HINDUSTAN
INSTITUTE OF TECHNOLOGY & SCIENCE
(DEEMED TO BE UNIVERSITY)

REGULATION 2022 A
(in line with NEP 2020)

B. TECH. AEROSPACE ENGINEERING
CHOICE BASED CREDIT SYSTEM

MOTTO, VISION, MISSION AND VALUE STATEMENT OF INSTITUTE

Motto

To Make Every Man a Success and No Man a Failure.

Vision

To be an International Institute of Excellence, providing a conducive environment for education with a strong emphasis on innovation, quality, research and strategic partnership blended with values and commitment to society.

Mission

- To create an ecosystem for learning and world class research.
- To nurture a sense of creativity and innovation.
- To instill highest ethical standards and values with a sense of professionalism.
- To take up activities for the development of Society.
- To develop national and international collaboration and strategic partnership with industry and institutes of excellence.
- To enable graduates to become future leaders and innovators.

Value Statement

Integrity, Innovation, Internationalization

DEPARTMENT OF AEROSPACE ENGINEERING
VISION

To excel in education, research, and innovation in Aerospace Engineering

MISSION

M1: To provide conducive academic environment through well designed curriculum, teaching and learning process imparting high quality education for research and innovation.

M2: To demonstrate hands-on training from state-of-the-art laboratories in their academic projects and career.

M3: To impart technical, leadership skills and life-long learning embedded with ethical values and social relevance

PROGRAM EDUCATIONAL OBJECTIVES [PEO]

PEO1. **Successful career and adoptability to industry:** Graduates of the programme will attain adequate academic knowledge and skills to adapt themselves in any aircraft and allied industries and have successful professional career.

PEO2. **Modern design tools and multi-disciplinary project execution:** Graduates of the programme will have knowledge on modern design tools and apply to multi-disciplinary projects through teamwork with a high degree of professional ethics and standards.

PEO3. **Contribution to Aerospace field and lifelong learning:** Graduates of the programme will have innovative ideas, sustained interest and potential to contribute for the development and current needs of the Aerospace industries in the country and the world.

PROGRAMME OUTCOMES (PO's)

Engineering Graduates will be able to:

PO1 : **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 : **Problem Analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 : **Design Development of Solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 : **Conduct Investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 : **Modern Tool Usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 : **The Engineer & Society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 : **Environment & Sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 : **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 : **Individual & Team Work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 : **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 : Project Management & Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 : Life-Long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES: (PSO's)

Graduates of B.Tech Aerospace Engineering students will be able to

PSO1: Develop an advanced ability capable of exploiting the knowledge in Aerospace engineering with innovation in design and development of new products

PSO2: Conceive and convert the theoretical knowledge and skills in handling practical problems to compete in the area of flight vehicles professionally and ethically.

PEOs and POs:

B.Tech Aerospace Engineering Program Outcomes (POs) leading to the achievements of the objectives (PEOs) are summarised in the following table.

Programme Educational Objectives (PEOs)	Programme Outcomes (POs)													
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**PSO1**	**PSO2**
Successful career and adoptability to industry	3	3	3	3	3	2	2	2	3	3	3	2	3	3
Modern design tools and multi-disciplinary project execution	3	3	3	3	3	2	2	2	3	3	3	2	3	3
Contribution to Aerospace field and lifelong learning	3	3	3	3	3	2	2	2	3	3	3	2	3	3

B. TECH AEROSPACE ENGINEERING CURRICULUM R2022A (in line with NEP 2020)																		
		S. NO	COURSE CODE	NAME OF THE COURSE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
FIRST YEAR	SEMESTER – I	1	EMA51001	Matrices and Calculus	2.8	2.6	1.6	1.4	1.6	-	-	-	-	-	-	1.4	1.6	1.4
		2	**Any one course to be opted**															
			ECT51001	Engineering Materials	3	2	1.4	-	-	-	1.6	-	-	-	-	2	1.6	1.6
			EPH51001	Engineering Physics	3	3	1.4	1.4	1.8	-	-	-	2.6	-	-	2.2	1.4	2
		3	**Any one course to be opted**															
			GGGG1001	Communication Skills	-	-	-	-	-	-	-	1.4	0.4	2.8	1.8	2	1.2	1.4
			GGGG1002	Personality Development and Soft Skills	-	-	-	-	-	-	-	1.4	0.4	2.8	1.8	2	1.2	1.4
		4	**Any one course to be opted**															
			ECS51010	Programming in Python	2.4	2.4	2.4	1.2	1	1.4	-	1.2	1	0.8	0.8	1.2	1.8	1.4
			EME51001	Engineering Graphics and Computer Aided Design	2.4	1.4	1.2	-	1.6	-	-	1.4	1.6	1.8	-	2	1	0.8
		5	EGE51002	Design Thinking	1.4	1.2	1.6	2	1.8	2.8	2.8	2	2.4	2.4	0.8	2	2.4	2.6
		6	**Any one course to be opted**															
			EGE51406	Engineering practices Lab	3	2	-	2	-	1	-	-	-	-	-	-	2.3	1.3
			EGE 51407	FAB Lab for Aeronautical Engineering	1.4	1.4	1.6	1.6	1.4	-	-	-	-	-	-	1.4	1.6	1.6
		7	**Any one course to be opted (Outreach)**															
			EGE51404	Outreach (NCC)- Level -1 #	1	2	1	1	-	2	1	3	2	3	3	2	-	-
			EGE51405	Outreach (NSS, Y's Men, Retract)- Level -1 #	1	2	1	1	-	2	1	3	2	3	3	2	-	-
		8	**Any one course to be opted (Indian/Foreign Language)**															
			GGGG1008	Tamil	-	-	-	-	-	-	0.4	0.4	0.4	3	0.4	0.6	-	-
			GGGG1009	Hindi	-	-	-	-	-	-	0.4	0.4	0.4	3	0.4	0.6	-	-

			GGGG1010	Telugu	-	-	-	-	-	-	0.4	0.4	0.4	3	0.4	0.6	-	-
			GGGG1011	French	-	-	-	-	-	-	0.4	0.4	0.4	3	0.4	0.6	-	-
			GGGG1012	German	-	-	-	-	-	-	0.4	0.4	0.4	3	0.4	0.6	-	-
			GGGG1013	Spanish	-	-	-	-	-	-	0.4	0.4	0.4	3	0.4	0.6	-	-
			GGGG1014	Korean	-	-	-	-	-	-	0.4	0.4	0.4	3	0.4	0.6	-	-
			GGGG1015	Mandarin	-	-	-	-	-	-	0.4	0.4	0.4	3	0.4	0.6	-	-
			GGGG1016	Japanese	-	-	-	-	-	-	0.4	0.4	0.4	3	0.4	0.6	-	-
			OR															
			EGE21001	Universal Human Values	1	1	1	1	1	2	2	3	2	2	3	1	-	-
		9	ELS51006	Tamil Culture and Technology	-	-	-	-	-	1	1	2	3	-	-	-	-	-
		S. NO	**COURSE CODE**	**NAME OF THE COURSE**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
	SEMESTER – II	1	EMA51002	Analytical Mathematics	3	3	2	1	2	-	-	-	-	-	-	2	3	0
		2	**Any one course to be opted**															
			ECT51001	Engineering Materials	3	2	1.4	-	-	-	1.6	-	-	-	-	2	1.6	1.6
			EPH51001	Engineering Physics	3	3	1.4	1.4	1.8	-	-	-	2.6	-	-	2.2	1.4	2
		3	**Any one course to be opted**															
			GGGG1001	Communication Skills	-	-	-	-	-	-	-	1.4	0.4	2.8	1.8	2	1.2	1.4
			GGGG1002	Personality Development and Soft Skills	-	-	-	-	-	-	-	1.4	0.4	2.8	1.8	2	1.2	1.4
		4	EAE51001	Engineering Mechanics for Aeronautical and Aerospace Engineers	3	3	3	3	1	2	-	1	2	1	1	2	3	2
		5	**Any one course to be opted**															
			ECS51010	Programming in Python	2.4	2.4	2.4	1.2	1	1.4	-	1.2	1	0.8	0.8	1.2	1.8	1.4
			EME51001	Engineering Graphics and Computer Aided Design	2.4	1.4	1.2	-	1.6	-	-	1.4	1.6	1.8	-	2	1	0.8
		6	**Any one course to be opted**															
			EGE51406	Engineering practices Lab	3	2	-	2	-	1	-	-	-	-	-	-	2.3	1.3
			EGE 51407	FAB Lab for Aeronautical Engineering	1.4	1.4	1.6	1.6	1.4	-	-	-	-	-	-	1.4	1.6	1.6
		7	**Any one course to be opted (Outreach)**															
			EGE51404	Outreach (NCC)- Level -1 #	1	2	1	1	-	2	1	3	2	3	3	2	-	-

			EGE51405	Outreach (NSS, Y's Men, Retract)- Level -1 #	1	2	1	1	-	2	1	3	2	3	3	2	-	-
		8	**Any one course to be opted (Indian/Foreign Language)**															
			GGGG1008	Tamil	-	-	-	-	-	-	0.4	0.4	0.4	3	0.4	0.6	-	-
			GGGG1009	Hindi	-	-	-	-	-	-	0.4	0.4	0.4	3	0.4	0.6	-	-
			GGGG1010	Telugu	-	-	-	-	-	-	0.4	0.4	0.4	3	0.4	0.6	-	-
			GGGG1011	French	-	-	-	-	-	-	0.4	0.4	0.4	3	0.4	0.6	-	-
			GGGG1012	German	-	-	-	-	-	-	0.4	0.4	0.4	3	0.4	0.6	-	-
			GGGG1013	Spanish	-	-	-	-	-	-	0.4	0.4	0.4	3	0.4	0.6	-	-
			GGGG1014	Korean	-	-	-	-	-	-	0.4	0.4	0.4	3	0.4	0.6	-	-
			GGGG1015	Mandarin	-	-	-	-	-	-	0.4	0.4	0.4	3	0.4	0.6	-	-
			GGGG1016	Japanese	-	-	-	-	-	-	0.4	0.4	0.4	3	0.4	0.6	-	-
				OR														
			EGE21001	Universal Human Values	1	1	1	1	1	2	2	3	2	2	3	1	-	-
		9	EGE5101*	Mandatory Course I														
SECOND YEAR	SEMESTER – III	**S. NO**	**COURSE CODE**	**NAME OF THE COURSE**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
		1	EMA51003	Partial Differential Equations and Transforms	3	3	2	2	2	-	-	-	-	-	-	-	1.4	1.6
		2	GGGG1003	Advanced Academic Writing	-	-	2	2	-	-	-	2.6	2	3	2	3	1.2	1.6
		3	EAE51002	Solid Mechanics	2	2	3	3	3	2	3	1	2	2	1	2	3	3
		4	EAS51001	Fundamentals of Aerospace Engineering	3	2	1	3	2	2	-	-	2	-	-	2	3	2
		5	EAE51004	Fluid Mechanics and Machinery	3	3	3	3	2	2	2	1	2	2	3	3	3	3
		6	EAS515XX	DE 1														
		7	EGE51003	Environmental Science and Sustainable Development	2	2	2	-	-	1	3	-	-	-	-	2	1.4	1.4
		8	EAS51801	Design Project – 1	3	3	2	1	3	2	1	3	3	3	3	2	2	2.3
		9	EAS51800	Internship -1 (To be carried out in summer after 2nd semester and evaluated in 3rd semester)	2	2	3	3	2	0.6	1	2	1.6	1.6	1.6	0.6	0.6	1

		10	EGE5102*	Mandatory Course II													
	SEMESTER – IV	**S. NO**	**COURSE CODE**	**NAME OF THE COURSE**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
		1	EMA51008	Numerical Methods	3	3	1.2	0.8	-	-	-	-	-	0.4	0.4	0.2	-	-
		2	GGGG1004	Professional Editing and Project Writing	-	-	-	2	-	-	-	-	-	3	-	2	-	-
		3	EAS51002	Aerospace Structural Mechanics	3	2	2	3	1	-	-	-	2	1	-	2	2	3
		4	EAE51006	Thermodynamics	3	3	1	3	2	1	-	-	-	-	-	2	3	2
		5	EAS51007	Design and Development of UAVs(Industry Collaborated Course)	3	3	3	3	2	2	2	2	2	2	2	1	1	2
		6	EAS515XX	DE 2 (May be lab integrated)														
		7	EXX517XX	NE 1 (May be lab integrated)														
		8	EAS51802	Design Project – 2	3	3	2.6	2	3	2	2	3	3	3	3	1	2	2
		9	EGE5103*	Mandatory Course III														
THIRD YEAR	SEMESTER – V	**S. NO**	**COURSE CODE**	**NAME OF THE COURSE**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
		1	ELS51009	Public Speaking	2	-	2	-	3	3	-	-	2	3	2	3	3	2
		2	EAS51003	Principles of Air-breathing Propulsion	3	3	2	2	3	-	0	-	1	1	1	2	2	2
		3	EAS51004	Subsonic and Transonic Aerodynamics	2	1	1	1	1	1	2	1	1	1	1	1	2	2
		4	EAS51005	Aerospace Structures	3	1	1	2	1	2	-	-	1	-	-	1	3	3
		5	EAE515XX	DE 3 (May be lab integrated)														
		6	EXX517XX	NE 2 (May be lab integrated)														
		7	EAS51803	Design Project – 3	3	3	2.6	2	3	2	2	3	3	3	3	1	2	2.6
		8	EGE51004	Entrepreneurship	2.75	2.5	1.75	2.5	2.25	2.75	1.75	1.5	2.75	2.5	2	3	2.5	2.5
		9	EAS51807	Internship -2	2	2	3	3	2	0.6	1	2	1.6	1.6	1.6	0.6	0.6	1
	SEMESTER – VI	**S. NO**	**COURSE CODE**	**NAME OF THE COURSE**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
		1	ELS51010	English for Competitive Examinations	-	-	-	-	-	-	0.4	0.4	0.8	3	0.8	-	-	0.6
		2	EAS51008	High Speed Aerodynamics	2	2	2	2	2	-	3	2	3	2	-	1	1	1
		3	EAS51009	Space Propulsion	2	2	2	2	2	-	3	2	3	2	-	1	1	1

		4	EAS51010	Control Systems for Aerospace Engineering	3	3	2	2	3	2			2	1		2	2	2
		5	EAS515XX	DE 4 (May be lab integrated)														
		6	EXX517XX	NE 3 (May be lab integrated)														
		7	EAS51011	Computational Fluid Dynamics	3	3	2	2	3	1	1	1	2	1	1	2	3	2
		8	EAS 51804	Design Project – 4	3	3	2.6	2	3	2	2	3	3	3	3	1	1.6	1.6
FINAL YEAR	SEMESTER – VII	**S. NO**	**COURSE CODE**	**NAME OF THE COURSE**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
		1	ELS51011	Verbal Reasoning and Interview Skills	-	0.8	1.2	1.2	-	1.6	-	-	2	3	1	3	-	-
		2	EAS51012	Flight Mechanics	3	3	3	2	-	1	-	1	2	2	2	2	3	3
		3	EAS51013	Space Mechanics	1	1	1	3	1	1	1	2	2	1	1	1	3	3
		4	EAS51014	Satellite Technology	1	1	1	3	1	1	1	2	2	1	1	1	3	3
		5	EAS515XX	DE 5 (May be lab integrated)														
		6	EXX517XX	NE 4 (May be lab integrated)														
		7	EGE51005	Research Methodology & IPR	2.4	2.8	1.2	1.2	3	2.4	1.8	2	2.2	2.6	2	3	2	2
		8	EAS51805	Project Phase 1	3	3	2	3	2	3	2	3	2	3	2	2	2	2
	SEMESTER VIII	**S. NO**	**COURSE CODE**	**NAME OF THE COURSE**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
		1	EAS51806	Project Phase 2	3	3	3	3	3	3	2	3	3	3	3	3	3	3

DEPARTMENT ELECTIVE COURSES

Vertical 1	Vertical 2	Vertical 3	Vertical 4	Vertical 5
Aerodynamics	**Aerospace Propulsion**	**Aerospace structures**	Avionics	Space Mechanics
Flow Visualization: The physics and Art of Fluid Flow.	Fuel safety Practices	Aerospace Materials and Manufacturing Processes	Aircraft Systems and Instruments	Spacecraft Systems and Engineering
Potential Flow Theory.	Cryogenic Engineering	Mechanics of Composite Materials	Aircraft Navigation Systems	Satellite Payloads
Laminar Flow Theory	Conductive and Convective Heat Transfer	Mechanics of Structural Impact	Aircraft Surveillance Systems	Satellite Remote Sensing
Wind tunnel design and its application	Propulsion Techniques for UAVs	Additive Manufacturing	IOT for Aerospace Engineers	Manned space missions
Missile and Launch Vehicle Aerodynamics	Theory of Flames	Vibration and Aeroelasticity	Flight instruments and Data Acquisition systems	Astronomy and Cosmology
Boundary Layer Theory	Reentry Aerothermodynamics	Nano-composites and Smart Materials	AI, ML for Aerospace Engineers	Satellite and Space System Design
Hypersonic Aerodynamics		Fatigue and Fracture Mechanics	GNSS and Applications	Satellite Image processing Systems
Turbulence Modelling		Finite Element Method	Aerospace Guidance and Control	Satellite Dynamics and Control

VERTICALSVERTICAL 1: AERODYNAMICS

Sl. No	COURSE NAME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2
1	Flow Visualization: The physics and Art of Fluid Flow.	3	3	3	3	3	3	-	-	2	2	2	3	3	2
2	Potential Flow Theory.	3	3	3	3	3	-	-	-	1	1	1	2	3	2
3	Laminar Flow Theory	3	3	3	3	1	1	-	-	1	1	1	1	3	2
4	Wind tunnel design and its application	3	3	3	3	1	2	-	-	1	1	1	1	3	2
5	Missile and Launch Vehicle Aerodynamics	3	3	3	3	1	1	-	-	1	1	1	1	3	2
6	Boundary Layer Theory	3	3	3	3	1	2	-	-	1	1	1	1	3	2
7	Hypersonic Aerodynamics	3	3	3	3	1	1	-	-	3	1	1	3	3	2
8	Turbulence Modeling	3	3	3	3	2	2	-	-	3	3	2	3	3	2

VERTICAL 2: AEROSPACE PROPULSION

Sl. No	COURSE NAME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2
1	Fuel safety Practices	3	3	3	3	1	1	-	-	1	1	1	3	3	2
2	Cryogenic Engineering	3	3	3	3	1	1	-	-	1	1	1	2	3	2
3	Conductive and Convective Heat Transfer	3	3	3	3	3	1	-	-	1	1	1	1	3	2
4	Propulsion Techniques for UAVs	3	3	3	3	3	1	-	-	1	1	1	1	3	2
5	Theory of Flames	3	3	3	3	3	1	-	-	1	1	1	1	3	2
6	Reentry Aerothermodynamics	3	3	3	3	3	1	-	-	1	1	1	1	3	2

VERTICAL 3: AEROSPACE STRUCTURES

Sl. No	COURSE NAME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2
1	Aerospace Materials and Manufacturing Processes	3	2	2	1	1	3	-	-	2	2	2	3	3	2
2	Mechanics of Composite Materials	3	3	3	3	3	1	-	-	1	1	1	2	3	2
3	Mechanics of Structural Impact	3	3	3	3	1	1	-	-	1	1	1	1	3	2
4	Additive Manufacturing	3	3	3	3	1	2	-	-	1	1	1	1	3	2
5	Vibration and Aeroelasticity	3	3	3	3	1	1	-	-	1	1	1	1	3	2
6	Nano-composites and Smart Materials.	3	3	3	3	2	2	-	-	1	1	1	1	3	2
7	Fatigue and Fracture Mechanics	3	3	3	3	1	1	-	-	3	1	1	3	3	2
8	Finite Element Method	3	3	3	3	3	2	-	-	3	3	2	3	3	2

VERTICAL 4: AVIONICS

Sl. No	COURSE NAME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2
1	Aircraft Systems and Instruments	3	3	2	2	2	-	3	2	3	2	-	1	1	1
2	Aircraft Navigation Systems	3	3	2	2	2	-	3	2	3	2	-	1	1	1
3	Aircraft Surveillance Systems	3	3	2	2	3	2	-	-	2	1		2	2	2
4	IOT for Aerospace Engineers	3	3	2	2	2	-	3	2	3	2	-	1	1	1
5	Flight instruments and Data Acquisition systems	3	3	2	2	3	2	-	-	2	1		2	2	2
6	AI, ML for Aerospace Engineers	3	3	2	2	3	1	1	1	2	1	1	2	3	2
7	GNSS and Applications	3	3	3	1	1	1	1	1	3	1	1	3	2	3
8	Aerospace Guidance and Control	3	3	2	2	3	1	1	1	2	1	1	2	3	2

VERTICAL 5: SPACE MECHANICS

Sl. No	COURSE NAME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2
1	Spacecraft Systems and Engineering	3	3	3	3	3	-	3	2	3	2	-	1	3	3
2	Satellite Payloads	3	3	3	3	3	-	3	2	3	2	-	1	3	3
3	Satellite Remote Sensing	3	3	3	3	3	2	-	-	2	1		2	3	3
4	Manned space missions	3	3	3	3	3	-	3	2	3	2	-	1	3	3
5	Astronomy and Cosmology	3	3	3	3	3	2	-	-	2	1		2	3	3
6	Satellite and Space System Design	3	3	3	3	3	1	1	1	2	1	1	2	3	3
7	Satellite Image processing Systems	3	3	3	3	3	1	1	1	3	1	1	3	3	3
8	Satellite Dynamics and Control	3	3	3	3	3	1	1	1	2	1	1	2	3	3

B. TECH. AEROSPACE ENGINEERING

GENERAL COURSE STRUCTURE & THEME

A. Definition of Credit:

1 Hr. Lecture (L) per week	1 Credit
1 Hr. Tutorial (T) per week	1 Credit
1 Hr. Practical (P) per week	0.5 Credit
2 Hours Practical (P) per week	1 Credit

B. Range of Credits: In the light of the fact that a typical Model Four-year Under Graduate degree program in Engineering has about 160 credits, we have adopted 165 credits.

C. Structure of UG Program: The structure of UG program shall have essentially the following categories of courses with the breakup of credits as given:

S. No.	Category Code	Category	Breakup of Credits
1.	HS	Humanities & Social Science Courses	16
2.	BS	Basic Science Courses	24
3.	ES	Engineering Science Courses	15
4.	PC	Program Core Courses (Branch specific)	61
5.	DE	Professional Elective Courses (Branch specific) – Department Elective	15
6.	NE	Open Elective Courses (Cross Discipline Subjects) – Non Department Elective	12
7.	EEC	Employment Enhancement Courses (Project/ Summer Internship/ Seminar)	22
		TOTAL	**165**

CURRICULUM COURSE DISTRIBUTION (BASED ON CREDITS)

Semester	HS	BS	ES	PC	DE	NE	EEC	Total Credits per semester
1	6	8	4	4				**22**
2	5	8	5	4				**22**
3	1	4	2	10	3		2	**22**
4	1	4		10	3	3	1	**22**
5	1		2	10	3	3	2	**21**
6	1			13	3	3	1	**21**
7	1		2	10	3	3	3	**22**
8							13	**13**
Total Credits	**16**	**24**	**15**	**61**	**15**	**12**	**22**	**165**

CURRICULUM COURSE DISTRIBUTION (BASED ON COURSE COUNT)

Semester	HS	BS	ES	PC	DE	NE	EEC	MC	Total Courses per semester
1	4	2	2	1					**9**
2	3	2	2	1				**1**	**9**
3	1	1	1	3	1		2	**1**	**10**
4	1	1		3	1	1	1	**1**	**9**
5	1		1	3	1	1	2		**9**
6	1			4	1	1	1		**8**
7	1		1	3	1	1	1		**8**
8							1		**1**
Total Courses	**12**	**6**	**7**	**18**	**5**	**4**	**8**	**3**	**63**

MC : Mandatory Course

CREDIT COUNT

Semester	Credit Count
1	22
2	22
3	22
4	22
5	21
6	21
7	22
8	13
	165

B. TECH AEROSPACE ENGINEERING CURRICULUM R2022A (in line with NEP 2020)									
SEMESTER – I									
S. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	BS	EMA51001	Matrices and Calculus	3	0	2	4	2	5
2	BS	**Any one course to be opted**		3	0	2	4	2	5
		ECT51001	Engineering Materials						
		EPH51001	Engineering Physics						
3	HS	**Any one course to be opted**		2	0	1	2	1	3
		GGGG1001	Communication Skills						
		GGGG1002	Personality Development and Soft Skills						
4	PC	**Any one course to be opted**		2	0	2	3	2	4
		ECS51010	Programming in Python						
		EME51001	Engineering Graphics and Computer Aided Design						
5	ES	EGE51002	Design Thinking	2	0	2	3	2	3
6	ES	**Any one course to be opted**		0	0	4	2	2	4
		EGE51406	Engineering practices Lab						
		EGE 51407	FAB Lab for Aeronautical Engineering						
7	HS	**Any one course to be opted (Outreach)**		0	0	2	1	4	2
		EGE51404	Outreach (NCC)- Level -1 #						
		EGE51405	Outreach (NSS, Y's Men, Retract)- Level -1 #						
8	HS	**Any one course to be opted (Indian/Foreign Language)**		2	0	0	2	2	2
		GGGG1008	Tamil						
		GGGG1009	Hindi						
		GGGG1010	Telugu						
		GGGG1011	French						
		GGGG1012	German						

		GGGG1013	Spanish						
		GGGG1014	Korean						
		GGGG1015	Mandarin						
		GGGG1016	Japanese						
			OR						
		EGE51001	Universal Human Values						
9	HS	ELS51006	Tamil Culture and Technology	1	0	0	1	2	1
Total				**15**	**0**	**15**	**22**	**19**	**30**

SEMESTER – II									
S. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	BS	EMA51002	Analytical Mathematics	3	0	2	4	2	5
2	BS	**Any one course to be opted**		3	0	2	4	2	5
		ECT51001	Engineering Materials						
		EPH51001	Engineering Physics						
3	HS	**Any one course to be opted**		2	0	1	2	1	3
		GGGG1001	Communication Skills						
		GGGG1002	Personality Development and Soft Skills						
4	PC	EAE51001	Engineering Mechanics for Aeronautical and Aerospace Engineers	3	1	0	4	2	4
5	PC	**Any one course to be opted**		2	0	2	3	2	4
		ECS51010	Programming in Python						
		EME51001	Engineering Graphics and Computer Aided Design						
6	ES	**Any one course to be opted**		0	0	4	2	2	4
		EGE51406	Engineering practices Lab						
		EGE 51407	FAB Lab for Aeronautical Engineering						
		Any one course to be opted (Outreach)							

7	HS	EGE51404	Outreach (NCC)- Level -1 #	0	0	2	1	4	2
		EGE51405	Outreach (NSS, Y's Men, Retract)- Level -1 #						
8	HS	**Any one course to be opted (Indian/Foreign Language)**		2	0	0	2	2	2
		GGGG1008	Tamil						
		GGGG1009	Hindi						
		GGGG1010	Telugu						
		GGGG1011	French						
		GGGG1012	German						
		GGGG1013	Spanish						
		GGGG1014	Korean						
		GGGG1015	Mandarin						
		GGGG1016	Japanese						
			OR						
		EGE51001	Universal Human Values						
9	MC	EGE5101*	Mandatory Course #1 (Mandatory Course I is a Non-credit course (Student shall select one course from the list given under Mandatory Course I)	3	0	0	0	2	3
Total				**19**	**1**	**13**	**22**	**19**	**32**

Students should choose Level-I and Level II of same outreach in the semester 1 and 2 respectively

SEMESTER – III									
S. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	BS	EMA51003	Partial Differential Equations and Transforms	3	1	0	4	2	4
2	HS	GGGG1003	Advanced Academic Writing	1	0	1	1	1	2
3	PC	EAE51002	Solid Mechanics	3	0	2	4	2	5
4	PC	EAS51001	Fundamentals of Aerospace Engineering	3	0	0	3	2	3

5	PC	EAE51004	Fluid Mechanics and Machinery	2	0	2	3	2	4
6	DE	EAS515XX	DE 1	2	0	2	3	2	4
7	ES	EGE51003	Environmental Science and Sustainable Development	2	0	0	2	2	2
8	EEC	EAS51801	Design Project – 1	0	0	2	1	6	2
9	EEC	EAS51800	Internship -1 (To be carried out in summer after 2nd semester and evaluated in 3rd semester)	0	0	0	1	2	0
10	MC	EGE5102*	Mandatory Course II (Mandatory Course II is a Non-credit course (Student shall select one course from the list given under Mandatory Course II)	3	0	0	0	2	3
Total				**19**	**1**	**9**	**22**	**23**	**29**

SEMESTER – IV									
S. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	BS	EMA51008	Numerical Methods	3	1	0	4	2	4
2	HS	GGGG1004	Professional Editing and Project Writing	1	0	1	1	1	2
3	PC	EAS51002	Aerospace Structural Mechanics	3	0	2	4	2	5
4	PC	EAE51006	Thermodynamics	2	0	2	3	2	4
5	PC	EAS51007	Design and Development of UAVs(Industry Collaborated Course)	2	0	2	3	2	4
6	DE	EAS515XX	DE 2 (May be lab integrated)	2	0	2	3	2	4
7	NE	EXX517XX	NE 1 (May be lab integrated)	2	0	2	3	2	4
8	EEC	EAS51802	Design Project – 2	0	0	2	1	6	2
9	MC	EGE5103*	Mandatory Course III (Mandatory Course III is a Non-credit course (Student shall select one course from the list	3	0	0	0	2	3

			given under Mandatory Course III)						
Total				**18**	**1**	**13**	**22**	**21**	**32**

SEMESTER – V									
S. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	HS	GGGG1005	Public Speaking	1	0	1	1	1	2
2	PC	EAS51003	Principles of Air-breathing Propulsion	3	0	2	4	2	5
3	PC	EAS51004	Subsonic and Transonic Aerodynamics	2	0	2	3	2	4
4	PC	EAS51005	Aerospace Structures	2	0	2	3	2	4
5	DE	EAE515XX	DE 3 (May be lab integrated)	2	0	2	3	2	4
6	NE	EXX517XX	NE 2 (May be lab integrated)	2	0	2	3	2	4
7	EEC	EAS51803	Design Project – 3	0	0	2	1	6	2
8	ES	EGE51004	Entrepreneurship	2	0	0	2	6	2
9	EEC	EAS51807	Internship -2 (to be evaluated in 5th semester. To be carried out in summer vacation after 4th semester)	0	0	0	1	0	0
Total				**14**	**0**	**13**	**21**	**23**	**27**

SEMESTER – VI									
S. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	HS	GGGG1006	English for Competitive Examinations	1	0	1	1	1	2
2	PC	EAS51008	High Speed Aerodynamics	3	0	2	4	2	5
3	PC	EAS51009	Space Propulsion	2	0	2	3	2	4
4	PC	EAS51010	Control Systems for Aerospace Engineering	2	0	2	3	2	4

5	DE	EAS515XX	DE 4 (May be lab integrated)	2	0	2	3	2	4
6	NE	EXX517XX	NE 3 (May be lab integrated)	2	0	2	3	2	4
7	PC	EAS51011	Computational Fluid Dynamics (Case Study/Field Study)	2	0	2	3	6	4
8	EEC	EAS 51804	Design Project – 4	0	0	2	1	6	2
Total				**14**	**0**	**15**	**21**	**23**	**29**

SEMESTER – VII									
S. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	HS	GGGG1007	Verbal Reasoning and Interview Skills	1	0	1	1	1	2
2	PC	EAS51012	Flight Mechanics	3	0	2	4	2	5
3	PC	EAS51013	Space Mechanics	2	0	2	3	2	4
4	PC	EAS51014	Satellite Technology	2	0	2	3	2	4
5	DE	EAS515XX	DE 5 (May be lab integrated)	2	0	2	3	2	4
6	NE	EXX517XX	NE 4 (May be lab integrated)	2	0	2	3	2	4
7	ES	EGE51005	Research Methodology & IPR	2	0	0	2	2	2
8	EEC	EAS51805	Project Phase 1	0	0	6	3	6	6
Total				**14**	**0**	**17**	**22**	**19**	**31**

SEMESTER – VIII									
S. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	EEC	EAS51806	Project Phase 2	0	0	26	13	10	24
Total				**0**	**0**	**26**	**13**	**10**	**24**
Total Credits				**165**					

LIST OF DEPARTMENTAL ELECTIVES									
DEPARTMENT ELECTIVE – 1									
S NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	DE	EAS51501	Flow Visualization: The physics and Art of Fluid Flow.	3	0	0	3	0	3
2	DE	EAE51503	Fuel safety Practices	3	0	0	3	0	3
3	DE	EAS51502	Aerospace Materials and Manufacturing Processes	3	0	0	3	0	3
4	DE	EAS51503	Aircraft Systems and Instruments	3	0	0	3	0	3
5	DE	EAS51504	Spacecraft Systems and Engineering	3	0	0	3	0	3
DEPARTMENT ELECTIVE – 2									
S NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	DE	EAE51507	Potential Flow Theory.	3	0	0	3	0	3
2	DE	EAS51505	Cryogenic Engineering	3	0	0	3	0	3
3	DE	EAS51506	Mechanics of Composite Materials	3	0	0	3	0	3
4	DE	EAE51509	Aircraft Navigation Systems	3	0	0	3	0	3
5	DE	EAS51507	Satellite Payloads	3	0	0	3	0	3
DEPARTMENT ELECTIVE – 3									
S NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	DE	EAE51513	Laminar Flow Theory	3	0	0	3	0	3
2	DE	EAE51514	Wind tunnel design and its application	3	0	0	3	0	3
3	DE	EAE51515	Conductive and Convective Heat Transfer	3	0	0	3	0	3
4	DE	EAE51516	Propulsion Techniques for UAVs	3	0	0	3	0	3
5	DE	EAS51508	Mechanics of Structural Impact	3	0	0	3	0	3
6	DE	EAS51509	Additive Manufacturing	3	0	0	3	0	3
7	DE	EAE51517	Aircraft Surveillance Systems	3	0	0	3	0	3
8	DE	EAS51510	IOT for Aerospace Engineers	3	0	0	3	0	3
9	DE	EAS51511	Satellite Remote Sensing	3	0	0	3	0	3
10	DE	EAS51512	Manned space missions	3	0	0	3	0	3
DEPARTMENT ELECTIVE – 4									

S NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
1	DE	EAS51513	Missile and Launch Vehicle Aerodynamics	3	0	0	3	0	3
2	DE	EAS51514	Boundary Layer Theory	3	0	0	3	0	3
3	DE	EAE51525	Theory of Flames	3	0	0	3	0	3
4	DE	EAE51520	Vibration and Aeroelasticity	2	0	2	3	0	4
5	DE	EAS51515	Nano-composites and Smart Materials.	3	0	0	3	0	3
6	DE	EAS51516	Flight instruments and Data Acquisition systems	3	0	0	3	0	3
7	DE	EAS51517	AI, ML for Aerospace Engineers	3	0	0	3	0	3
8	DE	EAS51518	Astronomy and Cosmology	3	0	0	3	0	3
9	DE	EAS51519	Satellite and Space System Design	3	0	0	3	0	3
DEPARTMENT ELECTIVE – 5									
S NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
1	DE	EAE51532	Hypersonic Aerodynamics	3	0	0	3	0	3
2	DE	EAE51533	Turbulence Modeling	3	0	0	3	0	3
3	DE	EAS51520	Reentry Aerothermodynamics	3	0	0	3	0	3
4	DE	EAE51530	Fatigue and Fracture Mechanics	3	0	0	3	0	3
5	DE	EAS51521	Finite Element Method	3	0	0	3	0	3
6	DE	EAS51522	GNSS and Applications	3	0	0	3	0	3
7	DE	EAE51536	Aerospace Guidance and Control	3	0	0	3	0	3
8	DE	EAS51523	Satellite Image processing Systems	3	0	0	3	0	3
9	DE	EAS51524	Satellite Dynamics and Control	3	0	0	3	0	3

LIST OF NON-DEPARTMENTAL ELECTIVES OFFERED BY AERONAUTICAL ENGINEERING									
NON-DEPARTMENTAL ELECTIVE 1									
S NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	NE	EAE51700	Aircraft constructions for Beginners	3	0	0	3	2	3
2	NE	EAE51701	Applications of Aerodynamics	3	0	0	3	2	3
3	NE	EAE51702	Introduction to air breathing propulsion	3	0	0	3	2	3
4	NE	EAE51703	UAV Photogrammetry	3	0	0	3	2	3
NON-DEPARTMENTAL ELECTIVE 2									
S NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	NE	EAE51704	Aerodynamics for Industrial application	3	0	0	3	2	3
2	NE	EAE51705	Heat Transfer	3	0	0	3	2	3
3	NE	EAE51706	Modern Warfare	3	0	0	3	2	3
4	NE	EAE51707	Aircraft Maintenance Management	3	0	0	3	2	3
NON-DEPARTMENTAL ELECTIVE 3									
S NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	NE	EAE51708	Self-healing and Functional coating materials	3	0	0	3	2	3
2	NE	EAE51709	Machine learning and IOT for Drones	3	0	0	3	2	3
3	NE	EAE51710	Introduction to NDT	3	0	0	3	2	3
4	NE	EAE51711	Introduction to GNSS systems and its applications	3	0	0	3	2	3
NON-DEPARTMENTAL ELECTIVE 4									
S NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	NE	EAE51712	Finite element methods for Engineers	3	0	0	3	2	3
2	NE	EAE51713	Air Transportation Management	3	0	0	3	2	3
3	NE	EAE51714	Satellite Image Processing	3	0	0	3	2	3

HONORS COURSES OFFERED BY DEPARTMENT OF AERONAUTICAL ENGINEERING

FRAMEWORK OF CURRICULUM 2022 (in line with NEP 2020)									
HONORS IN AERODYNAMICS									
SL. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	Honours	EAE51900	Supersonic Aerodynamics	3	0	0	3	2	3
2	Honours	EAE51901	Turbulence Theory	3	0	0	3	2	3
3	Honours	EAE51902	Atmospheric Boundary Layer	3	0	0	3	2	3
4	Honours	EAE51903	Helicopter Aerodynamics and Dynamics	3	0	0	3	2	3

HONORS IN PROPULSION									
SL. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	Honours	EAE51904	Spray And Droplet Dynamics	3	0	0	3	2	3
2	Honours	EAE51905	Hybrid Jet Engine Propulsion	3	0	0	3	2	3
3	Honours	EAE51906	Combustion Theory and Modelling	3	0	0	3	2	3
4	Honours	EAE51907	Unsteady Aerodynamics and Aeroelasticity of Turbomachines	3	0	0	3	2	3

HONORS IN AIRCRAFT STRUCTURES									
SL. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	Honours	EAE51908	Aeroelasticity	3	0	0	3	2	3
2	Honours	EAE51909	Aerospace Structural Health Monitoring	3	0	0	3	2	3
3	Honours	EAE51910	Vibration And Structural Dynamics	3	0	0	3	2	3
4	Honours	EAE51911	Smart Materials and Structures	3	0	0	3	2	3

HONORS IN SATELLITE TECHNOLOGY									
SL. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	Honours	EAS51900	Satellite Technology and its Application	3	0	0	3	2	3
2	Honours	EAS51901	Satellite System Configuration	3	0	0	3	2	3
3	Honours	EAS51902	Structural and Thermal Mechanisms of Satellite	3	0	0	3	2	3
4	Honours	EAS51903	Satellite Constellation Optimization	3	0	0	3	2	3

HONORS IN UAV									
SL. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	Honours	EAE51912	Introduction to UAV & its Design Principles	3	0	0	3	2	3
2	Honours	EAE51913	UAV Materials and Fabrication methodologies	3	0	0	3	2	3
3	Honours	EAE51914	Aerodynamics of UAV	3	0	0	3	2	3
4	Honours	EAE51915	UAV Path Planning, Mission Control & Data Processing	3	0	0	3	2	3