Bharath
INSTITUTE OF HIGHER EDUCATION AND RESEARCH
(Declared as Deemed-to-be University under section 3 of UGC Act, 1956)
(Vide Notification No. F.9-5/2000 - U.3, Ministry of Human Resource Development, Govt. of India, dated 4th July 2002)
BHARATH INSTITUTE OF SCIENCE AND TECHNOLOGY
SCHOOL OF AERONAUTICAL ENGINEERING

NAAC
NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL

B. Tech. – AEROSPACE ENGINEERING

(FULL TIME)

CURRICULUM & SYLLABUS

REGULATION – 2020

(As per AICTE Norms)

Based on Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

Applicable to the batches admitted from July 2020 onwards

Department of Aeronautical Engineering

School of Aeronautical Engineering

BHARATH INSTITUTE OF SCIENCE AND TECHNOLOGY

173, Agharam Road, Selaiyur, Chennai -600 073, Tamil Nadu.

SCHOOL OF AERONAUTICAL ENGINEERING

Department of Aeronautical Engineering

VISION

Department of Aeronautical Engineering will endeavor to accomplish worldwide recognition with a focal point of Excellence in the field of Aeronautics by providing quality Education through world class facilities, enabling graduates turning out to be Professional Experts with specific knowledge in Aeronautical & Aerospace engineering.

MISSION

- To be the state of art Teaching and Learning center with excellent infrastructure and empowered Faculties in Aeronautical & Aerospace Engineering.
- To foster a culture of innovation among students in the field of Aeronautics and Aerospace with updated professional skills to enhance research potential for sponsored research and innovative projects.
- To Nurture young individuals to be knowledgeable, skilful, and ethical professionals in their pursuit of Aeronautical & Aerospace Engineering.

B. Tech. – Aerospace Engineering

Program Educational Objectives (PEOs)

PEO 1: Demonstrate a solid grasp of fundamental concepts in Mathematics, Science, and Engineering, essential for effectively addressing engineering challenges within the Aerospace industry.

PEO 2: Involve in process of designing, simulating, fabricating, testing, and evaluating in the field of Aerospace.

PEO 3: Obtain advanced skills to actively engage in research and development endeavors within emerging domains, while also pursuing further education opportunities.

PEO 4: Demonstrate efficient performance both as independent contributors and as valuable team members in diverse multidisciplinary projects.

PEO 5: Embrace lifelong learning and career advancement while adapting to the evolving social demands and needs.

B. Tech. – Aerospace Engineering

Program Outcomes (POs)

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, research literature, and analyze engineering problems to arrive at substantiated conclusions using first principles of mathematics, natural, and engineering sciences.

PO3- Design/development of solutions: Design solutions for complex engineering problems and design system components, processes to meet the specifications with consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4- Conduct investigations of complex problems: Use research-based knowledge 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 and 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 and 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 and teamwork: Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings.

PO10- Communication: Communicate effectively with the engineering community and with society at large. Be able to comprehend and write effective reports documentation. Make effective presentations and give and receive clear instructions.

PO11- Project management and finance: Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team. Manage projects 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.

Program Specific Outcomes (PSOs)

PSO1: Design and analyze aerospace components/systems for aerospace industries.

PSO2: Acquire the concepts of spacecraft attitude dynamics for the prediction of spacecraft motion.

REGULATION 2020

B. Tech. - Aerospace Engineering

CURRICULUM

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CURRICULUM STRUCTURE AND CREDITS DISTRIBUTION

Sl. No.	Course Category	Category Code	Minimum Credit Required	Weightage Percentage
1	Humanities and Social Sciences including Management courses	H	**12**	7.5
2	Basic Science courses	B	**32**	20
3	Engineering Science courses	E	**19**	11.9
4	Professional Core courses (Compulsory courses)	C	**52**	32.5
5	Professional Elective courses (Optional courses relevant to chosen branch/specialization)	S	**18**	11.3
6	Open Elective courses (Optional courses from other technical and/or emerging subjects)	O	**12**	7.5
7	Project Work, Seminar, and Internship in industry or higher institutions	P	**15**	9.4
8	Mandatory Courses (Non-credit courses)	M	**-**	-
Total			**160**	**100 %**

REGULATION 2020

B. Tech. - Aerospace Engineering

CURRICULUM

Based on Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

CATEGORY-WISE COURSES & PREREQUISITE

CATEGORY	COURSE CODE	COURSE NAME	L	T	P	C	PREREQUISITE
HUMANITIES AND SOCIAL SCIENCES INCLUDING MANAGEMENT COURSES	**U20MBHT01**	Management Principles for Engineers	3	0	0	**3**	+2
	U20LEHJ01	Technical English	2	0	2	**3**	+2
	U20PDHJ01	Employability Skills and Practices	2	0	2	**3**	+2
	U20CYHT01	Social and Environmental Engineering	3	0	0	**3**	+2
	Total		10	0	4	**12**	
BASIC SCIENCE COURSES	**U20PYBJ04**	Engineering Physics for Aero Engineers	3	1	2	**5**	+2
	U20CYBJ01	Engineering Chemistry	3	1	2	**5**	+2
	U20MABT01	Calculus and Linear Algebra	3	1	0	**4**	+2
	U20MABT02	Advanced Calculus and Complex Analysis	3	1	0	**4**	+2
	U20MABT03	Transforms and Boundary Values Problems	3	1	0	**4**	U20MABT02- Advanced Calculus and Complex Analysis
	U20MABT04	Numerical Methods for Engineers	3	1	0	**4**	U20MABT03- Transforms and Boundary Values Problems
	U20MABT05	Probability and Statistics	3	1	0	**4**	U20MABT04- Numerical Methods for Engineers
	U20BTBT01	Biology for Engineers	2	0	0	**2**	+2
	Total		23	7	4	**32**	

ENGINEERING SCIENCE COURSES	**U20MEEJ01**	Engineering Graphics and Design	1	0	6	**4**	+2
	U20EEEJ01	Basic Electrical and Electronics Engineering	3	0	2	**4**	+2
	U20MEEJ02	Basic Civil and Mechanical Engineering	3	0	2	**4**	+2
	U20MEET01	Engineering Mechanics	3	0	0	**3**	+2
	U20CSEJ01	Programming and Problem Solving	3	0	2	**4**	+2
	Total		13	0	12	**19**	
PROFESSIONAL CORE COURSES (COMPULSORY COURSES)	**U20ASCT01**	Introduction to Space Science & Applications	2	0	0	**2**	+2
	U20ASCJ01	Fluid Mechanics for Aerospace Engineers	2	0	2	**3**	U20MEET01- Engineering Mechanics
	U20ASCJ02	Fundamentals of Aerospace Structures	2	0	2	**3**	U20PYBJ04 Engineering Physics for Aero Engineers
	U20ASCT02	Fundamentals of Thermal Engineering	2	1	0	**3**	U20CYBJ01- Engineering Chemistry U20MEEJ02 – Basic Civil and Mechanical Engineering
	U20ASCT03	Applied Dynamics and Vibrations	2	1	0	**3**	U20MEET01- Engineering Mechanics
	U20ASCT04	Aerospace Materials and Process	2	0	0	**2**	U20CYBJ01- Engineering Chemistry U20MEEJ02 – Basic Civil and Mechanical Engineering
	U20ASCT05	Spacecraft Instrumentation	2	0	0	**2**	U20EEEJ01-Basic Electrical and Electronics Engineering
	U20ASCT06	Spacecraft Communication	2	0	0	**2**	U20MABT02-Advanced Calculus and Complex analysis U20EEEJ01- Basic Electrical and Electronics Engineering
	U20ASCJ03	Low and High Speed Aerodynamics	3	0	2	**4**	U20ASCJ01- Fluid Mechanics for Aerospace Engineers U20BTBT01 – Biology for Engineers
	U20ASCJ04	Advanced Aerospace Structures	3	0	2	**4**	U20ASCJ02- Fundamentals of Aerospace Structures
	U20ASCJ05	Aerospace Propulsion	2	0	2	**3**	U20ASCT02- Fundamentals of Thermal Engineering

PROFESSIONAL CORE COURSES (COMPULSORY COURSES)	**U20ASCT07**	Control Theory	3	0	0	**3**	U20MABT03- Transforms and Boundary Values Problems U20EEEJ01- Basic Electrical and Electronics Engineering
	U20ASCT08	Orbital Mechanics	2	1	0	**3**	U20ASCT01- Introduction to Space Science & Applications U20ASCT03- Applied Dynamics and Vibrations
	U20ASCJ06	Avionics	2	0	2	**3**	U20ASCT05-Spacecraft Instrumentation
	U20ASCT09	Spacecraft Propulsion	3	0	0	**3**	U20ASCJ05- Aerospace Propulsion
	U20ASCT10	Flight Mechanics	2	0	0	**2**	U20ASCJ03- Low and High speed Aerodynamics
	U20ASCT11	Navigation and Guidance	2	0	0	**2**	U20ASCT07- Control Theory
	U20ASCT12	Satellite Technology	3	0	0	**3**	U20ASCJ06- Avionics
	U20ASCJ07	Computational Methods in Aerospace Engineering	1	0	2	**2**	U20MEEJ01 - Engineering Graphics and Design U20CSEJ01 – Programming and Problem Solving U20MABT04 Numerical Methods for Engineers U20ASCJ03- Low and High speed Aerodynamics U20ASCJ04- Advanced Aerospace Structures U20ASCJ05- Aerospace Propulsion
	Total		42	3	14	**52**	

PROFESSIONAL ELECTIVE COURSES	**U20ASST01**	Boundary Layer Theory	3	0	0	3	U20ASCJ03- Low and High speed Aerodynamics
	U20ASSJ02	Experimental Techniques in Fluid Mechanics	2	0	2	3	U20ASCJ03- Low and High speed Aerodynamics
	U20ASST02	Theory of Elasticity	2	1	0	3	U20ASCJ04- Advanced Aerospace Structures
	U20ASSJ03	Mechanics of Composite Materials	2	0	2	3	U20ASCT04-Aerospace Materials and Process U20ASCJ04- Advanced Aerospace Structures
	U20ASST03	Heat Transfer for Aerospace Engineers	2	1	0	3	U20ASCT02- Fundamentals of Thermal Engineering
	U20ASST05	Fundamental of Combustion	3	0	0	3	U20ASCT02- Fundamentals of Thermal Engineering
	U20ASST06	Applied Aerodynamics	3	0	0	3	U20ASCJ03- Low and High speed Aerodynamics
	U20ASSJ04	CFD for Aerospace Engineers	2	0	2	3	U20ASCJ07- Computational Methods in Aerospace Engineering
	U20ASST08	Mechanics of Fatigue and Fracture	3	0	0	3	U20ASCT04-Aerospace Materials and Process U20ASCJ04- Advanced Aerospace Structures
	U20ASSJ08	FEM in Aerospace Structures	2	0	2	3	U20ASCJ07- Computational Methods in Aerospace Engineering
	U20ASST15	Cryogenics Technology	3	0	0	3	U20ASCT09-Spacecraft Propulsion
	U20ASSJ10	Numerical Heat Transfer	1	0	4	3	U20ASCJ07- Computational Methods in Aerospace Engineering
	U20ASST16	High Temperature Gas Dynamics	3	0	0	3	U20ASCJ03- Low and High speed Aerodynamics
	U20ASST17	Space Vehicle Aerodynamics	3	0	0	3	U20ASCJ03- Low and High speed Aerodynamics

						U20ASCT10- Flight Mechanics
U20ASST18	Design of LTA Systems	3	0	0	3	U20ASCT10- Flight Mechanics
U20ASST19	Aeroelasticity	2	1	0	3	U20ASCT03 – Applied Dynamics and Vibrations; U20ASCJ04- Advanced Aerospace Structures U20ASCT10- Flight Mechanics
U20ASSJ05	Experimental Techniques in Structural Mechanics	2	0	2	3	U20ASCJ04- Advanced Aerospace Structures
U20ASST20	Materials for High Temperature Applications	3	0	0	3	U20ASCT04 - Aerospace Materials and Process U20ASCJ04 – Advanced Aerospace Structures
U20ASST14	Propellant Manufacturing Technology	2	1	0	3	U20ASCT09-Spacecraft Propulsion
U20ASSJ09	Experimental Methods in Propulsion	2	0	2	3	U20ASCT09-Spacecraft Propulsion
U20ASST21	Advances in Aerospace Propulsion Techniques	3	0	0	3	U20ASCT09-Spacecraft Propulsion

PROJECT WORK, SEMINAR, AND INTERNSHIP IN INDUSTRY OR HIGHER INSTITUTIONS	**U20ASPL01**	UAV Design	0	0	2	1	Pre-requisite: U20MEEJ01 - Engineering Graphics and Design; U20ASCJ06-Avionics; U20ASCT07- Control Theory; U20ASCJ03- Low and High speed Aerodynamics; U20ASCJ04- Advanced Aerospace Structures; U20ASCJ05- Aerospace Propulsion; U20CSEJ01 – Programming and Problem Solving; U20ASCT11- Navigation and Guidance
	U20ASPL02	Satellite Design	0	0	2	1	U20ASPL01 UAV Design
	U20ASPL03	Project Phase-1	0	0	4	2	U20MBHT01 – Management Principles for Engineers U20LEHJ01 – Technical English U20PDHJ01 – Employability Skills and Practices U20CYHT01 – Social and Environmental Engineering All Professional Core Courses
	U20ASPL04	Project Phase-2	0	0	20	10	U20ASPL03 Project Phase - 1

	U20AEPL03	Internship	0	0	0	1	U20MBHT01 – Management Principles for Engineers U20LEHJ01 – Technical English U20PDHJ01 – Employability Skills and Practices U20CYHT01 – Social and Environmental Engineering All Professional Core Courses
	Total		0	0	28	**15**	

OPEN ELECTIVE COURSES	**U20AEOT01**	Elements of Aeronautics and Astronautics	3	0	0	**3**	Nil
	U20AEOT02	Wind Tunnel Testing, Instrumentation & Measurements	3	0	0	**3**	Nil
	U20AEOT03	Introduction to Composite Materials	3	0	0	**3**	Nil
	U20AEOT04	Elements of Jet Propulsion Systems	3	0	0	**3**	Nil

MANDATORY COURSES (NON-CREDIT)	**U20PDMT01**	Constitution of India	1	0	0	0	Nil
	U20PDMT02	Indian Knowledge Tradition	1	0	0	0	Nil
	U20PDMT03	Universal Human Value	1	0	0	0	Nil
	U20PDMT04	NCC	0	0	2	0	Nil
	U20PDMT05	NSS	0	0	2	0	Nil
	U20PDMT06	Departmental Club activity	0	0	2	0	Nil