude)	R.S.Agarwal	S Chand	-	2019
2	R.S. Agarwal (Verbal & Non-verbal Reasoning)	R.S.Agarwal	S Chand	-	2010
3	Wren & Martin (Verbal, Grammar)	P.C.Wren	S Chand	-	2017

Reference Books:

Sl.No	Title	Author	Publisher	Edition	Year
1	APTIPEDIA (Quantitative, Logical, Verbal Aptitude)	Face	Wiley	-	2017
2	Wiley (Quantitative Aptitude)	P.A.Anand	Maestro	-	2015
3	Arun Sharma (Verbal Ability)	Meenakshi Upadhyay	McGraw Hill	-	2020

Assessment Modes:

Sl.No	Method/Technique	CO's				Marks		Weightage
		1	2	3	4	Max	Min	
1	ISE : CAS	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	25	20	50 %
2	ISE : Quiz	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	25		50 %

- ISE - In-Semester Examination, CAS - Continuous Assessment

CO's - PO's & PSO's Mapping: (Low - 1, Medium - 2, High -3, No Correlation - "-")

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	2	-	-	-	-	-	-	-	-	-	-	-	-
2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
4	2	-	-	-	-	-	-	-	-	2	-	-	-	-
Avg	2	2	-	-	-	-	-	-	-	2	-	-	-	-

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Course Details:

Class	S.Y B.Tech., Sem - IV
Course Code and Course Name	2AEUV201 - Introduction to Unmanned Aerial Vehicles (UAVs)
Prerequisite	NIL
Teaching Scheme: Lecture/Tutorial/Practical	02/00/00
Credits	02
Evaluation Scheme : ISE/MSE/ESE	40/30/30

Course Objectives:

1. Cultivate a solid grasp of UAV fundamentals, encompassing types, characteristics, components, motivations, specifications, applications, payloads, and an exploration of aerodynamics.
2. Develop proficiency in DGCA rules, drone categorization, type certification, and regulations for UAV operations, including registration, certification, and pilot licensing, coupled with knowledge of RPTO, flying zones, DTCs, and CSUAS.
3. Merge theoretical and hands-on knowledge by researching the industrial applications of UAVs, understanding aerodynamics, and gaining practical skills in Quadcopter design, assembly, manufacturing, and ground testing, covering Ground Control Station, flight simulation, autonomous flight path planning, and testing.

Course Outcomes (CO's):

After successful completion of this course, the student will be able to,

2AEUV201_1	Explain the Drone rules, regulations, guidelines of DGCA and various systems which applicable in drone industry & technology by using the current active gazettes of indian government & scientific research journals knowledge
2AEUV201_2	Classify and experiment the category, class, assembly & manufacturing techniques, testing & operating methods and its industrial applications aligned with drone technology by the active government gazette or scientific articles / book data
2AEUV201_3	Identify the forces and moments acting on the drone for various flying conditions/ applications by using fundamental physical principles and theories

Course Contents:

Unit 1	Introduction, Classifications, Applications and Payloads of UAV	04
Motivation - Types of UAV – Characteristics – Fixed Wing – Rotary Wing – Flapping Wing – Basic Parts of UAV – Specifications – Applications – Pay loads of UAV		
Unit 2	DGCA Rules, Regulation & Guidelines	04
Drone Categories Based on All-up weight – Type Certification of UAVs - DGCA Rules for UAV Registration, Certification and Pilot Licensing - Remote Pilot Training Organization (RPTO) – Flying Zones - Drone Training Circulars & Certification Scheme of Unmanned Aircraft Systems		

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Unit 3	Industrial and Future Engineering Applications of UAVs	05
Need of UAVs for Industrial Applications - Development of UAVs for Powerline Inspection - Telecom Structure Inspection and Radiation Measurement – Bridge and Heritage Structure Inspection – Collection of Seaweeds using UAV – Future Engineering Applications of UAVs.		
Unit 4	Aerodynamics of UAV	04
Basics of Aerodynamics – Angle of Attack - Lift and Drag – Bernoulli Theories and Equations - Peculiarities of Multicopters - Stability – Turning Flight – Stall conditions		
Unit 5	Design, Assembly Processes & Manufacturing Techniques of Quadcopter	05
Design of Quadcopter – Selection of Sub Systems - Airframe Assembly – Integration of Electronic Systems		
Unit 6	Ground Testing for Drones	04
Introduction to Ground Control Station – Flight Simulation – Autonomous Flight Path Planning – Testing of Quadcopter		

Text Books:

Sl.No	Title	Author	Publisher	Edition	Year
1	Unmanned aircraft systems: UAVS design, development and deployment	Austin, R.	John Wiley & Sons.	1st	2011
2	Introduction to UAV systems	Fahlstrom P, Gleason T	Wiley, UK	4th	2012
3	Build your own quadcopter	Norris D	McGraw-Hill Education, New York	1st	2014

Reference Books:

Sl.No	Title	Author	Publisher	Edition	Year
1	Handbook of unmanned aerial vehicles	Valavanis K. P.; Vachtsevanos, G. J., eds	Springer reference	1st	2015
2	A first course in aerial robots and drones	Sebbane, Y. B.	CRC Press	1st	2022

Online Reference Materials:

Sl.No	Source/Platform	Link to contents
1	Swayam	https://onlinecourses.swayam2.ac.in/ntr24_ed12/preview
2	Digital Sky Platform	https://www.dgca.gov.in/digigov-portal/jsp/dgca/homePage/viewPDF.jsp?pag

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Sl.No	Source/Platform	Link to contents
		e=InventoryList/headerblock/drones/Drone%20Rules%202021.pdf

Assessment Modes:

Sl.No	Method/Technique	CO's			Marks		Weightage
		1	2	3	Max	Min	
1	ISE : ABA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	40	16	40%
4	MSE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	30	24	60%
5	ESE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	30		

- ISE - In-Semester Examination, MSE - Mid-Semester Examination, ESE - End-Semester Examination
- ABA - Activity Based Assessment

CO's - PO's & PSO's Mapping: (Low - 1, Medium - 2, High -3, No Correlation - "-")

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	2	1	1	-	3	3	3	-	3	-	3	-	-
2	3	3	2	3	1	-	1	-	3	3	3	1	-	-
3	3	3	2	2	1	-	-	-	-	-	-	2	-	-
Avg	3	3	2	2	1	3	2	3	3	3	3	2	-	-

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Course Details:

Class	S.Y B.Tech., Sem - IV
Course Code and Course Name	2AEAT201 - Introduction to Air Transportation
Prerequisite	NIL
Teaching Scheme: Lecture/Tutorial/Practical	02/00/00
Credits	02
Evaluation Scheme : ISE/MSE/ESE	40/30/30

Course Objectives:

1. To familiarize students with the dynamics of the air transportation system, including the operations, management, and regulations governing air travel.
2. To equip students with the ability to understand and apply real-world scenarios such as safety and security, environmental concerns, marketing principles, and technological advancements.

Course Outcomes (CO's):

After successful completion of this course, the student will be able to,

2AEAT201_1	Gain insights into the operational functions of aerospace and air transportation entities to assess the role of governmental policies, network structure, management, market forces, environmental concerns, business models, and consumer preferences that help in shaping the air transportation landscape.
2AEAT201_2	Discuss legal frameworks governing international aviation, including treaties, conventions, and regulatory bodies such as ICAO, IATA, and national regulatory authorities, and their roles in promoting safety, security, and cooperation.
2AEAT201_3	Identify and compare different organizational structure and airline business models strategic positioning, operational characteristics, cost structures with the effects of deregulation on market competition, alliances, service quality, route and consumer choice.
2AEAT201_4	Apply marketing principles and strategies tailored to the unique characteristics of the air transportation industry and utilize market research techniques to identify customer needs, preferences, and competitive positioning opportunities
2AEAT201_5	Explore future directions by considering the ethical, social, and environmental implications of aerospace and air transportation activities for sustainable growth within the industry.

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**Course Contents:**

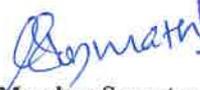
Unit 1	Aerospace Industry	03
Characteristics of the industry - Economic profile of the Industry - Civil Aviation market - Factors affecting commercial transport sales - General Aviation.		
Unit 2	Air Transportation Industry	04
Characteristics of the commercial air transport industry - Contribution to economy and efficient conduct of business - Economic and Social Benefits & Impacts - Basic Scheduling and Network structure.		
Unit 3	International Law, Regulators and Associations	06
Air law and Aviation law - International Air law - Sovereignty of territorial Airspace - Chicago Convention - Freedom of Air - Warsaw convention - Montreal Convention - ICAO - FAA - NTSB - IATA - EASA - DGCA - AAI - other International Associations.		
Unit 4	Management and Organization	04
Alliances - Deregulation and impact in airline industry - Organizational Structure – Types of Airline Personnel – Organizational Culture.		
Unit 5	Marketing for Air Transportation	05
Business model - Principles of air transport marketing - Stages in the Application of Marketing Principles - Principles of engagement marketing – Market segmentation – PESTE Analysis.		
Unit 6	Air Transport and the Environment	04
Introduction - Limiting Aviation's Environmental Impact: The role of Regulatory bodies - Airport Water Quality Control - Noise - Surface Air Quality - Impact of Aviation on Climate.		

Text Books:

Sl.No	Title	Author	Publisher	Edition	Year
1	Air Transportation - Management Perspective	John G Wensveen	Ashgate	7th	2011
2	Air Transport Management - An International Perspective	Lucy Budd and Stephen Ison	Routledge	-	2017


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Reference Books:

Sl.No	Title	Author	Publisher	Edition	Year
1	Airline Marketing and Management	Stephen Shaw	Ashgate	-	-
2	The Global Airline Industry	Peter Belobaba Amedeo Odoni Cynthia Barnhart	Wiley	1st	2009

Assessment Modes:

Sl. No	Method/ Technique	Course Outcomes					Marks		Weightage
		1	2	3	4	5	Max	Min	
1	ISE : ABA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	20	16	40 %
2	MSE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	30	24	60 %
3	ESE	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	30		

- ISE - In-Semester Examination, MSE - Mid-Semester Examination, ESE - End-Semester Examination
- ABA - Activity Based Assessment

CO's - PO's & PSO's Mapping: (Low - 1, Medium - 2, High -3, No Correlation - "-")

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	-	-	-	-	-	2	1	1	-	-	1	-	-	-
2	1	-	-	-	-	2	-	1	-	-	-	-	-	-
3	1	-	-	-	-	1	-	-	-	-	1	-	-	-
4	1	-	-	-	-	-	-	1	-	-	1	-	-	-
5	1	-	-	-	-	1	3	1	-	-	-	-	-	-
Avg	1	-	-	-	-	2	2	1	-	-	1	-	-	-

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**Course Details:**

Class	S.Y B.Tech., Sem - IV
Course Code and Course Name	2AEAV201- Introduction to Flight and Avionics
Prerequisite	NIL
Teaching Scheme: Lecture/Tutorial/Practical	02/00/00
Credits	02
Evaluation Scheme : ISE/MSE/ESE	40/30/30

Course Objectives:

1. Provide students the fundamental knowledge on the Verticals of Aeronautical Engineering – Aerodynamics, Propulsion, and Structures
2. Make student understand the basic components, systems & subsystems of the Aircraft and their functions
3. Describe the different types of avionics subsystems and how they work together

Course Outcomes (CO's):

After successful completion of this course, the student will be able to,

2AEAV201_1	Explain the historical developments in the Aeronautical Engineering, Current Trends in the Aviation Industry
2AEAV201_2	Comment & Explain in detail the basic components, systems & subsystems of the Aircraft and their functions
2AEAV201_3	Comment & Explain in detail the basics of Air Transportation & Airport Operations
2AEAV201_4	Illustrate cockpit and display technologies of civil and fighter airplanes
2AEAV201_5	Interpret the concept of Flight Control Systems from an earlier era to advanced Technologies.

Course Contents:

Unit 1	Introduction to Flying vehicles	05
History of Aviation(Global & India Perspective), Early Concepts, Wright Brothers Era, First World War Period, Second World War Period, Modern Developments, Classification of Flying Vehicles, Anatomy of (Basic Parts & Their Function), Buoyancy Lift Vehicles(Airships, Aerostats, Hot Air Balloons), Dynamic Lift Vehicles(Aircrafts), Powered Static Lift Vehicles(Helicopters), Reaction Lift Vehicles(Launch & Re-entry Vehicles), Parachutes & Para gliders, Control Surfaces & Their Functions		

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Unit 2	Aircraft Propulsion System	04
Air Breathing Propulsion - Principle of Operation , Components Piston Engines , Jet Engines, Turbo Jet, Turbo Fan, Turbo Prop, Turbo Shaft, Ramjet, Scramjet, Station Numbering - Flight Envelope - Non-Air Breathing Propulsion, Rocket Propulsion - Types and Classification		
Unit 3	Aircraft Maintenance and Repair	04
General Aircraft Repairs- A, B, C, D Checks - Starting procedures of Turbo Prop, Turbo Fan and Turbojet Engines- Flight Inspection Procedures - Tools used in Aircraft Maintenance- MRO Sector - Indian MRO Sector - Various job roles involved in the maintenance sector.		
Unit 4	Air Transportation and Regulations	04
History of Aviation - Regulatory bodies - ICAO, IATA, FAA, EASA, DGCA- Airlines Management in brief - Airport Operations - ARFF - Airport Nomenclature - Air Traffic Control Operations - Airline Ticketing- Job roles involved in the Aviation Sector - Flight Scheduling in brief.		
Unit 5	Introduction to Avionics and Instrumentation	05
Need for avionics in civil and military aircraft and space systems, integrated avionics and weapon systems, typical avionics subsystems, Introduction to digital computer and memories. Avionics system architecture, data buses – MIL-STD-1553B – ARINC – 420 – ARINC – 629, Control and display technologies: CRT, LED, LCD, EL and plasma panel, Touch flight display – Direct voice input (DVI), Civil and Military Cockpits: MFDS, HUD, MFK, HOTAS		
Unit 6	Flight control systems	04
Principles of flight controls, Flight control surfaces, Control surface actuation, Flight control linkage systems, Trim and feel, Power control, Mechanical, Direct drive, Electromechanical, Electro-hydrostatic actuation, Auto pilot system, Fly by wire system, fly by optics system, Autonomous taxi, Neural sensing		

Text Books:

Sl.No	Title	Author	Publisher	Edition	Year
1	Introduction to Flight	Anderson, J.D	McGraw-Hill	7th	2011
2	Aircraft Systems: Mechanical, Electrical and Avionics Subsystems Integration	Moir, I. and Sea bridge, A	AIAA (American Institute of Aeronautics and Astronautics)	-	2001
3	Avionics Training Systems, Installation and Troubleshooting	Len Buckwalter	Avionics Communications Inc	-	-

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**Reference Books:**

Sl.No	Title	Author	Publisher	Edition	Year
1	Aerodynamics, Aeronautics and Flight Mechanics	McCormick, B.W.	John Wiley	2nd	1995
2	Gas Turbines and Jet and Rocket Propulsion	Mathur M L and Sharma R P	Standard Publisher	3rd	2014
	Aircraft Structures for Engineering Students	Megson, T.H.G	Elsevier	4th	2007

Assessment Modes:

Sl.No	Method/Technique	CO's					Marks		Weightage
		1	2	3	4	5	Max	Min	
1	ISE : ABA	<input checked="" type="checkbox"/>	40	16	40%				
2	MSE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	30	24	60%
3	ESE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	30		

- ISE - In-Semester Examination, MSE - Mid-Semester Examination, ESE - End-Semester Examination
- ABA - Activity Based Assessment

CO's - PO's & PSO's Mapping: (Low - 1, Medium - 2, High -3, No Correlation - "-")

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	1	-	-	-	-	-	-	-	-	-	-	1	-	-
2	2	-	-	-	-	-	-	-	-	-	-	1	-	-
3	2	-	-	-	-	-	-	-	-	-	-	1	-	-
4	3	-	-	-	-	-	-	-	-	1	-	-	-	-
5	3	-	-	-	-	-	-	3	2	1	-	-	-	-
Avg	2	-	-	-	-	-	-	3	2	1	-	1	-	-

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Program Articulation Matrix for S.Y B.Tech., Sem - IV

Sl.No	Course		PO's												PSO's		
	Code	Name	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
1	2AEPCC211	Low Speed Aerodynamics	3	2	2	1	2	-	-	-	-	3	3	-	-	3	3
2	2AEPCC212	Aircraft Structures	3	2	1	1	2	-	-	-	-	3	2	-	1	2	2
3	2AEPCC213	Airbreathing Propulsion	3	2	2	1	1	-	-	-	-	3	2	-	1	2	2
4	2AEPE214	Introduction to Finite Element Analysis	2	1	1	2	3	-	-	1	-	3	-	1	2	2	2
5	2AEPE215	Introduction to Computational Fluid Dynamics	2	2	2	2	2	2	-	1	2	2	-	2	2	2	2
6	2AEPE216	Introduction to Unmanned Aerial Vehicles	2	2	1	2	1	3	2	3	3	3	3	3	2	2	2
7	2AEPE217	Introduction to Aircraft Maintenance	2	1	1	1	1	1	1	1	2	1	1	1	2	2	2
8	2AEVS218	Grid Generation using HyperMesh	1	-	-	-	3	-	-	1	2	3	-	3	2	-	-
9	2AEVS219	Professional and Business Communication	-	-	2	1	1	-	-	3	3	3	-	3	-	-	-
10	2AEEL220	Innovation/Prototype	3	3	2	1	2	3	3	3	3	3	3	3	2	3	3
11	2AEHS221	Psychology	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-
12	2AECC222	Aptitude and Reasoning Part - II	2	2	-	-	-	-	-	-	-	2	-	-	-	-	-
Average			2.2	1.9	1.7	1.6	2.1	3.0	3.3	2.4	3.1	3.0	4.5	3.1	2.0	2.2	2.2
No of Courses Mapped			10	9	9	9	10	4	3	8	10	12	4	8	9	8	8
Weighted Average			1.8	1.4	1.3	1.2	1.7	1.0	0.8	1.6	2.6	3.0	1.5	2.1	1.5	1.5	1.5

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Program Articulation Matrix for S.Y.B.Tech., Sem - IV (Minor Stream Course 1)

Sl. No	Course		PO's												PSO's	
	Code	Name	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2AEUV201	Introduction to Unmanned Aerial Vehicles	3	3	2	2	1	3	2	3	3	3	3	2	-	-
2	2AEAT201	Introduction to Air Transportation	1	-	-	-	-	2	2	1	-	-	1	-	-	-
3	2AEAV201	Introduction to Flight and Avionics	2	-	-	-	-	-	-	3	2	1	-	1	-	-

(Low - 1, Medium - 2, High - 3, No Correlation - "-")


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