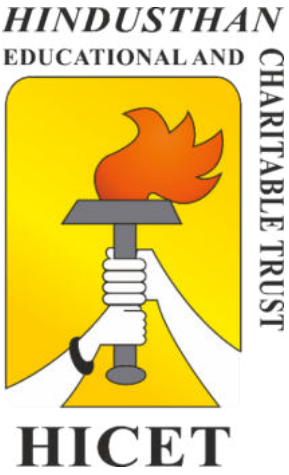
HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY

(An Autonomous Institution Affiliated to Anna University, Chennai)

(Approved by AICTE, New Delhi, Accredited by NAAC with 'A' Grade)

Coimbatore - 641 032.

B.E. AERONAUTICAL ENGINEERING



CHOICE BASED CREDIT SYSTEM

Revised Curriculum and Syllabus for the odd semester

Academic year 2023-24

(Academic Council Meeting Held on 15.06.2023)

Department of Aeronautical Engineering

Vision of the Institute

To become a premier institution by producing professionals with strong technical knowledge, innovative research skills, and high ethical values

Mission of the Institute

IM1: To provide academic excellence in technical education through novel teaching methods

IM2: To empower students with creative skills and leadership qualities

IM3: To produce dedicated professionals with social responsibility

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Vision of the Department

To be a global player and prepare the students with knowledge, skills, and ethics for their successful deployment in Aeronautical Engineering.

Mission of the Department

DM1: To nurture the students technically based on current trends and opportunities in the global Aerospace industry.

DM2: To develop the students as innovative engineers to address the contemporary issues in the Aeronautical field.

DM3: To inculcate professional and social responsibility based on an innate ethical value system.

Program Educational Objectives (PEOs) of the Department

PEO1: Graduates shall exhibit their sound theoretical and practical knowledge with skills for successful employment, advanced education, research, and entrepreneurial endeavors.

PEO2: Graduates shall establish deep-rooted mastering abilities, professional ethics, and communication alongside business abilities and initiative through lifelong learning experiences.

PEO3: Graduates shall become leaders and innovators by devising engineering solutions to care for modern society.

Chairman - BoS
AERO - HiCET

ACADEMIC COUNCIL
Chairman

Dean (Academics)
HiCET

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 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 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, responsibilities, and norms of the engineering practice.
PO9	Individual and 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 and 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.

Chairman - BoS
AERO - HiCET

ACADEMIC COUNCIL Chairman

Dean (Academics)
HiCET

Program Specific Outcomes (PSOs)

The graduates will be able to

PSO1: Apply the knowledge of aerodynamics, structures, propulsion, avionics, and aircraft maintenance to give solutions for complex engineering problems.

PSO2: Use progressive methodology and tools involving design, analyze, and experiment in aircraft design.

Chairman - BoS
AERO - HiCET

ACADEMIC COUNCIL
Chairman

Dean (Academics)
HiCET

CURRICULUM
R2019

DETAILS OF CHANGES CARRIED OUT IN CURRICULUM & SYLLABUS

CBCS PATTERN

UNDERGRADUATE PROGRAMMES

B.E. AERONAUTICAL ENGINEERING (UG)

REGULATION-2019

For the students admitted during the academic year 2020-2021 and onwards

SEMESTER I

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1.	**19HE1101**	Technical English	HS	2	1	0	3	25	75	100
2.	**19MA1102**	Calculus and Linear Algebra	BS	3	1	0	4	25	75	100
THEORY & LAB COMPONENT										
3.	**19PH1151**	Applied Physics	BS	2	0	2	3	50	50	100
4.	**19CY1151**	Chemistry for Engineers	BS	2	0	2	3	50	50	100
5.	**19CS1151**	Python Programming and Practices	ES	2	0	2	3	50	50	100
6.	**19ME1152**	Engineering Drawing	ES	1	0	4	3	50	50	100
PRACTICAL										
7.	**19HE1071**	Language Competency Enhancement Course-I	HS	0	0	2	1	100	0	100
MANDATORY COURSES										
8.	**19HE1072**	**Career Guidance Level** – I Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
9.	**19HE1073**	Entrepreneurship & Innovation	EEC	1	0	0	0	100	0	100
			Total:	**15**	**2**	**12**	**20**	**550**	**350**	**900**
As Per AICTE Norms 3 Weeks Induction Programme is Added in The First Semester as an Audit Course										

SEMESTER II

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1.	**19HE2101**	Business English for Engineers	HS	2	1	0	3	25	75	100
2.	**19MA2101**	Differential Equations and Complex Variables	BS	3	1	0	4	25	75	100
3.	**19EE2103**	Basics of Electrical and Electronics Engineering	ES	3	0	0	3	25	75	100
4.	**19ME2101**	Engineering Mechanics	ES	3	0	0	3	25	75	100
THEORY & LAB COMPONENT										
5.	**19PH2151**	Material Science	BS	2	0	2	3	50	50	100
6.	**19CY2151**	Environmental Studies	BS	2	0	2	3	50	50	100
PRACTICALS										
7.	**19ME2001**	Engineering Practices Laboratory	ES	0	0	4	2	50	50	100
8.	**19HE2071**	Language Competency Enhancement Course-II	HS	0	0	2	1	100	0	100
MANDATORY COURSES										

9.	**19HE2072**	**Career Guidance Level – II** Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
			Total:	**17**	**2**	**10**	**22**	**450**	**450**	**900**

SEMESTER III

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1.	**19MA3103**	Fourier Analysis and Numerical Methods	BS	3	1	0	4	25	75	100
2.	**19AE3201**	Elements of Aeronautics	PC	3	1	0	4	25	75	100
3.	**19AE3202**	Engineering Fluid Mechanics	PC	3	0	0	3	25	75	100
4.	**19AE3203**	Solid Mechanics	PC	3	0	0	3	25	75	100
THEORY AND LAB COMPONENT										
5.	**19AE3251**	Aero Engineering Thermodynamics	PC	2	0	2	3	50	50	100
PRACTICALS										
6.	**19AE3001**	Aircraft Component Drawing Laboratory	PC	0	0	3	1.5	50	50	100
7.	**19AE3002**	Fluid mechanics and Solid mechanics Laboratory	PC	0	0	3	1.5	50	50	100
MANDATORY COURSES										
8.	**19MC3191**	Indian Constitution	MC	2	0	0	0	100	0	100
9.	**19HE3072**	**Career Guidance Level – III** Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
10.	**19HE3073**	Leadership Management Skills	EEC	1	0	0	0	100	0	100
			Total	**19**	**2**	**8**	**20**	**550**	**450**	**1000**

SEMESTER IV

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1.	**19MA4101**	Numerical Methods	BS	3	1	0	4	25	75	100
2.	**19AE4201**	Aerodynamics	PC	3	1	0	4	25	75	100
3.	**19AE4202**	Gas Turbine Propulsion	PC	3	0	0	3	25	75	100
	19AE4203	Mechanics of Machines	PC	3	0	0	3	25	75	100
THEORY AND LAB COMPONENT										
5.	**19AE4251**	Aircraft Structures - I	PC	3	0	2	4	50	50	100
PRACTICALS										
6.	**19AE4001**	Aerodynamics Laboratory	PC	0	0	3	1.5	50	50	100
7.	**19AE4002**	Propulsion Laboratory	PC	0	0	3	1.5	50	50	100
MANDATORY COURSES										
8.	**19MC4191**	Essence of Indian tradition knowledge/Value Education	MC	2	0	0	0	100	0	100
9.	**19HE4072**	**Career Guidance Level – IV** Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
10.	**19HE4073**	Ideation Skills	EEC	1	0	0	0	100	0	100
			Total	**21**	**2**	**8**	**21**	**550**	**450**	**1000**

SEMESTER V

S. No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	Total
1.	**19AE5201**	Advanced Propulsion	PC	3	0	0	3	25	75	100
2.	**19AE5202**	Aircraft Structures - II	PC	3	0	0	3	25	75	100
3.	**19AE5203**	Flight Dynamics	PC	3	1	0	4	25	75	100
4.	**19AE5204**	High Speed Aerodynamics	PC	3	0	0	3	25	75	100
5.	**19AE53XX**	Professional Elective -I	PE	3	0	0	3	25	75	100
THEORY AND LAB COMPONENT										
6.	**19AE5251**	Aircraft Systems and General Maintenance Practices	PC	2	0	2	3	50	50	100
PRACTICALS										
7.	**19AE5001**	UAV design and Aeromodelling Laboratory	PC	0	0	3	1.5	50	50	100
8.	**19AE5002**	Aircraft Structures Laboratory -II	PC	0	0	3	1.5	50	50	100
MANDATORY COURSES										
9.	**19HE5071**	Soft Skills - I	EEC	0	0	0	1	100	0	100
10.	**19HE5072**	Design Thinking	EEC	0	0	0	1	100	0	100
		TOTAL		**19**	**1**	**8**	**24**	**475**	**525**	**1000**

SEMESTER VI

S. No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	Total
THEORY										
1.	**19AE6201**	Finite Element Methods in Engineering	PC	3	0	0	3	25	75	100
2.	**19AE6202**	Composite Materials and Structures	PC	3	0	0	3	25	75	100
3.	**19AE6203**	Heat Transfer	PC	3	0	0	3	25	75	100
4.	**19AE6181**	Total Quality Management	HS	3	0	0	3	25	75	100
5.	**19AE63XX**	Professional Elective - II	PE	3	0	0	3	25	75	100
6.	**19XX64XX**	Open Elective– I	OE	3	0	0	3	25	75	100
PRACTICALS										
7.	**19AE6001**	Structural Simulation Laboratory	PC	0	0	3	1.5	50	50	100
8.	**19AE6002**	Aero Engine and Airframe Laboratory	PC	0	0	3	1.5	50	50	100
MANDATORY COURSES										
9.	**19AE6701**	Internship / Industrial Training	EEC	0	0	0	1	100	0	100
10.	**19HE6071**	Soft Skills - II	EEC	1	0	0	1	100	0	100
11.	**19HE6072**	Intellectual Property Rights(IPR)	EEC	1	0	0	1	100	0	100
		TOTAL		**20**	**0**	**6**	**24**	**550**	**550**	**1100**

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
PROFESSIONAL ELECTIVE I										
1.	**19EI5331**	Control Engineering	PE	3	0	0	3	25	75	100
2.	**19AE5301**	Aircraft Materials and Process	PE	3	0	0	3	25	75	100
3.	**19AE5302**	Wind tunnel techniques	PE	3	0	0	3	25	75	100
4.	**19AE5303**	UAV and MAV design	PE	3	0	0	3	25	75	100
5.	**19AE5304**	Non-Destructive Evaluation	PE	3	0	0	3	25	75	100

PROFESSIONAL ELECTIVE II										
1.	**19AE6301**	Theory of Elasticity	PE	3	0	0	3	25	75	100
2.	**19AE6302**	Introduction to cryogenics	PE	3	0	0	3	25	75	100
3.	**19AE6303**	Boundary Layer Theory	PE	3	0	0	3	25	75	100
4.	**19AE6304**	AI & IoT for aviation	PE	3	0	0	3	25	75	100
5.	**19AE6305**	Airframe Maintenance and Repair	PE	3	0	0	3	25	75	100

OPEN ELECTIVE

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	**19AE6401**	Introduction to Flight	OE	3	0	0	3	25	75	100

SEMESTER VII

S. No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	Total
THEORY										
1.	**19AE7201**	Computational Fluid Dynamics	PC	3	0	0	3	25	75	100
2.	**19AE7202**	Vibrations and Elements of Aero Elasticity	PC	3	0	0	3	25	75	100
3.	**19AE73XX**	Professional Elective-III	PC	3	0	0	3	25	75	100
4.	**19XX74XX**	Open Elective – II	PE	3	0	0	3	25	75	100
THEORY AND LAB COMPONENT										
5.	**19AE7251**	Avionics	PC	2	0	2	3	50	50	100
PRACTICALS										
6.	**19AE7001**	Aircraft Design Project	PC	0	0	3	1.5	50	50	100
7.	**19AE7002**	Flow Simulation Laboratory	PC	0	0	3	1.5	50	50	100
PROJECT WORK										
8.	**19AE7901**	Project Phase I	EEC	0	0	4	2	50	50	100
			TOTAL	**14**	**0**	**12**	**20**	**300**	**500**	**800**

SEMESTER VIII

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1.	**19AE83XX**	**Professional Elective –IV**	PE	3	0	0	3	25	75	100
2.	**19AE83XX**	**Professional Elective- V**	PE	3	0	0	3	25	75	100
PROJECT WORK										
3.	**19AE8901**	Project Work – Phase II	EEC	0	0	16	8	100	100	200
			Total	**6**	**0**	**16**	**14**	**150**	**250**	**400**

PROFESSIONAL ELECTIVE III

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	**19AE7301**	Smart Materials and Structures	PE	3	0	0	3	25	75	100
2.	**19AE7302**	Satellite Technology	PE	3	0	0	3	25	75	100
3.	**19AE7303**	Fatigue and Fracture Mechanics	PE	3	0	0	3	25	75	100

4.	**19AE7304**	Aero Engine Maintenance and Repair	PE	3	0	0	3	25	75	100
5.	**19AE7305**	Space Mechanics	PE	3	0	0	3	25	75	100
PROFESSIONAL ELECTIVE IV										
1.	**19AE8301**	Experimental Stress analysis	PE	3	0	0	3	25	75	100
2.	**19AE8302**	Aviation management and Air safety Engineering	PE	3	0	0	3	25	75	100
3.	**19AE8303**	Helicopter Theory	PE	3	0	0	3	25	75	100
4.	**19AE8304**	Hypersonic Aerodynamics	PE	3	0	0	3	25	75	100
5.	**19AE8305**	Additive Manufacturing and Tooling	PE	3	0	0	3	25	75	100
6.	**19AE8311**	Aircraft Design	PE	3	0	0	3	25	75	100
PROFESSIONAL ELECTIVE V										
S.No.	**Course Code**	**Course Title**	**Type**	**L**	**T**	**P**	**C**	**CIA**	**ESE**	**TOTAL**
1.	**19AE8306**	Rockets and Missiles	PE	3	0	0	3	25	75	100
2.	**19AE8307**	Aircraft Rules and Regulations	PE	3	0	0	3	25	75	100
3.	**19AE8308**	Product Design and Development	PE	3	0	0	3	25	75	100
4.	**19AE8309**	Air traffic control and Airport planning	PE	3	0	0	3	25	75	100
5.	**19AE8310**	Industrial Aerodynamics	PE	3	0	0	3	25	75	100

LIST OF OPEN ELECTIVES – AERONAUTICAL ENGINEERING

S.No.	**Course Code**	**Course Title**	**Type**	**L**	**T**	**P**	**C**	**CIA**	**ESE**	**TOTAL**
1.	**19AE7401**	Introduction to Drones	OE	3	0	0	3	25	75	100
LIFE SKILL COURSES										
1.	**19LSZ401**	General Studies for Competitive Examinations	OE	3	0	0	3	25	75	100
2.	**19LSZ402**	Human Rights, Women's Rights and Gender Equality	OE	3	0	0	3	25	75	100
3.	**19LSZ403**	Indian Ethos and Human Values	OE	3	0	0	3	25	75	100
4.	**19LSZ404**	Indian Constitution and Political System	OE	3	0	0	3	25	75	100
5.	**19LSZ405**	Yoga for Human Excellence	OE	3	0	0	3	25	75	100

SEMESTER-WISE CREDIT DISTRIBUTION

B.E. / B.TECH. PROGRAMMES										
S.No.	**Course Area**	**Credits per Semester**								**Total Credits**
		I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	
1	HS	04	04	-	-	-	03	-	-	11
2	BS	10	10	04	04	-	-	-	-	28
3	ES	06	08	-	-	-	-	-	-	14
4	PC	-	-	16	17	19	12	12	-	76
5	PE	-	-	-	-	03	03	03	06	15
6	OE	-	-	-	-	-	03	03	-	06
7	EEC	-	-	-	-	02	03	02	08	15
Total		**20**	**22**	**20**	**21**	**24**	**24**	**20**	**14**	**165**

Credit Distribution R2019

Semester	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**Total**
Credits	20	22	20	21	24	24	20	14	**165**

Chairman, Board of Studies

Dean – Academics

PRINCIPAL

Chairman - BoS
AERO - HiCET

Dean (Academics)
HiCET

HINDUSTHAN ACADEMIC COUNCIL OF ENGINEERING & TECH. Chairman

CURRICULUM
R2019

DETAILS OF CHANGES CARRIED OUT IN CURRICULUM & SYLLABUS

CBCS PATTERN

UNDERGRADUATE PROGRAMMES

B.E. AERONAUTICAL ENGINEERING (UG)

REGULATION-2019

For the students admitted during the academic year 2021-2022 and onwards

The course code 21 indicates that the students joined in the academic year 2021

SEMESTER I

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1.	**21HE1101**	Technical English	HS	2	1	0	3	40	60	100
2.	**21MA1102**	Calculus and Linear Algebra	BS	3	1	0	4	40	60	100
THEORY & LAB COMPONENT										
3.	**21PH1151**	Applied Physics	BS	2	0	2	3	50	50	100
4.	**21CY1151**	Chemistry for Engineers	BS	2	0	2	3	50	50	100
5.	**21CS1151**	Python Programming and Practices	ES	2	0	2	3	50	50	100
6.	**21ME1152**	Engineering Drawing	ES	1	0	4	3	50	50	100
PRACTICAL										
7.	**21HE1071**	Language Competency Enhancement Course-I	HS	0	0	2	1	100	0	100
MANDATORY COURSES										
8.	**21HE1072**	**Career Guidance Level** – I Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
9.	**21HE1073**	Entrepreneurship & Innovation	EEC	1	0	0	0	100	0	100
			Total:	**15**	**2**	**12**	**20**	**580**	**320**	**900**
As Per AICTE Norms 3 Weeks Induction Programme is Added in The First Semester as an Audit Course										

SEMESTER II

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1.	**21HE2101**	Business English for Engineers	HS	2	1	0	3	40	60	100
2.	**21MA2101**	Differential Equations and Complex Variables	BS	3	1	0	4	40	60	100
3.	**21EE2103**	Basics of Electrical and Electronics Engineering	ES	3	0	0	3	40	60	100
4.	**21ME2101**	Engineering Mechanics	ES	3	0	0	3	40	60	100
THEORY & LAB COMPONENT										
4.	**21PH2151**	Material Science	BS	2	0	2	3	50	50	100
5.	**21CY2151**	Environmental Studies	BS	2	0	2	3	50	50	100
PRACTICALS										

7.	**21ME2001**	Engineering Practices Lab	ES	0	0	4	2	60	40	100
8.	**21HE2071**	Language Competency Enhancement Course-II	HS	0	0	2	1	100	0	100
MANDATORY COURSES										
9.	**21HE2072**	**Career Guidance Level – II** Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
			Total:	**17**	**2**	**10**	**22**	**520**	**380**	**900**

SEMESTER III

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1.	**21MA3103**	Fourier Analysis and Numerical Methods	BS	3	1	0	4	40	60	100
2.	**21AE3201**	Elements of Aeronautics	PC	3	1	0	4	40	60	100
3.	**21AE3202**	Engineering Fluid Mechanics	PC	3	0	0	3	40	60	100
4.	**21AE3203**	Solid Mechanics	PC	3	0	0	3	40	60	100
THEORY AND LAB COMPONENT										
5.	**21AE3251**	Aero Engineering Thermodynamics	PC	2	0	2	3	50	50	100
PRACTICALS										
6.	**21AE3001**	Aircraft Component Drawing Laboratory	PC	0	0	3	1.5	50	50	100
7.	**21AE3002**	Fluid mechanics and Solid mechanics Laboratory	PC	0	0	3	1.5	50	50	100
MANDATORY COURSES										
8.	**21MC3191**	Indian Constitution	MC	2	0	0	0	100	0	100
9.	**21HE3072**	**Career Guidance Level – III** Personality, Aptitude and CareerDevelopment	EEC	2	0	0	0	100	0	100
10.	**21HE3073**	Leadership Management Skills	EEC	1	0	0	0	100	0	100
			Total	**19**	**2**	**8**	**20**	**610**	**390**	**1000**

SEMESTER IV

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1.	**21MA4101**	Numerical Methods	BS	3	1	0	4	40	60	100
2.	**21AE4201**	Aerodynamics	PC	3	1	0	4	40	60	100
3.	**21AE4202**	Gas Turbine Propulsion	PC	3	0	0	3	40	60	100
4.	**21AE4203**	Mechanics of Machines	PC	3	0	0	3	40	60	100
THEORY AND LAB COMPONENT										

5.	**21AE4251**	Aircraft Structures - I	PC	3	0	2	4	50	50	100
PRACTICALS										
6.	**21AE4001**	Aerodynamics Laboratory	PC	0	0	3	1.5	50	50	100
7.	**21AE4002**	Propulsion Laboratory	PC	0	0	3	1.5	50	50	100
MANDATORY COURSES										
8.	**21MC4191**	Essence of Indian tradition knowledge/Value Education	MC	2	0	0	0	100	0	100
9.	**21HE4072**	**Career Guidance Level – IV** Personality, Aptitude andCareer Development	EEC	2	0	0	0	100	0	100
10.	**21HE4073**	Ideation Skills	EEC	2	0	0	0	100	0	100
		Total		**21**	**2**	**8**	**21**	**610**	**390**	**1000**

SEMESTER V

S. No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	Total
1.	**21AE5201**	Advanced Propulsion	PC	3	0	0	3	40	60	100
2.	**21AE5202**	Aircraft Structures - II	PC	3	0	0	3	40	60	100
3.	**21AE5203**	Flight Dynamics	PC	3	1	0	4	40	60	100
4.	**21AE5204**	High Speed Aerodynamics	PC	3	0	0	3	40	60	100
5.	**21AE53XX**	Professional Elective -I	PE	3	0	0	3	40	60	100
THEORY AND LAB COMPONENT										
6.	**21AE5251**	Aircraft Systems and General Maintenance Practices	PC	2	0	2	3	50	50	100
PRACTICALS										
7.	**21AE5001**	UAV design and Aeromodelling Laboratory	PC	0	0	3	1.5	50	50	100
8.	**21AE5002**	Aircraft Structures Laboratory -II	PC	0	0	3	1.5	50	50	100
MANDATORY COURSES										
9.	**21HE5071**	Soft Skills - I	EEC	1	0	0	1	100	0	100
10.	**21HE5072**	Design Thinking	EEC	1	0	0	1	100	0	100
		TOTAL		**19**	**1**	**8**	**24**	**550**	**450**	**1000**

SEMESTER VI

S. No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	Total
THEORY										
1.	**21AE6201**	Finite Element Methods in Engineering	PC	3	0	0	3	40	60	100
2.	**21AE6202**	Composite Materials and Structures	PC	3	0	0	3	40	60	100
3.	**21AE6203**	Heat Transfer	PC	3	0	0	3	40	60	100
4.	**21AE6181**	Total Quality Management	HS	3	0	0	3	40	60	100
5.	**21AE63XX**	Professional Elective - II	PE	3	0	0	3	40	60	100
6.	**21XX64XX**	Open Elective– I	OE	3	0	0	3	40	60	100
PRACTICALS										

7.	**21AE6001**	Structural Simulation Laboratory	PC	0	0	3	1.5	50	50	100
8.	**21AE6002**	Aero Engine and Airframe Laboratory	PC	0	0	3	1.5	50	50	100
MANDATORY COURSES										
9.	**21AE6701**	Internship / Industrial Training	EEC	0	0	0	1	100	0	100
10.	**21HE6071**	Soft Skills - II	EEC	1	0	0	1	100	0	100
11.	**21HE6072**	Intellectual Property Rights (IPR)	EEC	1	0	0	1	100	0	100
			TOTAL	**20**	**0**	**6**	**24**	**640**	**460**	**1100**

S.No.	**Course Code**	**Course Title**	**Type**	**L**	**T**	**P**	**C**	**CIA**	**ESE**	**TOTAL**
PROFESSIONAL ELECTIVE I										
1	**21EI5331**	Control Engineering	PE	3	0	0	3	40	60	100
2	**21AE5301**	Aircraft Materials and Process	PE	3	0	0	3	40	60	100
3	**21AE5302**	Wind tunnel techniques	PE	3	0	0	3	40	60	100
4	**21AE5303**	UAV and MAV design	PE	3	0	0	3	40	60	100
5	**21AE5304**	Non-Destructive Evaluation	PE	3	0	0	3	40	60	100
PROFESSIONAL ELECTIVE II										
1	**21AE6301**	Theory of Elasticity	PE	3	0	0	3	40	60	100
2	**21AE6302**	Introduction to cryogenics	PE	3	0	0	3	40	60	100
3	**21AE6303**	Boundary Layer Theory	PE	3	0	0	3	40	60	100
4	**21AE6304**	AI & IoT for aviation	PE	3	0	0	3	40	60	100
5	**21AE6305**	Airframe Maintenance and Repair	PE	3	0	0	3	40	60	100

OPEN ELECTIVE

S.No.	**Course Code**	**Course Title**	**Type**	**L**	**T**	**P**	**C**	**CIA**	**ESE**	**TOTAL**
1.	**21AE6401**	Introduction to Flight	OE	3	0	0	3	40	60	100

SEMESTER VII

S. No	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**CIA**	**ESE**	**Total**
THEORY										
1.	**21AE7201**	Computational Fluid Dynamics	PC	3	0	0	3	40	60	100
2.	**21AE7202**	Vibrations and Elements of Aero Elasticity	PC	3	0	0	3	40	60	100
3.	**21AE73XX**	Professional Elective-III	PE	3	0	0	3	40	60	100
4.	**21XX74XX**	Open Elective – II	OE	3	0	0	3	40	60	100
THEORY AND LAB COMPONENT										
5.	**21AE7251**	Avionics	PC	2	0	2	3	50	50	100
PRACTICALS										
6.	**21AE7001**	Aircraft Design Project	PC	0	0	3	1.5	50	50	100

7.	**21AE7002**	Flow Simulation Laboratory	PC	0	0	3	1.5	50	50	100
PROJECT WORK										
8.	**21AE7901**	Project Phase I	EEC	0	0	4	2	50	50	100
			TOTAL	**14**	**0**	**12**	**20**	**360**	**440**	**800**

SEMESTER VIII

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1.	**21AE83XX**	Professional Elective –IV	PE	3	0	0	3	40	60	100
2.	**21AE83XX**	Professional Elective- V	PE	3	0	0	3	40	60	100
PRACTICAL										
3.	**21AE8901**	Project Work – Phase II	EEC	0	0	16	8	100	100	200
			TOTAL	**6**	**0**	**16**	**14**	**180**	**220**	**400**

PROFESSIONAL ELECTIVE III

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	**21AE7301**	Smart Materials and Structures	PE	3	0	0	3	40	60	100
2.	**21AE7302**	Satellite Technology	PE	3	0	0	3	40	60	100
3.	**21AE7303**	Fatigue and Fracture Mechanics	PE	3	0	0	3	40	60	100
4.	**21AE7304**	Aero Engine Maintenance and Repair	PE	3	0	0	3	40	60	100
5.	**21AE7305**	Space Mechanics	PE	3	0	0	3	40	60	100
PROFESSIONAL ELECTIVE IV										
1.	**21AE8301**	Experimental Stress analysis	PE	3	0	0	3	40	60	100
2.	**21AE8302**	Aviation management and Air safety Engineering	PE	3	0	0	3	40	60	100
3.	**21AE8303**	Helicopter Theory	PE	3	0	0	3	40	60	100
4.	**21AE8304**	Hypersonic Aerodynamics	PE	3	0	0	3	40	60	100
5.	**21AE8305**	Additive Manufacturing and Tooling	PE	3	0	0	3	40	60	100
6.	**21AE8311**	Aircraft Design	PE	3	0	0	3	40	60	100
PROFESSIONAL ELECTIVE V										
S.No.	**Course Code**	**Course Title**	**Type**	**L**	**T**	**P**	**C**	**CIA**	**ESE**	**TOTAL**
1.	**21AE8306**	Rockets and Missiles	PE	3	0	0	3	40	60	100
2.	**21AE8307**	Aircraft Rules and Regulations	PE	3	0	0	3	40	60	100
3.	**21AE8308**	Product Design and Development	PE	3	0	0	3	40	60	100
4.	**21AE8309**	Air traffic control and Airport planning	PE	3	0	0	3	40	60	100
5.	**21AE8310**	Industrial Aerodynamics	PE	3	0	0	3	40	60	100

LIST OF OPEN ELECTIVES – AERONAUTICAL ENGINEERING

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	**21AE7401**	Introduction to Drones	OE	3	0	0	3	40	60	100
	LIFE SKILL COURSES									
1.	**21LSZ401**	General Studies for Competitive Examinations	OE	3	0	0	3	40	60	100
2.	**21LSZ402**	Human Rights, Women's Rights and Gender Equality	OE	3	0	0	3	40	60	100
3.	**21LSZ403**	Indian Ethos and Human Values	OE	3	0	0	3	40	60	100
4.	**21LSZ404**	Indian Constitution and Political System	OE	3	0	0	3	40	60	100
5.	**21LSZ405**	Yoga for Human Excellence	OE	3	0	0	3	40	60	100
NCC COURSES (Only for the students' who have opted NCC subjects in Semester I, II, III & IV are eligible)										
6.	**21HEZ401**	NCC course level 1	OE	3	0	0	3	40	60	100
7.	**21HEZ402**	NCC course level 2	OE	3	0	0	3	40	60	100

Enrollment for B.E. / B. TECH. (HONOURS) / Minor Degree (optional)

A student can also optionally register for additional courses (18 credits) and become eligible for the award of B.E. / B. Tech. (Honours) or Minor Degree. For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from semester V onwards. These courses shall be from the same vertical or a combination of different verticals of the same programme of study only. For minor degree, a student shall register for the additional courses (18 credits) from semester V onwards. All these courses have to be in a particular vertical from any one of the other programmes.

Clause 4.10 of Regulation 2022 is applicable for the Enrolment of B.E. / B. TECH. (HONOURS) / Minor Degree (Optional).

VERTICALS FOR MINOR DEGREE

- Heads are requested to provide one vertical from their program to offer for other program students to register for additional courses (18 Credits) to become eligible for the B.E./B.Tech. Minor Degree.
  Note: Each programme should provide verticals for minor degree

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	**21AE5231**	Sem 5: Fundamentals of Aeronautics	MDC	3	0	0	3	3
2.	**21AE6231**	Sem 6: Aircraft Systems and Instruments	MDC	3	0	0	3	3
3.	**21AE6232**	Sem6: Aircraft Materials and Processes	MDC	3	0	0	3	3
4.	**21AE7231**	Sem 7: Aircraft General Maintenance	MDC	3	0	0	3	3
5.	**21AE7232**	Sem 7: Introduction to Unmanned Aerial Vehicle Systems	MDC	3	0	0	3	3
6.	**21AE8231**	Sem 8: Introduction to Space Vehicles	MDC	3	0	0	3	3

*MDC – Minor Degree Course

In addition to the above the following additional courses for Minor Degree can also be given to the student's common to all the branches.

Vertical I Fintech and Block Chain	Vertical II Entrepreneurship	Vertical III Environment and Sustainability
Financial Management	Foundation of Entrepreneurship	Sustainable infrastructure Development
Fundamentals of Investment	Introduction to Business Venture	Sustainable Agriculture and Environmental Management
Banking, Financial Services and Insurance	Team Building & Leadership Management for Business	Sustainable Bio Materials
Introduction to Blockchain and its Applications	Creativity & Innovation in Entrepreneurship	Materials for Energy Sustainability
Fintech Personal Finance and Payments	Principles of Marketing Management for Business	Green Technology
Introduction to Fintech	Human Resource Management for Entrepreneurs	Environmental Quality Monitoring and Analysis
	Financing New Business Ventures	

B.E. (Hons) Aeronautical Engineering with Specialization in Space Technology

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	**21AE5205**	Sem 5: Space Flight Mechanics	PC	3	0	0	3	3	40	60	100
2.	**21AE6204**	Sem 6: Space Propulsion Systems	PC	3	0	0	3	3	40	60	100
3.	**21AE6205**	Sem 6: Heat Transfer in Aerospace Applications	PC	3	0	0	3	3	40	60	100
4.	**21AE7203**	Sem 7: Missiles Guidance and Control	PC	3	0	0	3	3	40	60	100
5.	**21AE7204**	Sem 7: Satellite attitude dynamics and control	PC	3	0	0	3	3	40	60	100
6.	**21AE8201**	Sem 8: Electrical Propulsion	PC	3	0	0	3	3	40	60	100

B.E. (Hons) Aeronautical Engineering with Specialization in Applied Aerodynamics

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	**21AE5206**	Sem 5: Wind Engineering	PC	3	0	0	3	3	40	60	100
2.	**21AE6206**	Sem 6: Experimental methods in fluid mechanics	PC	3	0	0	3	3	40	60	100
3.	**21AE6207**	Sem 6: Introduction to turbulence	PC	3	0	0	3	3	40	60	100

4.	**21AE7205**	Sem 7: Space Vehicle Aerodynamics	PC	3	0	0	3	3	40	60	100
5.	**21AE7206**	Sem 7: Computational Heat Transfer and fluid flow	PC	3	0	0	3	3	40	60	100
6.	**21AE8202**	Sem 8: Aviation innovation and biomimicry	PC	3	0	0	3	3	40	60	100

Note: Each programme should provide verticals for Honours degree

SEMESTER-WISE CREDIT DISTRIBUTION

B.E. / B.TECH. PROGRAMMES										
S.No.	**Course Area**	**Credits per Semester**								**Total Credits**
		I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	
1	HS	04	04	-	-	-	03	-	-	11
2	BS	10	10	04	04	-	-	-	-	28
3	ES	06	08	-	-	-	-	-	-	14
4	PC	-	-	16	17	19	12	12	-	76
5	PE	-	-	-	-	03	03	03	06	15
6	OE	-	-	-	-	-	03	03	-	06
7	EEC	-	-	-	-	02	03	02	08	15
Total		**20**	**22**	**20**	**21**	**24**	**24**	**20**	**14**	**165**

Credit Distribution R2019

Semester	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**Total**
Credits	20	22	20	21	24	24	20	14	**165**

Chairman, Board of Studies

Dean – Academics

PRINCIPAL

Chairman - BoS
AERO - HiCET

Dean (Academics)
HiCET

HINDUSTHAN ACADEMIC COUNCIL OF TECHNICAL EDUCATION
Chairman

CURRICULUM
R2022

DETAILS OF CHANGES CARRIED OUT IN CURRICULUM & SYLLABUS

CBCS PATTERN

UNDERGRADUATE PROGRAMMES

B.E. AERONAUTICAL ENGINEERING (UG)

REGULATION-2022

For the students admitted during the academic year 2022-2023 and onwards

SEMESTER I

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1.	**22MA1101**	Matrices and Calculus	BSC	3	1	0	4	4	40	60	100
2.	**22ME1201**	Engineering Drawing	ESC	1	4	0	3	5	40	60	100
THEORY WITH LAB COMPONENT											
3.	**22PH1151**	Physics for Non-Circuit Engineering	BSC	2	0	2	3	4	50	50	100
4.	**22HE1151**	English for Engineers	HSC	2	0	2	3	4	50	50	100
5.	**22IT1151**	Python Programming and practices	ESC	2	0	2	3	4	50	50	100
EEC COURSES (SE/AE)											
6.	**22HE1071**	UHV	AEC	2	0	0	2	3	40	60	100
7.	**22HE1072**	Entrepreneurship & Innovation	AEC	1	0	0	1	1	100	0	100
MANDATORY COURSE											
8.	**22MC1091**	தமிழரும் தொழில் நுட்பமும்	MC	2	0	0	0	2	100	0	100
			TOTAL	**15**	**5**	**6**	**19**	**27**	**470**	**330**	**800**

SEMESTER II

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1.	**22MA2101**	Differential Equations and Complex Analysis	BSC	3	1	0	4	4	40	60	100
2.	**22CY2101**	Environmental Studies	ESC	2	0	0	2	3	40	60	100
3.	**22PH2101**	Basics Of Material Science	BSC	2	0	0	2	3	40	60	100
4.	**22ME2101**	Engineering Mechanics	ESC	3	0	0	3	3	40	60	100
THEORY WITH LAB COMPONENT											
5.	**22CY2152**	Applied Chemistry	BSC	2	0	2	3	4	50	50	100
6.	**22HE2151**	Effective Technical Communication	HSC	2	0	2	3	4	50	50	100

PRACTICAL											
7.	**22ME2001**	Engineering Practices	ESC	0	0	4	2	2	60	40	100
EEC COURSES (SE/AE)											
8.	**22HE2071**	Design Thinking	AEC	1	0	2	2	2	100	0	100
9.	**22HE2072**	Soft Skills -1	SEC	1	0	0	1	1	100	0	100
MANDATORY COURSE											
10.	**22MC2091**	தமிழர் மரபு	MC	2	0	0	0	2	100	0	100
11.	**22MC2093**	NCC */NSS / YRC / Sports / Clubs / Society Service - Enrollment (Common)	MC	All students shall enroll, on admission, in anyone of the personality and character development programmes and undergo training for about 80 hours							-
			TOTAL	**18**	**1**	**10**	**22**	**27**	**520**	**380**	**900**

SEMESTER III

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1.	**22MA3104**	Fourier Analysis and Numerical Techniques	BSC	3	1	0	4	4	40	60	100
2.	**22AE3201**	Elements of Aeronautics	PCC	3	0	0	3	3	40	60	100
3.	**22AE3202**	Solid Mechanics	PCC	3	0	0	3	3	40	60	100
THEORY WITH LAB COMPONENT											
4.	**22AE3251**	Aero Engineering Thermodynamics	PCC	3	0	2	4	5	50	50	100
5.	**22AE3252**	Engineering Fluid Mechanics	PCC	3	0	2	4	5	50	50	100
PRACTICAL											
6.	**22AE3001**	Strength of Materials Laboratory	ESC	0	0	4	2	4	60	40	100
7.	**22AE3002**	Aircraft Component Drawing Laboratory	PCC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
8.	**22HE3071**	Soft Skills and Aptitude - II	SEC	1	0	0	1	1	100	0	100
9.	**22AE3072**	Introduction to MATLAB	AEC	2	0	0	2	2	40	60	100
10.	**22MC3191**	Essence Of Indian Traditional Knowledge	MC	2	0	0	0	2	100	0	100
			TOTAL	**20**	**2**	**10**	**25**	**32**	**570**	**430**	**1000**

SEMESTER IV

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1.	**22HE4101**	IPR and Start-ups	HSC	2	0	0	2	2	40	60	100
2.	**22AE4201**	Aerodynamics - I	PCC	3	0	0	3	3	40	60	100

3.	**22AE4202**	Mechanics of machines	PCC	3	1	0	4	4	40	60	100
4.	**22AE4203**	Gas Turbine Propulsion	PCC	3	1	0	4	4	40	60	100
THEORY WITH LAB COMPONENT											
5.	**22MA4151**	Probability And Statistics with R Programming	BSC	2	0	2	3	4	50	50	100
6.	**22AE4251**	Aircraft Structures-I	PCC	2	0	2	3	4	50	50	100
PRACTICAL											
7.	**22AE4001**	Aerodynamics Laboratory	PCC	0	0	4	2	4	60	40	100
8.	**22AE4002**	Propulsion Laboratory	PCC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
9.	**22HE4071**	Soft Skills -III	SEC	1	0	0	1	1	100	0	100
10.	**22MC4191**	Indian Constitution	MC	2	0	0	0	2	100	0	100
			TOTAL	**18**	**2**	**12**	**24**	**32**	**480**	**420**	**1000**

* Two weeks internship carries 1 credit and it will be done during Semester III summer vacation and same will be evaluated in Semester IV.
If students unable to undergo in semester III, then the Internship I offered in the semester IV can be clubbed with Internship II (Total: 4 weeks-2 credits)

SEMESTER V

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1.	**22AE5201**	Aircraft structures - II	PCC	3	1	0	3	4	40	60	100
2.	**22AE5202**	Aerodynamics - II	PCC	3	0	0	3	3	40	60	100
3.	**22AE53XX**	Professional Elective-1	PEC	3	0	0	3	3	40	60	100
4.	**22AE53XX**	Professional Elective-2	PEC	3	0	0	3	3	40	60	100
5.	**22AE53XX**	Professional Elective-3	PEC	3	0	0	3	3	40	60	100
THEORY WITH LAB COMPONENT											
6.	**22AE5251**	Aircraft Systems and General Maintenance Practices	PCC	2	0	2	3	4	50	50	100
PRACTICAL											
7.	**22AE5001**	Aircraft Structures Laboratory	PCC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
8.	**22HE5071**	Soft Skills -4/Foreign languages	SEC	1	0	0	1	1	100	0	100
			TOTAL	**18**	**1**	**6**	**21**	**25**	**410**	**390**	**800**

SEMESTER VI

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1.	**22AE6201**	Flight Dynamics	PCC	3	0	0	3	3	40	60	100

2.	**22HE6101**	Professional Ethics	HSC	3	0	0	3	3	40	60	100
3.	**22AE63XX**	Professional Elective-4	PEC	3	0	0	3	3	40	60	100
4.	**22AE63XX**	Professional Elective-5	PEC	3	0	0	3	3	40	60	100
5.	**22XX64XX**	Open Elective – I*	OEC	3	0	0	3	3	40	60	100
6.	**22XX64XX**	Open Elective – II*	OEC	3	0	0	3	3	40	60	100
PRACTICAL											
7.	**22AE6001**	UAV design and Aeromodelling Laboratory	PCC	0	0	4	2	4	60	40	100
8.	**22AE6002**	Aero Engine Airframe Laboratory	PCC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
9.	**22HE6071**	Soft Skills – 5	SEC	2	0	0	2	2	100	0	100
			TOTAL	**20**	**0**	**8**	**24**	**28**	**460**	**440**	**900**

SEMESTER VII

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1.	**22AE7201**	Avionics	PCC	3	0	0	3	3	40	60	100
2.	**22AE73XX**	Professional Elective-6	PEC	3	0	0	3	3	40	60	100
3.	**22XX74XX**	Open Elective – III*	OEC	3	0	0	3	3	40	60	100
4.	**22XX74XX**	Open Elective – IV*	OEC	3	0	0	3	3	40	60	100
THEORY WITH LAB COMPONENT											
5.	**22AE7251**	Aircraft Design project	PCC	2	0	2	4	4	50	50	100
PRACTICAL											
6.	**22AE7001**	Computer Aided Simulation Laboratory	PCC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
7.	**22AE7701**	Internship*	SEC	0	0	0	2	2	100	0	100
			TOTAL	**14**	**0**	**6**	**20**	**22**	**370**	**330**	**700**

* - Two weeks internship carries 1 credit and it will be done during Semester VI summer vacation/placement training and same will be evaluated in Semester VII.

SEMESTER VIII

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
EEC COURSES (SE/AE)											
1.	**22AE8901**	Project Work/Granted Patent	SEC	0	0	20	10	20	100	100	200
			TOTAL	**0**	**0**	**20**	**10**	**20**	**100**	**100**	**200**

Note:

1. *As per the AICTE guideline, in Semesters I, II, III & IV NCC one credit subject is added as Value Added Course with Extra Credit. Further, the students who enrolled his/her name in HICET NCC and Air Wing are eligible to undergo this subject. The earned extra credits printed in the Consolidated Mark sheet as per the regulation.

2. NCC course level 1 & Level 2 will be added in the list of open elective subjects in the appropriate semester. Further, the students' who have opted NCC subjects in Semester I, II, III & IV are eligible to undergo NCC Open Elective Subjects.
3. The above-mentioned NCC Courses will be offered to the students who are going to be admitted in the Academic Year 2021 – 22.

OPEN ELECTIVE I AND II (EMERGING TECHNOLOGIES)

To be offered for the students other than CSE, IT, AI&ML, ECE & BIOMEDICAL

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	**22AI6451**	Artificial Intelligence and Machine Learning Fundamentals	OEC	2	0	2	4	3
2	**22CS6451**	Block chain Technology	OEC	2	0	2	4	3
3	**22EC6451**	Cyber security	OEC	2	0	2	4	3
4	**22EC6452**	IoT Concepts and Applications	OEC	2	0	2	4	3
5	**22IT6451**	Data Science and Analytics	OEC	2	0	2	4	3
6	**22BM6451**	Augmented and Virtual Reality	OEC	2	0	2	4	3

OPEN ELECTIVE I AND II

To be offered for the students other than AUTO, AERO, AGRI, MECH, MCTS, CIVIL, EEE, CHEMICAL, FOOD TECH, E&I

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	**22AE6401**	Introduction to Aeronautical Engineering	OEC	3	0	0	3	3
2	**22MT6401**	Introduction to Industrial Engineering	OEC	3	0	0	3	3
3	**22MT6402**	Industrial Safety and Environment	OEC	3	0	0	3	3
4	**22CE6401**	Climate Change and its Impact	OEC	3	0	0	3	3
5	**22CE6402**	Environment and Social Impact Assessment	OEC	3	0	0	3	3
6	**22ME6401**	Renewable Energy System	OEC	3	0	0	3	3
7	**22ME6402**	Additive Manufacturing systems	OEC	3	0	0	3	3
8	**22EI6401**	Introduction to Industrial Instrumentation and Control	OEC	3	0	0	3	3
9	**22EI6402**	Graphical Programming using Virtual Instrumentation	OEC	3	0	0	3	3
10	**22AU6401**	Fundamentals of Automobile Engineering	OEC	3	0	0	3	3
11	**22AU6402**	Automotive Vehicle Safety	OEC	3	0	0	3	3
12	**22EE6401**	Digital Marketing	OEC	3	0	0	3	3
13	**22EE6402**	Research Methodology	OEC	3	0	0	3	3
14	**22FT6401**	Traditional Foods	OEC	3	0	0	3	3
15	**22AG6401**	Urban Agriculture and Organic Farming	OEC	3	0	0	3	3
16	**22CH6401**	Biomass and Bio refinery	OEC	3	0	0	3	3

Note: Non-Circuit Departments can add one Open Elective course in the above list to offer for the circuit branches

OPEN ELECTIVE III

Students shall choose any one of the open elective courses such that the course content or title not belong to their own programme.

(Note: Each programme in our institution is expected to provide one course only)

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	**22AE7401**	Introduction to Drones	OEC	3	0	0	3	3

OPEN ELECTIVE IV

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	**22LS7401**	General studies for competitive examinations	OEC	3	0	0	3	3
2	**22LS7402**	Human Rights, Women Rights and Gender equity	OEC	3	0	0	3	3
3	**22LS7403**	Indian ethos and Human values	OEC	3	0	0	3	3
4	**22LS7404**	Financial independence and management	OEC	3	0	0	3	3
5	**22LS7405**	Yoga for Human Excellence	OEC	3	0	0	3	3
6	**22LS7406**	Democracy and Good Governance	OEC	3	0	0	3	3
7	**22LS7407**	NCC Level - II	OEC	3	0	0	3	3

PROFESSIONAL ELECTIVE COURSES: VERTICALS

Vertical I Aerospace Structures & Materials	**Vertical II Aerodynamics**	**Vertical III Propulsion**	**Vertical IV Avionics and Drone Technology**	**Vertical V Aircraft Maintenance**	**Vertical VI Advanced Manufacturing Technology**
22AE5301 Theory of Elasticity	22AE5304 Wind Tunnel Techniques	22AE5307 Advanced Propulsion System	22AE5310 Control Engineering	22AE5313 Airframe Maintenance and Repair	22AE5316 Manufacturing Technology
22AE5302 Experimental Stress Analysis	22AE5305 Boundary layer Theory	22AE5308 Heat Transfer	22AE5311 Microprocessor and Applications	22AE5314 Civil Aviation Regulations	22AE5317 Lean Manufacturing
22AE5303 Composite Materials and Structures	22AE5306 Helicopter Aerodynamics	22AE5309 Combustion in Aerospace Engineering	22AE5312 Aerodynamics of Drones	22AE5315 Aircraft Engine Maintenance and Repair	22AE5318 Additive Manufacturing and Tooling
22AE6301 Finite Element Methods	22AE6303 Industrial Aerodynamics	22AE6305 Rocket and Missiles	22AE6307 Navigation and Communication systems	22AE6309 Air Traffic Control and Airport Planning	22AE6311 Industrial Design & Rapid Prototyping Techniques

22AE6302 Vibration and Aeroelasticity	22AE6304 Hypersonic Aerodynamics	22AE6306 Introduction to Cryogenics	22AE6308 Design of UAV Systems	22AE6310 Aviation management and Air Safety Engineering	22AE6312 Non-Destructive Testing
22AE7301 Fatigue and Fracture Mechanics	22AE7302 Computational Fluid Dynamics	22AE7303 Satellite Technology	22AE7304 Aerospace Guidance and Control	22AE7305 Engine Systems and Control	22AE7306 Integrated Product Development

Students are permitted to choose all Professional Electives from a particular vertical or from different verticals.

PROFESSIONAL ELECTIVE COURSES: VERTICALS

Details of Vertical I: Aerospace Structures & Materials

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	**22AE5301**	Theory of Elasticity	PEC	3	0	0	3	3
2.	**22AE5302**	Experimental Stress Analysis	PEC	3	0	0	3	3
3.	**22AE5303**	Composite Materials and Structures	PEC	3	0	0	3	3
4.	**22AE6301**	Finite Element Methods	PEC	3	0	0	3	3
5.	**22AE6302**	Vibration and Aeroelasticity	PEC	3	0	0	3	3
6.	**22AE7301**	Fatigue and Fracture Mechanics	PEC	3	0	0	3	3

Details of Vertical II: Aerodynamics

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	**22AE5304**	Wind Tunnel Techniques	PEC	3	0	0	3	3
2.	**22AE5305**	Boundary layer Theory	PEC	3	0	0	3	3
3.	**22AE5306**	Helicopter Aerodynamics	PEC	3	0	0	3	3
4.	**22AE6303**	Industrial Aerodynamics	PEC	3	0	0	3	3
5.	**22AE6304**	Hypersonic Aerodynamics	PEC	3	0	0	3	3
6.	**22AE7302**	Computational Fluid Dynamics	PEC	3	0	0	3	3

Details of Vertical III: Propulsion

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	**22AE5307**	Advanced Propulsion System	PEC	3	0	0	3	3

2.	**22AE5308**	Heat Transfer	PEC	3	0	0	3	3
3.	**22AE5309**	Combustion in Aerospace Engineering	PEC	3	0	0	3	3
4.	**22AE6305**	Rocket and Missiles	PEC	3	0	0	3	3
5.	**22AE6306**	Introduction to Cryogenics	PEC	3	0	0	3	3
6.	**22AE7303**	Satellite Technology	PEC	3	0	0	3	3

Details of Vertical IV: Avionics and Drone Technology

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	**22AE5310**	Control Engineering	PEC	3	0	0	3	3
2.	**22AE5311**	Microprocessor and Applications	PEC	3	0	0	3	3
3.	**22AE5312**	Aerodynamics of Drones	PEC	3	0	0	3	3
4.	**22AE6307**	Navigation and Communication systems	PEC	3	0	0	3	3
5.	**22AE6308**	Design of UAV Systems	PEC	3	0	0	3	3
6.	**22AE7304**	Aerospace Guidance and Control	PEC	3	0	0	3	3

Details of Vertical V: Aircraft Maintenance

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	**22AE5313**	Airframe Maintenance and Repair	PEC	3	0	0	3	3
2.	**22AE5314**	Civil Aviation Regulations	PEC	3	0	0	3	3
3.	**22AE5315**	Aircraft Engine Maintenance and Repair	PEC	3	0	0	3	3
4.	**22AE6309**	Air Traffic Control and Airport Planning	PEC	3	0	0	3	3
5.	**22AE6310**	Aviation management and Air Safety Engineering	PEC	3	0	0	3	3
6.	**22AE7305**	Engine Systems and Control	PEC	3	0	0	3	3

Details of Vertical VI: Advanced Manufacturing Technology

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	**22AE5316**	Manufacturing Technology	PEC	3	0	0	3	3
2.	**22AE5317**	Lean Manufacturing	PEC	3	0	0	3	3
3.	**22AE5318**	Additive Manufacturing and Tooling	PEC	3	0	0	3	3

4.	**22AE6311**	Industrial Design & Rapid Prototyping Techniques	PEC	3	0	0	3	3
5.	**22AE6312**	Non-Destructive Testing	PEC	3	0	0	3	3
6.	**22AE7306**	Integrated Product Development	PEC	3	0	0	3	3

Enrollment for B.E. / B. TECH. (HONOURS) / Minor Degree (optional)

A student can also optionally register for additional courses (18 credits) and become eligible for the award of B.E. / B. Tech. (Honours) or Minor Degree. For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from semester V onwards. These courses shall be from the same vertical or a combination of different verticals of the same programme of study only. For minor degree, a student shall register for the additional courses (18 credits) from semester V onwards. All these courses have to be in a particular vertical from any one of the other programmes.

Clause 4.10 of Regulation 2022 is applicable for the Enrolment of B.E. / B. TECH. (HONOURS) / Minor Degree (Optional).

VERTICALS FOR MINOR DEGREE

- Heads are requested to provide one vertical from their program to offer for other program students to register for additional courses (18 Credits) to become eligible for the B.E./B.Tech. Minor Degree.
  Note: Each programme should provide verticals for minor degree

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	**22AE5231**	Sem 5: Fundamentals of Aeronautics	MDC	3	0	0	3	3
2.	**22AE6231**	Sem 6: Aircraft Systems and Instruments	MDC	3	0	0	3	3
3.	**22AE6232**	Sem6: Aircraft Materials and Processes	MDC	3	0	0	3	3
4.	**22AE7231**	Sem 7: Aircraft General Maintenance	MDC	3	0	0	3	3
5.	**22AE7232**	Sem 7: Introduction to Unmanned Aerial Vehicle Systems	MDC	3	0	0	3	3
6.	**22AE8231**	Sem 8: Introduction to Space Vehicles	MDC	3	0	0	3	3

*MDC – Minor Degree Course

In addition to the above the following additional courses for Minor Degree can also be given to the student's common to all the branches.

Vertical I **Fintech and Block Chain**	**Vertical II** **Entrepreneurship**	**Vertical III** **Environment and Sustainability**
Financial Management	Foundation of Entrepreneurship	Sustainable infrastructure Development
Fundamentals of Investment	Introduction to Business Venture	Sustainable Agriculture and Environmental Management
Banking, Financial Services and Insurance	Team Building & Leadership Management for Business	Sustainable Bio Materials
Introduction to Blockchain and its Applications	Creativity & Innovation in Entrepreneurship	Materials for Energy Sustainability

Fintech Personal Finance and Payments	Principles of Marketing Management for Business	Green Technology
Introduction to Fintech	Human Resource Management for Entrepreneurs	Environmental Quality Monitoring and Analysis
	Financing New Business Ventures	

B.E. (Hons) Aeronautical Engineering with Specialization in Space Technology

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	**22AE5203**	Sem 5: Space Flight Mechanics	PC	3	0	0	3	3	40	60	100
2.	**22AE6202**	Sem 6: Space Propulsion Systems	PC	3	0	0	3	3	40	60	100
3.	**22AE6203**	Sem 6: Heat Transfer in Aerospace Applications	PC	3	0	0	3	3	40	60	100
4.	**22AE7202**	Sem 7: Missiles Guidance and Control	PC	3	0	0	3	3	40	60	100
5.	**22AE7203**	Sem 7: Satellite attitude dynamics and control	PC	3	0	0	3	3	40	60	100
6.	**22AE8201**	Sem 8: Electrical Propulsion	PC	3	0	0	3	3	40	60	100

B.E. (Hons) Aeronautical Engineering with Specialization in Applied Aerodynamics

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	**22AE5204**	Sem 5: Wind Engineering	PC	3	0	0	3	3	40	60	100
2.	**22AE6204**	Sem 6: Experimental methods in fluid mechanics	PC	3	0	0	3	3	40	60	100
3.	**22AE6205**	Sem 6: Introduction to turbulence	PC	3	0	0	3	3	40	60	100
4.	**22AE7204**	Sem 7: Space Vehicle Aerodynamics	PC	3	0	0	3	3	40	60	100
5.	**22AE7205**	Sem 7: Computational Heat Transfer and fluid flow	PC	3	0	0	3	3	40	60	100
6.	**22AE8202**	Sem 8: Aviation innovation and biomimicry	PC	3	0	0	3	3	40	60	100

Note: Each programme should provide verticals for Honours degree

SEMESTER-WISE CREDIT DISTRIBUTION

B.E. / B.TECH. PROGRAMMES										
S.No.	**Course Area**	**Credits per Semester**								**Total Credits**
		I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	
1	HSC	3	3	-	2	-	3	-	-	**11**
2	BSC	7	9	4	3	-	-	-	-	**23**
3	ESC	6	7	2	-	-	-	-	-	**15**
4	PCC	-	-	16	18	11	7	9	-	**61**
5	PEC	-	-	-	-	9	6	3	-	**18**
6	OEC	-	-	-	-	-	6	6	-	**12**
7	EEC	3	3	3	1	1	2	2	10	**25**
8	MCC	✓	✓	-	-	-	-	-	-	-
Total		**19**	**22**	**25**	**24**	**21**	**24**	**20**	**10**	**165**

Credit Distribution R2022

Semester	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**Total**
Credits	19	22	25	24	21	24	20	10	**165**

Chairman, Board of Studies

Dean – Academics

PRINCIPAL

Chairman - BoS
AERO - HiCET

Dean (Academics)
HiCET

HINDUSTHAN COLLEGE OF ENGG. & TECH. ACADEMIC COUNCIL Chairman

CURRICULUM
R2022

DETAILS OF CHANGES CARRIED OUT IN CURRICULUM & SYLLABUS

CBCS PATTERN

UNDERGRADUATE PROGRAMMES

B.E. AERONAUTICAL ENGINEERING (UG)

REGULATION-2022

For the students admitted during the academic year 2023-2024 and onwards

SEMESTER I

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1.	**22MA1101**	Matrices and Calculus	BSC	3	1	0	4	4	40	60	100
2.	**22ME1201**	Engineering Drawing	ESC	1	4	0	3	5	40	60	100
THEORY WITH LAB COMPONENT											
3.	**22PH1151**	Physics for Non-Circuit Engineering	BSC	2	0	2	3	4	50	50	100
4.	**22HE1151**	English for Engineers	HSC	2	0	2	3	4	50	50	100
5.	**22IT1151**	Python Programming and practices	ESC	2	0	2	3	4	50	50	100
EEC COURSES (SE/AE)											
6.	**22HE1072**	Entrepreneurship & Innovation	AEC	1	0	0	1	1	100	0	100
7.	**22HE1073**	Introduction To Soft Skills	SEC	1	0	0	0	1	100	0	100
MANDATORY COURSE											
8.	**22MC1093/ 22MC1094**	தமிழர்மரபு /HERITAGE OF TAMIL	MC	2	0	0	1	2	100	0	100
9.	**22MC1095**	Universal Human Values	AEC	2	0	0	0	2	40	60	100
		TOTAL		**15**	**5**	**6**	**19**	**27**	**470**	**330**	**800**

SEMESTER II

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1.	**22MA2101**	Differential Equations and Complex Analysis	BSC	3	1	0	4	4	40	60	100
2.	**22CY2101**	Environmental Studies	ESC	2	0	0	2	3	40	60	100
3.	**22PH2101**	Basics Of Material Science	BSC	2	0	0	2	3	40	60	100
4.	**22ME2101**	Engineering Mechanics	ESC	3	0	0	3	3	40	60	100
THEORY WITH LAB COMPONENT											
5.	**22CY2152**	Applied Chemistry	BSC	2	0	2	3	4	50	50	100

6.	**22HE2151**	Effective Technical Communication	HSC	2	0	2	3	4	50	50	100
PRACTICAL											
7.	**22ME2001**	Engineering Practices	ESC	0	0	4	2	2	60	40	100
EEC COURSES (SE/AE)											
8.	**22HE2071**	Design Thinking	AEC	1	0	2	2	2	100	0	100
9.	**22HE2073**	SOFT SKILLS AND APTITUDE-I	SEC	1	0	0	1	1	100	0	100
MANDATORY COURSE											
10.	**22MC2094/ 22MC2095**	தமிழரும் தொழில்நுட்பமும் / TAMILS AND TECHNOLOGY	MC	2	0	0	1	2	100	0	100
11.	**22MC2093**	NCC */NSS / YRC / Sports / Clubs / Society Service - Enrollment (Common)	MC	All students shall enroll, on admission, in anyone of the personality and character development programmes and undergo training for about 80 hours							-
			TOTAL	**18**	**1**	**10**	**22**	**27**	**520**	**380**	**900**

SEMESTER III

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1.	**22MA3104**	Fourier Analysis and Numerical Techniques	BSC	3	1	0	4	4	40	60	100
2.	**22AE3201**	Elements of Aeronautics	PCC	3	0	0	3	3	40	60	100
3.	**22AE3202**	Solid Mechanics	PCC	3	0	0	3	3	40	60	100
THEORY WITH LAB COMPONENT											
4.	**22AE3251**	Aero Engineering Thermodynamics	PCC	3	0	2	4	5	50	50	100
5.	**22AE3252**	Engineering Fluid Mechanics	PCC	3	0	2	4	5	50	50	100
PRACTICAL											
6.	**22AE3001**	Strength of Materials Laboratory	ESC	0	0	4	2	4	60	40	100
7.	**22AE3002**	Aircraft Component Drawing Laboratory	PCC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
8.	**22HE3071**	Soft Skills -2	SEC	1	0	0	1	1	100	0	100
9.	**22AE3072**	Introduction to MATLAB	AEC	2	0	0	2	2	40	60	100
10.	**22MC3191**	Essence Of Indian Traditional Knowledge	MC	2	0	0	0	2	100	0	100
			TOTAL	**20**	**2**	**10**	**25**	**32**	**470**	**430**	**1000**

SEMESTER IV

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1.	**22HE4101**	IPR and Start-ups	HSC	2	0	0	2	2	40	60	100

2.	**22AE4201**	Aerodynamics - I	PCC	3	0	0	3	3	40	60	100
3.	**22AE4202**	Mechanics of machines	PCC	3	1	0	4	4	40	60	100
4.	**22AE4203**	Gas Turbine Propulsion	PCC	3	1	0	4	4	40	60	100
THEORY WITH LAB COMPONENT											
5.	**22MA4151**	Probability And Statistics with R Programming	BSC	2	0	2	3	4	50	50	100
6.	**22AE4251**	Aircraft Structures-I	PCC	2	0	2	3	4	50	50	100
PRACTICAL											
7.	**22AE4001**	Aerodynamics Laboratory	PCC	0	0	4	2	4	60	40	100
8.	**22AE4002**	Propulsion Laboratory	PCC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
9.	**22HE4071**	Soft Skills -III	SEC	1	0	0	1	1	100	0	100
10.	**22MC4191**	Indian Constitution	MC	2	0	0	0	2	100	0	100
			TOTAL	**18**	**2**	**12**	**24**	**32**	**480**	**420**	**1000**

* Two weeks internship carries 1 credit and it will be done during Semester III summer vacation and same will be evaluated in Semester IV.
If students unable to undergo in semester III, then the Internship I offered in the semester IV can be clubbed with Internship II (Total: 4 weeks-2 credits)

SEMESTER V

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1.	**22AE5201**	Aircraft structures - II	PCC	3	1	0	3	4	40	60	100
2.	**22AE5202**	Aerodynamics - II	PCC	3	0	0	3	3	40	60	100
3.	**22AE53XX**	Professional Elective-1	PEC	3	0	0	3	3	40	60	100
4.	**22AE53XX**	Professional Elective-2	PEC	3	0	0	3	3	40	60	100
5.	**22AE53XX**	Professional Elective-3	PEC	3	0	0	3	3	40	60	100
THEORY WITH LAB COMPONENT											
6.	**22AE5251**	Aircraft Systems and General Maintenance Practices	PCC	2	0	2	3	4	50	50	100
PRACTICAL											
7.	**22AE5001**	Aircraft Structures Laboratory	PCC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
8.	**22HE5071**	Soft Skills -4/Foreign languages	SEC	1	0	0	1	1	100	0	100
			TOTAL	**18**	**1**	**6**	**21**	**25**	**410**	**390**	**800**

SEMESTER VI

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											

1.	**22AE6201**	Flight Dynamics	PCC	3	0	0	3	3	40	60	100
2.	**22HE6101**	Professional Ethics	HSC	3	0	0	3	3	40	60	100
3.	**22AE63XX**	Professional Elective-4	PEC	3	0	0	3	3	40	60	100
4.	**22AE63XX**	Professional Elective-5	PEC	3	0	0	3	3	40	60	100
5.	**22XX64XX**	Open Elective – I*	OEC	3	0	0	3	3	40	60	100
6.	**22XX64XX**	Open Elective – II*	OEC	3	0	0	3	3	40	60	100
PRACTICAL											
7.	**22AE6001**	UAV design and Aeromodelling Laboratory	PCC	0	0	4	2	4	60	40	100
8.	**22AE6002**	Aero Engine Airframe Laboratory	PCC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
9.	**22HE6071**	Soft Skills – 5	SEC	2	0	0	2	2	100	0	100
			TOTAL	**20**	**0**	**8**	**24**	**28**	**460**	**440**	**900**

SEMESTER VII

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1.	**22AE7201**	Avionics	PCC	3	0	0	3	3	40	60	100
2.	**22AE73XX**	Professional Elective-6	PEC	3	0	0	3	3	40	60	100
3.	**22XX74XX**	Open Elective – III*	OEC	3	0	0	3	3	40	60	100
4.	**22XX74XX**	Open Elective – IV*	OEC	3	0	0	3	3	40	60	100
THEORY WITH LAB COMPONENT											
5.	**22AE7251**	Aircraft Design project	PCC	2	0	2	4	4	50	50	100
PRACTICAL											
6.	**22AE7001**	Computer Aided Simulation Laboratory	PCC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
7.	**22AE7701**	Internship*	SEC	0	0	0	2	2	100	0	100
			TOTAL	**14**	**0**	**6**	**20**	**22**	**370**	**330**	**700**
* - Two weeks internship carries 1 credit and it will be done during Semester VI summer vacation/placement training and same will be evaluated in Semester VII.											

SEMESTER VIII

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
EEC COURSES (SE/AE)											
1.	**22AE8901**	Project Work/Granted Patent	SEC	0	0	20	10	20	100	100	200
			TOTAL	**0**	**0**	**20**	**10**	**20**	**100**	**100**	**200**

Note:

1. *As per the AICTE guideline, in Semesters I, II, III & IV NCC one credit subject is added as Value Added Course with Extra Credit. Further, the students who enrolled his/her name in

HICET NCC and Air Wing are eligible to undergo this subject. The earned extra credits printed in the Consolidated Mark sheet as per the regulation.

2. NCC course level 1 & Level 2 will be added in the list of open elective subjects in the appropriate semester. Further, the students' who have opted NCC subjects in Semester I, II, III & IV are eligible to undergo NCC Open Elective Subjects.
3. The above-mentioned NCC Courses will be offered to the students who are going to be admitted in the Academic Year 2021 – 22.

OPEN ELECTIVE I AND II (EMERGING TECHNOLOGIES)

To be offered for the students other than CSE, IT, AI&ML, ECE & BIOMEDICAL

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	**22AI6451**	Artificial Intelligence and Machine Learning Fundamentals	OEC	2	0	2	4	3
2	**22CS6451**	Block chain Technology	OEC	2	0	2	4	3
3	**22EC6451**	Cyber security	OEC	2	0	2	4	3
4	**22EC6452**	IoT Concepts and Applications	OEC	2	0	2	4	3
5	**22IT6451**	Data Science and Analytics	OEC	2	0	2	4	3
6	**22BM6451**	Augmented and Virtual Reality	OEC	2	0	2	4	3

OPEN ELECTIVE I AND II

To be offered for the students other than AUTO, AERO, AGRI, MECH, MCTS, CIVIL, EEE, CHEMICAL, FOOD TECH, E&I

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	**22AE6401**	Introduction to Aeronautical Engineering	OEC	3	0	0	3	3
2	**22MT6401**	Introduction to Industrial Engineering	OEC	3	0	0	3	3
3	**22MT6402**	Industrial Safety and Environment	OEC	3	0	0	3	3
4	**22CE6401**	Climate Change and its Impact	OEC	3	0	0	3	3
5	**22CE6402**	Environment and Social Impact Assessment	OEC	3	0	0	3	3
6	**22ME6401**	Renewable Energy System	OEC	3	0	0	3	3
7	**22ME6402**	Additive Manufacturing systems	OEC	3	0	0	3	3
8	**22EI6401**	Introduction to Industrial Instrumentation and Control	OEC	3	0	0	3	3
9	**22EI6402**	Graphical Programming using Virtual Instrumentation	OEC	3	0	0	3	3
10	**22AU6401**	Fundamentals of Automobile Engineering	OEC	3	0	0	3	3
11	**22AU6402**	Automotive Vehicle Safety	OEC	3	0	0	3	3
12	**22EE6401**	Digital Marketing	OEC	3	0	0	3	3
13	**22EE6402**	Research Methodology	OEC	3	0	0	3	3
14	**22FT6401**	Traditional Foods	OEC	3	0	0	3	3
15	**22AG6401**	Urban Agriculture and Organic Farming	OEC	3	0	0	3	3
16	**22CH6401**	Biomass and Bio refinery	OEC	3	0	0	3	3

Note: Non-Circuit Departments can add one Open Elective course in the above list to offer for the circuit branches

OPEN ELECTIVE III

Students shall choose any one of the open elective courses such that the course content or title not belong to their own programme.

(Note: Each programme in our institution is expected to provide one course only)

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	**22AE7401**	Introduction to Drones	OEC	3	0	0	3	3

OPEN ELECTIVE IV

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	**22LS7401**	General studies for competitive examinations	OEC	3	0	0	3	3
2	**22LS7402**	Human Rights, Women Rights and Gender equity	OEC	3	0	0	3	3
3	**22LS7403**	Indian ethos and Human values	OEC	3	0	0	3	3
4	**22LS7404**	Financial independence and management	OEC	3	0	0	3	3
5	**22LS7405**	Yoga for Human Excellence	OEC	3	0	0	3	3
6	**22LS7406**	Democracy and Good Governance	OEC	3	0	0	3	3
7	**22LS7407**	NCC Level - II	OEC	3	0	0	3	3

PROFESSIONAL ELECTIVE COURSES: VERTICALS

Vertical I Aerospace Structures & Materials	Vertical II Aerodynamics	Vertical III Propulsion	Vertical IV Avionics and Drone Technology	Vertical V Aircraft Maintenance	Vertical VI Advanced Manufacturing Technology
22AE5301 Theory of Elasticity	22AE5304 Wind Tunnel Techniques	22AE5307 Advanced Propulsion System	22AE5310 Control Engineering	22AE5313 Airframe Maintenance and Repair	22AE5316 Manufacturing Technology
22AE5302 Experimental Stress Analysis	22AE5305 Boundary layer Theory	22AE5308 Heat Transfer	22AE5311 Microprocessor and Applications	22AE5314 Civil Aviation Regulations	22AE5317 Lean Manufacturing
22AE5303 Composite Materials and Structures	22AE5306 Helicopter Aerodynamics	22AE5309 Combustion in Aerospace Engineering	22AE5312 Aerodynamics of Drones	22AE5315 Aircraft Engine Maintenance and Repair	22AE5318 Additive Manufacturing and Tooling
22AE6301 Finite Element Methods	22AE6303 Industrial Aerodynamics	22AE6305 Rocket and Missiles	22AE6307 Navigation and Communication systems	22AE6309 Air Traffic Control and Airport Planning	22AE6311 Industrial Design & Rapid Prototyping Techniques

22AE6302 Vibration and Aeroelasticity	22AE6304 Hypersonic Aerodynamics	22AE6306 Introduction to Cryogenics	22AE6308 Design of UAV Systems	22AE6310 Aviation management and Air Safety Engineering	22AE6312 Non-Destructive Testing
22AE7301 Fatigue and Fracture Mechanics	22AE7302 Computational Fluid Dynamics	22AE7303 Satellite Technology	22AE7304 Aerospace Guidance and Control	22AE7305 Engine Systems and Control	22AE7306 Integrated Product Development

Students are permitted to choose all Professional Electives from a particular vertical or from different verticals.

PROFESSIONAL ELECTIVE COURSES: VERTICALS

Details of Vertical I: Aerospace Structures & Materials

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	**22AE5301**	Theory of Elasticity	PEC	3	0	0	3	3
2.	**22AE5302**	Experimental Stress Analysis	PEC	3	0	0	3	3
3.	**22AE5303**	Composite Materials and Structures	PEC	3	0	0	3	3
4.	**22AE6301**	Finite Element Methods	PEC	3	0	0	3	3
5.	**22AE6302**	Vibration and Aeroelasticity	PEC	3	0	0	3	3
6.	**22AE7301**	Fatigue and Fracture Mechanics	PEC	3	0	0	3	3

Details of Vertical II: Aerodynamics

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	**22AE5304**	Wind Tunnel Techniques	PEC	3	0	0	3	3
2.	**22AE5305**	Boundary layer Theory	PEC	3	0	0	3	3
3.	**22AE5306**	Helicopter Aerodynamics	PEC	3	0	0	3	3
4.	**22AE6303**	Industrial Aerodynamics	PEC	3	0	0	3	3
5.	**22AE6304**	Hypersonic Aerodynamics	PEC	3	0	0	3	3
6.	**22AE7302**	Computational Fluid Dynamics	PEC	3	0	0	3	3

Details of Vertical III: Propulsion

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	**22AE5307**	Advanced Propulsion System	PEC	3	0	0	3	3

2.	**22AE5308**	Heat Transfer	PEC	3	0	0	3	3
3.	**22AE5309**	Combustion in Aerospace Engineering	PEC	3	0	0	3	3
4.	**22AE6305**	Rocket and Missiles	PEC	3	0	0	3	3
5.	**22AE6306**	Introduction to Cryogenics	PEC	3	0	0	3	3
6.	**22AE7303**	Satellite Technology	PEC	3	0	0	3	3

Details of Vertical IV: Avionics and Drone Technology

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	**22AE5310**	Control Engineering	PEC	3	0	0	3	3
2.	**22AE5311**	Microprocessor and Applications	PEC	3	0	0	3	3
3.	**22AE5312**	Aerodynamics of Drones	PEC	3	0	0	3	3
4.	**22AE6307**	Navigation and Communication systems	PEC	3	0	0	3	3
5.	**22AE6308**	Design of UAV Systems	PEC	3	0	0	3	3
6.	**22AE7304**	Aerospace Guidance and Control	PEC	3	0	0	3	3

Details of Vertical V: Aircraft Maintenance

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	**22AE5313**	Airframe Maintenance and Repair	PEC	3	0	0	3	3
2.	**22AE5314**	Civil Aviation Regulations	PEC	3	0	0	3	3
3.	**22AE5315**	Aircraft Engine Maintenance and Repair	PEC	3	0	0	3	3
4.	**22AE6309**	Air Traffic Control and Airport Planning	PEC	3	0	0	3	3
5.	**22AE6310**	Aviation management and Air Safety Engineering	PEC	3	0	0	3	3
6.	**22AE7305**	Engine Systems and Control	PEC	3	0	0	3	3

Details of Vertical VI: Advanced Manufacturing Technology

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	**22AE5316**	Manufacturing Technology	PEC	3	0	0	3	3
2.	**22AE5317**	Lean Manufacturing	PEC	3	0	0	3	3
3.	**22AE5318**	Additive Manufacturing and Tooling	PEC	3	0	0	3	3

4.	**22AE6311**	Industrial Design & Rapid Prototyping Techniques	PEC	3	0	0	3	3
5.	**22AE6312**	Non-Destructive Testing	PEC	3	0	0	3	3
6.	**22AE7306**	Integrated Product Development	PEC	3	0	0	3	3

Enrollment for B.E. / B. TECH. (HONOURS) / Minor Degree (optional)

A student can also optionally register for additional courses (18 credits) and become eligible for the award of B.E. / B. Tech. (Honours) or Minor Degree. For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from semester V onwards. These courses shall be from the same vertical or a combination of different verticals of the same programme of study only. For minor degree, a student shall register for the additional courses (18 credits) from semester V onwards. All these courses have to be in a particular vertical from any one of the other programmes.

Clause 4.10 of Regulation 2022 is applicable for the Enrolment of B.E. / B. TECH. (HONOURS) / Minor Degree (Optional).

VERTICALS FOR MINOR DEGREE

- Heads are requested to provide one vertical from their program to offer for other program students to register for additional courses (18 Credits) to become eligible for the B.E./B.Tech. Minor Degree.
  Note: Each programme should provide verticals for minor degree

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	**22AE5231**	Sem 5: Fundamentals of Aeronautics	MDC	3	0	0	3	3
2.	**22AE6231**	Sem 6: Aircraft Systems and Instruments	MDC	3	0	0	3	3
3.	**22AE6232**	Sem6: Aircraft Materials and Processes	MDC	3	0	0	3	3
4.	**22AE7231**	Sem 7: Aircraft General Maintenance	MDC	3	0	0	3	3
5.	**22AE7232**	Sem 7: Introduction to Unmanned Aerial Vehicle Systems	MDC	3	0	0	3	3
6.	**22AE8231**	Sem 8: Introduction to Space Vehicles	MDC	3	0	0	3	3

*MDC – Minor Degree Course

In addition to the above the following additional courses for Minor Degree can also be given to the student's common to all the branches.

Vertical I **Fintech and Block Chain**	**Vertical II** **Entrepreneurship**	**Vertical III** **Environment and Sustainability**
Financial Management	Foundation of Entrepreneurship	Sustainable infrastructure Development
Fundamentals of Investment	Introduction to Business Venture	Sustainable Agriculture and Environmental Management
Banking, Financial Services and Insurance	Team Building & Leadership Management for Business	Sustainable Bio Materials
Introduction to Blockchain and its Applications	Creativity & Innovation in Entrepreneurship	Materials for Energy Sustainability
Fintech Personal Finance and Payments	Principles of Marketing Management for Business	Green Technology

Introduction to Fintech	Human Resource Management for Entrepreneurs	Environmental Quality Monitoring and Analysis
	Financing New Business Ventures	

B.E. (Hons) Aeronautical Engineering with Specialization in Space Technology

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	**22AE5203**	Sem 5: Space Flight Mechanics	PC	3	0	0	3	3	40	60	100
2.	**22AE6202**	Sem 6: Space Propulsion Systems	PC	3	0	0	3	3	40	60	100
3.	**22AE6203**	Sem 6: Heat Transfer in Aerospace Applications	PC	3	0	0	3	3	40	60	100
4.	**22AE7202**	Sem 7: Missiles Guidance and Control	PC	3	0	0	3	3	40	60	100
5.	**22AE7203**	Sem 7: Satellite attitude dynamics and control	PC	3	0	0	3	3	40	60	100
6.	**22AE8201**	Sem 8: Electrical Propulsion	PC	3	0	0	3	3	40	60	100

B.E. (Hons) Aeronautical Engineering with Specialization in Applied Aerodynamics

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	**22AE5204**	Sem 5: Wind Engineering	PC	3	0	0	3	3	40	60	100
2.	**22AE6204**	Sem 6: Experimental methods in fluid mechanics	PC	3	0	0	3	3	40	60	100
3.	**22AE6205**	Sem 6: Introduction to turbulence	PC	3	0	0	3	3	40	60	100
4.	**22AE7204**	Sem 7: Space Vehicle Aerodynamics	PC	3	0	0	3	3	40	60	100
5.	**22AE7205**	Sem 7: Computational Heat Transfer and fluid flow	PC	3	0	0	3	3	40	60	100
6.	**22AE8202**	Sem 8: Aviation innovation and biomimicry	PC	3	0	0	3	3	40	60	100

Note: Each programme should provide verticals for Honours degree

SEMESTER-WISE CREDIT DISTRIBUTION

B.E. / B.TECH. PROGRAMMES										
S.No.	**Course Area**	**Credits per Semester**								**Total Credits**
		I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	
1	HSC	3	3	-	2	-	3	-	-	**11**
2	BSC	7	9	4	3	-	-	-	-	**23**
3	ESC	6	7	2	-	-	-	-	-	**15**
4	PCC	-	-	16	18	11	7	9	-	**61**
5	PEC	-	-	-	-	9	6	3	-	**18**
6	OEC	-	-	-	-	-	6	6	-	**12**
7	EEC	3	3	3	1	1	2	2	10	**25**
8	MCC	✓	✓	-	-	-	-	-	-	-
Total		**19**	**22**	**25**	**24**	**21**	**24**	**20**	**10**	**165**

Credit Distribution R2022

Semester	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**Total**
Credits	19	22	25	24	21	24	20	10	**165**

Chairman, Board of Studies

Dean – Academics

PRINCIPAL

Chairman - BoS
AERO - HiCET

Dean (Academics)
HiCET

HINDUSTHAN COLLEGE OF ENGINEERING & TECHNOLOGY ACADEMIC COUNCIL Chairman

Syllabus

I-Semester

R-2022

Programme	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech	**22MA1101**	**MATRICES AND CALCULUS (Common to all Branches)**	3	1	0	4

Course Objective

The learner should be able to

1. Construct the characteristic polynomial of a matrix and use it to identify eigen values and Eigenvectors
2. Impart the knowledge of sequences and series.
3. Analyseanddiscussthemaximaandminimaofthefunctionsofseveralvariables.
4. Evaluate the multiple integrals and apply in solving problems.
5. Apply vector differential operator for vector function and theorems to solve engineering problems.

Unit	Description	Instructional Hours
I	**Matrices** Eigen values and Eigen vectors – Properties of Eigen values and Eigen vectors (without proof) - Cayley - Hamilton Theorem (excluding proof) - Reduction of a quadratic form to canonical form by orthogonal transformation.	12
II	**Single Variate Calculus** Rolle's Theorem–Lagrange's Mean Value Theorem-Maxima and Minima–Taylor's and Maclaurin's Series.	12
III	**Functions of Several Variables** Partial derivatives-Total derivative, Jacobian, Maxima, minima and saddle points; Method of Lagrange multipliers	12
IV	**Integral Calculus** Double integrals in Cartesian coordinates–Area enclosed by plane curves (excluding surface area)– Triple integrals in Cartesian co-ordinates – Volume of solids (Sphere, Ellipsoid , Tetrahedron) using Cartesian co-ordinates.	12
V	**Vector Calculus** Gradient, divergence and curl; Green's theorem, Stoke's and Gauss divergence theorem (statement only) for cubes only.	12
	Total Instructional Hours	**60**

Course Outcome

At the end of the course, the learner will be able to

CO1: Compute Eigen values and Eigen vectors of the given matrix and transform given quadratic form into canonical form.

CO2: Apply the concept of differentiation to identify the maximum and minimum values of curve.

CO3: Compute partial derivatives of function of several variables and write Taylor's series for functions with two variables.

CO4: Evaluate multiple integral and its applications in finding area, volume.

CO5: Apply the concept of vector calculus in two and three dimensional spaces.

TEXTBOOKS:

T1:G.B.ThomasandR.L.Finney,"CalculusandAnalyticalGeometry",9th EditionAddisonWesleyPublishing Company,2016.

T2:ErwinKreyszig,"AdvancedEngineeringMathematics",JohnWiley&Sons,2019.

T3:K.P.UmaandS.Padma,"EngineeringMathematicsI(MatricesandCalculus) ",PearsonLtd,2022.

REFERENCEBOOKS:

R1-JerroldE.Marsden,AnthonyTromba,"VectorCalculus",W.H.Freeman,2003

R2-StraussM.J,G.L.BradleyandK.J.Smith,"Multivariablecalculus",PrenticeHall,2002.

R3-VeerarajanT,"EngineeringMathematics",McGrawHillEducation(India)PvtLtd,NewDelhi,2016.

Chairman - BoS
AERO - HiCET

ACADEMIC COUNCIL Chairman

Dean (Academics)
HiCET

rogramme	Course Code	Name of the Course	L	T	P	C
BE/B.Tech	22PH1151	**PHYSICS FOR NON- CIRCUIT ENGINEERING** I – SEM (AERO,AUTO,AGRI,CHEM,CIVIL,MECH,MCT &FT)	2	0	2	3

The student should be able to

Course Objective

1.Gain knowledge about laser, their applications , become Conversant with principles of optical fiber, types and applications of optical fiber
2. Enhance his fundamental knowledge about properties of matter
3.Understand the concept of Wave optics
4. Gain knowledge about Quantum Physics.
5. Acquire fundamental knowledge of thermal physics which is related to the engineering program

Unit	Description	Instructional Hours
I	**LASER AND FIBRE OPTICS** Spontaneous emission and stimulated emission –Type of lasers – Nd:YAG laser - Laser Applications – Holography – Construction and reconstruction of images. Principle and propagation of light through optical fibers – Derivation of numerical aperture and acceptance angle – Classification of optical fibers (based on refractive index and modes) – Fiber optical communication link. **Determination of Wavelength and particle size using Laser**	6
II	**PROPERTIES OF MATTER** Elasticity – Hooke's law – Poisson's ratio – Bending moment – Depression of a cantilever – Deteremination of Young's modulus of the material of the beam by Uniform bending theory and experiment. Twisting couple - torsion pendulum: theory and experiment **Determination of Young's modulus by uniform bending method** **Determination of Rigidity modulus – Torsion pendulum**	6
III	**WAVE OPTICS** Interference of light – air wedge –Thickness of thin paper -Testing of thickness of surface-Michelson interferometer. Diffraction of light –Fraunhofer diffraction at single slit –Diffraction grating – Rayleigh's criterion of resolution power - resolving power of grating. **Determination of wavelength of mercury spectrum – spectrometer grating** **Determination of thickness of a thin wire – Air wedge method**	6
IV	**QUANTUM PHYSICS** Black body radiation –Compton effect: theory and experimental verification – wave particle duality –concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box .	6
V	**THERMAL PHYSICS** Transfer of heat energy –thermal conduction, convection and radiation – thermal conductivity - Lee's disc method: theory and experiment - conduction through compound media (series and parallel) – applications: solar water heaters.	6
	Total Instructional Hours	30
	Total Lab Instructional Hours	30

After completion of the course the learner will be able to

Course Outcome

CO1: Understand the advanced technology of LASER and optical communication in the field of Engineering
CO2: Illustrate the fundamental properties of matter
CO3: Discuss the Oscillatory motions of particles
CO4: Understand the advanced technology of Quantum Physics in the field of Engineering
CO5: Develop the technology of thermal physics in engineering field

TEXT BOOKS:

T1 - Rajendran V, Applied Physics, Tata McGraw Hill Publishing Company Limited, New Delhi, 2017.
T2- Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, Dhanpat Rai Publications (P) Ltd., New Delhi, 2015.

REFERENCE BOOKS:

R1 - M.N Avadhanulu and PG Kshirsagar "A Text Book of Engineering physics" S. Chand and Company ltd., New Delhi 2016
R2 - Dr. G. Senthilkumar "Engineering Physics – I" VRB publishers Pvt Ltd., 2021

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B.E./B.Tech/ I	22HE1151	ENGLISH FOR ENGINEERS (Common to all Branches)	L2	T0	P2	C3

The student should be able

Course Objective

1. To improve the communicative proficiency of learners.
2. To help learners use language effectively in professional writing.
3. To advance the skills of maintaining the suitable one of communication.
4. To introduce the professional life skills.
5. To impart official communication etiquette.

Unit	Description	Instructional Hours
I	**Language Proficiency:** Types of Sentences, Functional Units, Framing question. **Writing:** process description, Writing Checklist.**Vocabulary –** words on environment. **Practical Component: Listening**- Watching short videos and answer the questions, **Speaking**- Self introduction ,formal & semi-formal**,Reading**- Purpose of Reading - Churning & Assimilation, Interpreting Ideas - Interpreting Graphs in Technical Writing.	7+2
II	**Language Proficiency**: Tenses, Adjectives and adverbs. **Writing:** Formal letters (letters conveying positive and negative news), Formal and informal email writing (using emoticons, abbreviations& acronyms), reading comprehension**. Vocabulary–** words on entertainment. **Practical Component: Listening**-Comprehensions based on TED talks**Speaking-** Narrating a short story or an event happened in their life **Reading** - Skimming – Scanning – Reading: Scientific Texts – Literary Texts .	7+2
III	**Language Proficiency:** Prepositions, phrasal verbs. **Writing:** Formal thanks giving, Congratulating, warning and apologizing letters, cloze test. **Vocabulary –** words on tools.**PracticalComponent:Listening**-Listen to songs and answer the questions**Speaking**-Justaminute**Reading**- Reading feature articles (from newspapers and magazines) -Reading to identify point of view and perspective (opinion pieces, editorials etc.)	5+4
IV	**Language Proficiency:** Subject verb concord, Prefixes & suffixes. **Writing:**Preparing agenda &minutes, writing an event report. **Vocabulary–** words on engineering process. **Practical Component: Listening**- Comprehensions based on Talk of orators or interview shows **Speaking-**Presentation on a general topic with ppt. **Reading**- Reading Comprehension - Techniques for Good Comprehension - - Sequencing of Sentences.	5+4
V	**Language Proficiency:** Modal Auxiliaries, Active & passive voice, **Writing:** Project report (proposal & progress) ,sequencing of sentences **Vocabulary –**words on engineering material**Practical Component: Listening**- Listening- Comprehensions based on Nat Geo/Discovery channel videos **Speaking-** Preparing posters and presenting as a team.**Reading**- Biographies,travelogues,technical blogs.	6+3
	Total Instructional Hours	**45**

After completion of the course the learner will be able

Course Outcome

CO1:Tocommunicateinaprofessional forum
CO2:Tospeakorwriteacontentintheproficientlanguage
CO3: To maintain and use appropriate one of the communication.
CO4:To read ,write and present in a professional way.
CO5:To follow the etiquettes in formal communication.

TEXTBOOKS:

T1- Norman Whitby, "Business Benchmark-Pre-intermediate to Intermediate", Cambridge University Press,2016.T2- Raymond Murphy, "Essential English Grammar", Cambridge UniversityPress,2019.

REFERENCEBOOKS:

R1- Meenakshi Raman and Sangeetha Sharma. "Technical Communication- Principles and Practice", Oxford University Press, 2009.

R2-RaymondMurphy, "English GrammarinUse"-4th editionCambridgeUniversityPress,2004.

R3-KamaleshSadanan"AFoundationCoursefortheSpeakersofTamil-Part-I&II",Orient Blackswan,2010.

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Programme	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech	22ME1201	**ENGINEERING DRAWING (AGRI, BME, (CHEM,,AERO, AUTO, CIVIL,MECH, MECT,FT,EEE)**	1	4	0	3

Course Objective

1. To gain the knowledge of Engineer's language of expressing complete details about objects and construction of conics and special curves.
2. To learn about the orthogonal projections of straight lines and planes.
3. To acquire the knowledge of projections of simple solid objects in plan and elevation.
4. To learn about the projection of sections of solids and development of surfaces.
5. To study the isometric projections of different objects.

Unit	Description	Instructional Hours
I	**PLANE CURVES** Importance of engineering drawing; drafting instruments; drawing sheets – layout and folding; Lettering and dimensioning, BIS standards, scales.Geometrical constructions, Engineering Curves Conic sections –Construction of ellipse, parabolaand hyperbola by eccentricity method. Construction of cycloids and involutes of square and circle – Drawing of tangents and normal to the above curves.	12
II	**PROJECTIONS OF POINTS, LINES AND PLANE SURFACES** Introduction to Orthographic projections- Projection of points. Projection of straight lines inclinedto both the planes, Determination of true lengths and true inclinations by rotating line method. Projection of planes (polygonal and circular surfaces) inclined to both the planes by rotating object method (First angle projections only).	12
III	**PROJECTIONS OF SOLIDS** Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is perpendicular and inclined to one plane by rotating object method.	12
IV	**SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES** Sectioning of simple solids with their axis in vertical position when the cutting plane is inclined toone of the principal planes and perpendicular to the other – Obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids, cylinder and cone. Development of lateral surfaces of truncated solids.	12
V	**ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS** Isometric views and projections simple and truncated solids such as - Prisms, pyramids,cylinders, cones- combination of two solid objects in simple vertical positions.Free hand sketching of multiple views from a pictorial drawing. Basics of drafting using AutoCAD software.	12
	Total Instructional Hours	**60**

Course Outcome

CO1: Understand and interpret the engineering drawings in order to visualize the objects and draw the conics and special curves.
CO2: Draw the orthogonal projections of straight lines and planes.
CO3: Interpret the projections of simple solid objects in plan and elevation.
CO4: Draw the projections of section of solids and development of surfaces of solids.
CO5: Draw the isometric projections and the perspective views of different objects.

TEXT BOOK:

T1. K.Venugopal, V.Prabu Raja, "Engineering Drawing, AutoCAD, Building Drawings", 5thedition New Age International Publishers, New Delhi 2016.
T2. K.V.Natarajan, "A textbook of Engineering Graphics", Dhanlaksmi Publishers, Chennai 2016.

REFERENCES:

R1. BasantAgrawal and C.M.Agrawal, "Engineering Drawing", Tata McGraw Hill Publishing company Limited, New Delhi,2013.
R2. N.S. Parthasarathy, Vela Murali, "Engineering Drawing", Oxford University PRESS, India 2015.

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Programme	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech	22IT1151	PYTHON PROGRAMMING AND PRACTICES AGRI, CHEM,FT,AERO, AUTO, CIVIL,MECH, MECT,ECE,BME)	2	0	2	3

Course Objective	**The learner should be able** 1. To know the basics of algorithmic problem solving 2. To read and write simple Python programs 3. To develop Python programs with conditionals and loops and to define Python functions and call them 4. To use Python data structures –- lists, tuples, dictionaries 5. To do input/output with files in Python

Unit	Description	Instructional Hours
I	**ALGORITHMIC PROBLEM SOLVING** Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). **Illustrative problems: To find the Greatest Common Divisor (GCD)oftwo numbers, Fahrenheit to Celsius, Perform Matrix addition.**	5+4
II	**DATA, STATEMENTS,CONTROL FLOW** Data Types, Operators and precedence of operators, expressions, statements, comments; Conditionals: Boolean values and operators, conditional (if), alternative (if -else), chained conditional (if –elif-else); Iteration: state, while, for, break, continue, pass; **Simple algorithms and programs: Area of the circle, check the given year is Leap year or not, Factorial of a Number.**	5+4
III	**FUNCTIONS, STRINGS** Functions, parameters and arguments; Fruitful functions: return values, local and global scope, function composition, recursive functions. Strings: string slices, immutability, string functions and methods, string module. **Illustrative programs: Perform Linear Search, Selection sort, Sum of all elements in a List, Pattern Programs**	5+4
IV	**LISTS, TUPLES, DICTIONARIES** Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, listparameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations andmethods; advanced list processing - list comprehension. **Illustrative programs: List Manipulation, Finding Maximum in a List, String processing.**	5+4
V	**FILES, MODULES, PACKAGES** Files and exception: text files, reading and writing files, errors and exceptions, handling exceptions, modules, packages **Illustrative programs: Reading writing in a file, word count, Handling Exceptions**	9
	Total Instructional Hours	**45**

Course Outcome	At the end of the course, the learner will be able to CO1: Develop algorithmic solutions to simple computational problems CO2: Read, write, execute by hand simple Python programs CO3: Structure simple Python programs for solving problems and Decompose a Python program into functions CO4: Represent compound data using Python lists, tuples, dictionaries CO5: Read and write data from/to files in Python Programs.

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TEXT BOOKS:

T1: Guido van Rossum and Fred L. Drake Jr, An Introduction to Python – Revised and updated for Python 3.6.2, Shroff Publishers, First edition (2017).

T2:S. Annadurai, S.Shankar, I.Jasmine, M.Revathi, Fundamentals of Python Programming, Mc-Graw Hill Education (India) Private Ltd, 2019.

REFERENCE BOOKS:

R1:CharlesDierbach, ―Introduction to Computer Science using Python: A Computational Problem- Solving Focus, Wiley India Edition,2013.

R2:Timothy A. Budd, ―Exploring Python‖, Mc-Graw Hill Education (India) Private Ltd., 2015

R3:Robert Sedgewick, Kevin Wayne, Robert Dondero, ―Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson

India Education Services Pvt. Ltd., 2016

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Programme	Course Code	Name of the Course	L	T	P	C
B.E./ B.Tech/	**22HE1095**	**UNIVERSAL HUMAN VALUES** (COMMON TO ALL BRANCHES)	2	0	0	0

Course Objectives

1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. TofacilitatethedevelopmentofaHolisticperspectiveamongstudentstowardslifeandprofession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3. To highlight plausible implication s of such a Holistic understanding Interms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

Unit	Description	Instructional Hours
I	**Introduction to Value Education** Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)-Understanding Value Education - Self-exploration as the Process for Value Education - Continuous Happiness and Prosperity – the Basic Human Aspirations - Happiness and Prosperity – Current Scenario - Method to Fulfill the Basic Human Aspirations	6
II	**Harmony in the Human Being and Harmony in the Family** Understanding Human being as the Co-existence of the Self and the Body - Distinguishing between the Needs of the Self and the Body - The Body as an Instrument of the Self - Understanding Harmony in the Self- Harmony of the Self with the Body - Programme to ensure self-regulation and Health	6
III	**Harmony in the Family and Society** Harmony in the Family – the Basic Unit of Human Interaction.Values in Human to Human Relationship'Trust' – the Foundational Value in Relationship Values in Human to Human Relationship'Respect' – as the RightEvaluation Understanding Harmony in the Society	6
IV	**Harmony in the Nature / Existence** Understanding Harmony in the Nature.Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature- Understanding Existence as Co-existence of mutually interacting units in all pervasivespace Realizing Existence as Co-existence at All Levels The Holistic Perception of Harmony in Existence. Vision for the Universal Human Order	6
V	**Implications of the Holistic Understanding – a Look at Professional Ethics** Natural Acceptance of Human Values Definitiveness of (Ethical) Human Conduct A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order-Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical CaseStudiesStrategies for Transition towards Value-based Life and Profession	6
	Total Instructional Hours	**30**

Course Outcome

At the end of the course, the learner will be able

CO1: To become more aware of holistic vision of life - themselves and their surroundings.

CO2: To become more responsible in life, in the Society and in handling problems with sustainable Solutions.

CO3: To sensitive towards their commitment towards what they understood towards environment and Socially responsible behavior.

CO4: To able to apply what have learnt to their own self in different day-to-day settings in real life and In handling problems with sustainable solutions.

CO5: To develop competence and capabilities for maintaining Health and Hygiene.

Reference Books:

R1.A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

R2.Teachers'ManualforAFoundationCourseinHumanValuesandProfessionalEthics,RRGaur, R Asthana,G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93- 87034-53-2

R3.JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak,1999.

R4.Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

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rogramme	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech	22HE1072	**ENTREPRENEURSHIP & INNOVATION (Common for all Branches)**	1	0	0	1

Course Objectives

The student should be made

1. To acquire the knowledge and skills needed to manage the development of innovation.
2. To recognize and evaluate potential opportunities to monetize these innovations.
3. To plan specific and detailed method to exploit these opportunities.
4. To acquire the resources necessary to implement these plans.
5. To make students understand organizational performance and its importance.

Module	Description
1	**Entrepreneurial Thinking**
2	**Innovation Management**
3	**Design Thinking**
4	**Opportunity Spotting / Opportunity Evaluation**
5	**Industry and Market Research**
6	**Innovation Strategy and Business Models**
7	**Financial Forecasting**
8	**Business Plans/ Business Model Canvas**
9	**Entrepreneurial Finance**
10	**Pitching to Resources Providers / Pitch Deck**
11	**Negotiating Deals**
12	**New Venture Creation**
13	**Lean Start-ups**
14	**Entrepreneurial Ecosystem**
15	**Velocity Venture**
	TOTAL INSTRUCTIONAL HOURS **15**

Course Outcome

At the end of the course, the learner will be able to

CO1: Understandthenatureofbusinessopportunities,resources,andindustriesincriticalandcreative aspects.
CO2: Understand the processes by which innovation is fostered, managed, and commercialized.
CO3:Remember effectively and efficiently the potential of new business opportunities.
CO4:Assess the market potential for a new venture, including customer need, competitors, and industry attractiveness..
CO5:Developabusiness model for a new venture, including revenue. Margins, operations, Working capital, and investment

TEXTBOOKS

T1:AryaKumar"Entrepreneurship–CreatingandleadinganEntrepreneurialOrganization",Pearson,SecondEdition(2012).
T2:EmrahYayici"DesignThinkingMethodology", Artbiztech,FirstEdition(2016).

REFERENCEBOOKS

R1: Christopher Golis "Enterprise & Venture Capital", Allen &Unwin Publication, Fourth Edition (2007).
R2: ThomasLockWood&EdgerPapke"InnovationbyDesign",Career Press.com,SecondEdition(2017).
R3: Jonathan Wilson "Essentials of Business Research", Sage Publication, FirstEdition(2010).

WEBRESOURCES

W1:https://blof.forgeforward.in/tagged/startup-lessons
W2:https://blof.forgeforward.in/tagged/entrepreurship
W3:https://blof.forgeforward.in/tagged/minimum-viable-product
W4:https://blof.forgeforward.in/tagged/minimum-viable-product
W5:https://blof.forgeforward.in/tagged/innovation

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Programme	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech	22MC1094	**HERITAGE OF TAMIL**	2	0	0	0

The learner should be able to

Course Objective

1. Introduce students to the great History of Tamil literature.
2. Establish the heritage of various forms of Rock art and Sculpture art.
3. To study and understand the various folk and Martial arts of Tamil culture
4. Introduce students to Ancient Tamil concepts to understand the richness of Tamil literature.
5. To learn about the various influences or impacts of Tamil language in Indian culture.

Unit	Description	Instructional Hours
I	**Language and Literature** Language families in India – Dravidian Languages – Tamil as a classical language – Classical Literature in Tamil- Secular nature of Sangam Literature – Distributive justice in Sangam Literature – Management principles in Thirukural – Tamil epics and impacts of Buddhism & Jainism in Tamil and Bakthi literature of Azhwars and Nayanmars – Forms of minor poetry _ Development of Modern literature in Tamil – Contribution of Bharathiyar and Bharathidasan.	6
II	**Heritage _ Rock Art Paintings to Modern Art – Sculpture** Hero Stone to Modern Sculpture – Bronze icons – Tribes and their handcrafts - Art of temple car making – Massive Terracotta sculptures, Village deities, Thiruvalluvar statue at Kanyakumari, Making of musical instruments – Mridangam, Parai, Yazh and Nadhaswaram - Role of Temples in social and economic life of Tamils.	6
III	**Folk and Martial Arts** Therukoothu, Karagattem, Villupattu, Kaniyan koothu, Oyilattam, Leather puppertry, Silambattam., Valari Tiger dance – Sports and Games of Tamils.	6
IV	**Thinai Concept of Tamils** Flora and Fauna of Tamils – Aham and Puram Concept from Tholkappiyam and Sangam Literature – Aram concept of Tamils – Education and Literacy during Sangam Age - Ancient cities and ports of Sangam age – Exporot and Import during Sangam age – Overseas conquest of Cholas.	6
V	**Contribution of Tamils to Indian National Movement and Indian Culture** Contribution of Tamils to Indian freedom struggle – The cultural influence of Tamils over the other parts of India – Self respect movement – Role of Siddha Medicine in indigenous systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil books.	6
	Total Instructional Hours	**30**

At the end of the course, the learner will be able to

Course Outcome

CO1: Learn about the works pertaining to Sangam age
CO2: Aware of our Heritage in art from Stone sculpture to Modern Sculpture.
CO3Appreciate the role of Folk arts in preserving, sustaining and evolution of Tamil culture.
CO4: Appreciate the intricacies of Tamil literature that had existed in the past.
CO5: Understand the contribution of Tamil Literature to Indian Culture

TEXTBOOKS:

T1: Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
T2: Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
T3: Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu)(Published by: International Institute of Tamil Studies).

REFERENCEBOOKS:

R1-The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies)
R2- Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
R3-Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

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Programme	Course Code	Course Title	L	T	P	C
BE/BTECH	22HE1073	INTRODUCTION TO SOFT SKILLS	0	0	0	1

Course Objectives:

1. To develop and nurture the soft skills of the students through instruction, knowledge acquisition, demonstration and practice.
2. To enhance the students ability to deal with numerical and quantitative skills.
3. To identify the core skills associated with critical thinking.
4. To develop and integrate the use of English language skills.

Unit	Description	Instructional Hours
I	**Lessons on excellence** Skill introspection, Skill acquisition, consistent practice	2
II	**Logical Reasoning** Problem Solving - Critical Thinking- Lateral Thinking - Coding and Decoding – Series – Analogy - Odd Man Out - Visual Reasoning - Sudoku puzzles - Attention to detail	11
III	**Quantitative Aptitude** Addition and Subtraction of bigger numbers - Square and square roots - Cubes and cube roots - Vedic maths techniques - Multiplication Shortcuts - Multiplication of 3 and higher digit numbers – Simplifications - Comparing fractions - Shortcuts to find HCF and LCM - Divisibility tests shortcuts - Algebra and functions	11
IV	**Recruitment Essentials** Resume Building - Impression Management	2
V	**Verbal Ability** Nouns and Pronouns – Verbs - Subject-Verb Agreement - Pronoun-Antecedent – Agreement - Punctuations	4
	Total Instructional Hours	30

Course Outcome:

CO1:	Students will analyze interpersonal communication skills. public speaking skills.
CO2:	Students will exemplify tautology, contradiction and contingency by logical thinking.
CO3:	Students will be able to develop an appropriate integral form to solve all sorts of quantitative problems.
CO4:	Students can produce a resume that describes their education, skills, experiences and measurable achievements with proper grammar, format and brevity.
CO5:	Students will be developed to acquire the ability to use English language with an error while making optimum use of grammar.

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SUBJECT CODE – 22MC1093

GE3152 **தமிழர் மரபு** **L T P C**
1 0 0 1

அலகு I **மொழி மற்றும் இலக்கியம்:** **3**

இந்திய மொழிக் குடும்பங்கள் – திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி – தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை – சங்க இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மைக் கருத்துக்கள் – தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் – சிற்றிலக்கியங்கள் – தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு II **மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை:** **3**

நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள்– பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் – தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புறத் தெய்வங்கள் – குமரிமுனையில் திருவள்ளுவர் சிலை – இசைக் கருவிகள் – மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு III **நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்:** **3**

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

அலகு IV **தமிழர்களின் திணைக் கோட்பாடுகள்:** **3**

தமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக்கோட்பாடு – சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் – சங்ககால நகரங்களும் துறை முகங்களும் – சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு V **இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு:** **3**

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் – சுயமரியாதை இயக்கம் – இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு – கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

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1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

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Department of Aeronautical Engineering

Syllabus

III-Semester

R-2022

Programme	Course Code	Name of the Course	L	T	P	C
B.E	22MA3104	FOURIER ANALYSIS AND NUMERICAL TECHNIQUES (AUTO , AERO)	3	1	0	4

Course Objective

The learner should be able to

1. Analyze Fourier series which is central to many applications in engineering.
2. Apply the effective tools for the solutions of one and two dimensional boundary value problems.
3. Apply Fourier transform techniques in various situations.
4. Explain single and multi step methods to solve Ordinary differential equations
5. Describe various methods to solve ordinary differential equations and partial differential equations

Unit	Description	Instructional Hours
I	**FOURIER SERIES** Dirichlet's conditions- General Fourier Series – Odd and Even Functions – Half range sine and cosine series – Change of Interval - Parseval's Identity - Harmonic analysis.	12
II	**BOUNDARY VALUE PROBLEMS** Classification of PDE - Solutions of one dimensional wave equation - One dimensional equation of heat conduction (excluding insulated edges).Two dimensional heat equations-Steady state solution of two dimensional equation of heat conduction in infinite plate	12
III	**FOURIER TRANSFORMS** Fourier Transform Pairs - Fourier sine and cosine transforms – Properties - Transforms of Simple functions – Convolution Theorem (Statement only) – Parseval's identity (Statement only).	12
IV	**INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS** Single step methods for solving first order equations: Taylor's series method – Euler and Modified Euler methods – Fourth order Runge-kutta method -Multi step method: Milne's predictor and corrector method.	12
V	**BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS** Solution of second order ordinary differential equation by Finite difference method – Solution of partial differential equation: one dimensional heat equation by Bender schmidt method – One dimensional Wave equation by Explicit method– Laplace Equations and Poisson Equations.	12
	Total Instructional Hours	60

Course Outcome

At the end of the course, the learner will be able to

CO1: Understand the principles of Fourier series which helps them to solve physical problems of engineering.

CO2: Employ Fourier series in solving the boundary value problems.

CO3: Apply Fourier transform techniques which extend its applications.

CO4: Classify and solve ordinary differential equations by using single and multi step methods.

CO5: Illustrate various methods to find the solution of ordinary and partial differential equations.

TEXT BOOKS:

T1 - Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, Wiley India Private Ltd., New Delhi, 2018

T2 - Bali. N.P and Manish Goyal& Watkins, "Advanced Engineering Mathematics", 7th Edition, Laxmi Publications Pvt Ltd, 2007

REFERENCE BOOKS:

R1 - Veerarajan. T.,"Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd.,Second reprint, New Delhi, 2012.

R2 - Grewal B.S., "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, Delhi,2018.

R3 -Grewal B.S. and Grewal J.S. " Numerical Methods in Engineering and Science ", 6th Edition, Khanna publishers, New Delhi 2015.

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Programme	Course Code	Name of the Course	L	T	P	C
BE	22AE3201	**Elements of Aeronautics**	3	0	0	3

Course Objective

1. To introduce the history, concept of flying, aircraft components and materials.
2. To study about the various configurations, systems and instruments used in aircraft.
3. To understand the structure of atmosphere and concept of flight mechanics.
4. To impart the knowledge about various propulsion systems used in aircraft and rocket.
5. To comprehend the various structures and materials used in aircraft.

Unit	Description	Instructional Hours
I	**HISTORY AND INTRODUCTION OF FLIGHT** Balloon flight – ornithopters - Early Airplanes- Wright Brothers era-Biplanes and monoplanes, Developments in aerodynamics, materials, structures and propulsion over the years, Components of an Airplane and their functions - Introduction to rotorcraft - UAV and MAVs.	9
II	**AIRCRAFT CONFIGURATIONS** Different Types of Flight Vehicles - Conventional Systems – Power assisted and fully powered flight controls – Power actuated systems – Digital fly by wire systems - Engine control systems– Auto pilot system – Instrument Landing Systems - Basic Instruments for flying.	10
III	**BASICS OF FLIGHT MECHANICS** Physical properties and structure of the atmosphere- Temperature, pressure and altitude relationships- Newton's law of motions applied to aeronautics, Evolution of Lift, Drag and Moment- Airfoils characteristics and nomenclature-Mach Number, Maneuvers.	8
IV	**AIRCRAFT PROPULSION** Basic Ideas about piston engine and jet engines - working principle and basic components, Use of Propeller and Jets for Thrust Production, -Comparative Merits - Principles of Operation of Rocket - Types of Rocket and typical applications – exploration into space.	10
V	**AIRCRAFT STRUCTURES AND MATERIALS** General types of construction, Monocoque, semi-monocoque and geodesic constructions, typical wing and fuselage structure. Metallic and non-metallic materials. Use of Aluminium alloy, titanium, stainless steel and composite materials. Stresses and strains-Hooke's law- stress-strain diagrams-elastic constants-Factor of Safety.	8
	Total Instructional Hours	**45**

Course Outcome

CO1: Understand the functions of aircraft components.
CO2: Able to identify the types of flight vehicles and control systems.
CO3: Understand the basic concepts of flight mechanics.
CO4: Understand the working principle of various aircraft propulsion system.
CO5: Acquire the knowledge about various materials used for aircraft construction.

TEXT BOOKS:

T1 - Anderson, J.D., "Introduction to flight", 8th edition, McGraw Hill, 2016.
T2 - E Rathakrishnan, "Introduction to Aerospace Engineering: Basic Principles of Flight", JohnWiley, NJ, 2021

REFERENCE BOOKS:

R1 - Stephen.A. Brandt, Introduction to aeronautics: A design perspective, 2nd edition, AIAA Education Series, 2004.
R2 - Houghton, E.L., and Caruthers, N.B., "Aerodynamics for Engineering students", 5th edition, Butterworth-Heinemann Publishers, London, 2003.
R3 - A.C. Kermode, "Flight without formulae", Pearson education, 5th edition, 2011.

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Programme	Course Code	Name of the Course	L	T	P	C
BE	22AE3202	Solid Mechanics	3	0	0	3

Course Objective

1. To understand the behavior of structural members under axial loading conditions.
2. To sketch the Shear Force and bending moment diagram for beams with various loadings.
3. To calculate the deflections of the beams under various loading conditions.
4. To determine the stresses in shafts and springs.
5. To describe the behavior of materials due to axial, bending, torsional and combined loads.

Unit	Description	Instructional Hours
I	**INTRODUCTION** Definition of stress, strain and their relations – relations between material constants – axial loading - statically determinate and indeterminate problems in tension & compression.	9
II	**STRESSES IN BEAMS** Shear force & bending moment diagrams: bending and shear stress variation in beams of symmetric sections, beams of uniform strength	10
III	**DEFLECTION OF BEAMS** Double integration method – Macaulay's method – moment area method – conjugate beam method	9
IV	**TORSION – SPRINGS** Torsion of solid and hollow circular shafts – shear stress variation – open and closed-coiled helical springs – stresses in helical springs- deflection of helical springs.	9
V	**BIAXIAL STRESSES** Stresses in thin-walled pressure vessels – combined loading of circular shaft with bending, torsion and axial loadings – Mohr's circle and its construction – determination of principal stresses.	8
	Total Instructional Hours	**45**

Course Outcome

CO1: Ability to learn the behaviors of materials under axial loading conditions.
CO2: Ability to sketch the Shear Force and bending moment diagram for beams with various loadings.
CO3: Analyze the deflections of the beams under various loading conditions.
CO4: Evaluate the springs and to calculate the stresses in circular shafts.
CO5: Construct Mohr's circle for materials due to axial, bending, torsional and combined loads.

TEXT BOOKS:

T1 - William Nash, "Strength of Materials", Tata McGraw Hill, 6th edition, 2013.
T2 - Barry J. Goodno, James M. Gere, 'Mechanics of Materials,9th edition T.Van Nostrand Co. Inc., Princeton, N.J., 2017.

REFERENCE BOOKS:

R1 –R.K. Rajput., 'Strength of Materials', 6th edition. Lakshmi Publications., 2018.
R2 - Stephen Timoshenko, 'Strength of Materials', Vol I & II, CBS Publishers and Distributors, Third Edition, 2016.

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Programme	Course Code	Name of the Course	L	T	P	C
BE	22AE3251	Aero Engineering Thermodynamics	3	0	2	4

Course Objective

1. To understand the thermodynamic principles, basic concepts and laws of thermodynamics.
2. To impart the knowledge about reversible process and Carnot theorem.
3. To understand the thermodynamic cycles used for energy production.
4. To study the performance calculation of Refrigeration and Air-conditioning systems.
5. To understand the basic concepts of Aircraft Propulsion systems

Unit	Description	Instructional Hours
I	**FIRST LAW OF THERMODYNAMICS** Concept of continuum, macroscopic approach, thermodynamic systems - closed, open and isolated. Property, State, Path and Process, Quasi-static Process, Work, modes of work, Zeroth law of thermodynamics - concept of temperature and heat, internal energy, specific heat capacities, enthalpy - concept of ideal and real gases. First law of thermodynamics - applications to closed and open systems - steady flow processes with references to various thermal equipment	10
II	**SECOND LAW OF THERMODYNAMICS AND ENTROPY** Second law of thermodynamics - Kelvin Planck and Clausius statements of second law. Reversibility and Irreversibility –Exergy - Carnot theorem, Carnot cycle efficiency - Clausius inequality, concept of entropy, Entropy change for various processes.	9
III	**AIR STANDARD CYCLES** Otto, Diesel, Dual and Brayton cycles - air standard efficiency - mean effective pressure, Actual and theoretical PV diagrams of Four stroke and Two stroke IC engines - **Valve timing of a Four stroke engine and port timing of a two stroke engine.**	12+2(P)
IV	**VAPOUR POWER CYCLES** Standard Rankine cycle – efficiency - Reversed Carnot cycle – Principles of refrigeration and Air conditioning- Tonne of refrigeration. -Vapor compression cycle - Vapor absorption cycle - Properties of refrigerants - Coefficient of performance - **Test on a vapor compression refrigeration test rig - Test on a vapor compression air-conditioning test rig**	10+4(P)
V	**BASICS OF PROPULSION** Classification of jet engines - simple jet propulsion system – Gaseous equations- thrust equation - specific impulse – fundamentals of rocket propulsion. Theoretical (Stoichiometric) air for combustion of fuels. Excess air, mass balance, Exhaust gas analysis, A/F ratio. **Determination of thermal conductivity of solid - Determination of thermal resistance of a composite wall**	9+4(P)
	Total Instructional Hours	**60 hours**

Course Outcome

CO1: Apply the thermodynamic principles to various thermal equipment.
CO2: Acquire the knowledge about Carnot theorem and reversibility.
CO3: Ability to interpret the various thermodynamic cycles used for energy production and analyze the performance of thermodynamic cycles.
CO4: Ability to determine the performance of Refrigeration and Air-conditioning systems
CO5: Understand the various aircraft propulsion systems.

TEXT BOOKS:

T1 - Nag.P.K., "Engineering Thermodynamics", Tata McGraw-Hill, New Delhi, 6th Edition 2017
T2 - Rathakrishnan E., "Fundamentals of Engineering Thermodynamics", Prentice-Hall India, 2005.

REFERENCE BOOKS:

R1 - Ramalingam K.K. "Thermodynamics", Sci-Tech Publications, 2006
R2 – Yunus A.Cengal."Thermodynamics an Engineering Approach", Tata McGraw-Hill Co.Ltd.,8th Edition, 2017.

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Programme	Course Code	Name of the Course	L	T	P	C
B.E	22 AE3252	Engineering Fluid Mechanics	3	0	2	4

Course Objective

1. To familiarize with the fluid properties and flow characteristics
2. To understand the importance of conservation laws to flow through circular conduits.
3. To comprehend the importance of dimensional analysis
4. To examine the performance of Pumps
5. To examine the performance of Turbines

UNIT I FLUID PROPERTIES AND FLOW CHARACTERISTICS 11 + 2(P)

Properties of fluids – Fluid statics - Pressure Measurements - Buoyancy and floatation - Flow characteristics - Eulerian and Lagrangian approach - Concept of control volume and system - Reynold's transportation theorem - Continuity equation, energy equation and momentum equation - Applications.

Determination of the Coefficient of discharge using venturi meter

UNIT II FLOW THROUGH PIPES AND BOUNDARY LAYER 11 + 4(P)

Incompressible Fluid Flow- Viscous flow - Reynold's Experiment - Laminar flow through circular conduits - Darcy Weisbach equation – friction factor - Moody diagram - Major and minor losses - Hydraulic and energy gradient lines - Pipes in series and parallel - Boundary layer concepts - Types of boundary layer thickness.

Calculation of rate of flow using water meter and rotameter

Determination of friction factor for a given set of pipes

UNIT III DIMENSIONAL ANALYSIS AND MODEL STUDIES 8

Fundamental dimensions - Dimensional homogeneity - Rayleigh's method and Buckingham Pi theorem - Dimensionless parameters - Similitude and model studies - Distorted and undistorted models.

UNIT IV TURBINES 10 + 2(P)

Impact of jets - Velocity triangles - Theory of rotodynamic machines - Classification of turbines - Working principles - Pelton wheel - Modern Francis turbine - Kaplan turbine - Work done - Efficiencies - Draft tube - Specific speed - Performance curves for turbines - Governing of turbines.

Conducting experiments and drawing the characteristics curves for the given turbines

UNIT V PUMPS 10 + 2(P)

Classification of pumps - Centrifugal pumps - Working principle - Heads and efficiencies– Velocity triangles - Work done by the impeller - Performance curves - Reciprocating pump working principle - Indicator diagram and its variations - Work saved by fitting air vessels - Rotary pumps.

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Conducting experiments and drawing the characteristics curves for the centrifugal pump

Course Outcome	CO1: Apply mathematical knowledge to predict the properties and characteristics of a fluid. CO2: Capacity in working with the conservative laws and flow through circular conduits CO3: Proficiency in Dimensional Analysis CO4: Capability to analyze the performance of pumps CO5: Ability to evaluate the performance of turbines

TEXT BOOKS:

1. Modi P.N. and Seth, S.M. Hydraulics and Fluid Mechanics, Standard Book House, New Delhi, 22nd edition (2019)
2. Jain A. K. Fluid Mechanics including Hydraulic Machines, Khanna Publishers, New Delhi, 2014.
3. Kumar K. L., Engineering Fluid Mechanics, Eurasia Publishing House(p) Ltd. New Delhi, 2016.

REFERENCES:

1. Fox W.R. and McDonald A.T., Introduction to Fluid Mechanics John-Wiley and Sons, Singapore, 2011.
2. Pani B S, Fluid Mechanics: A Concise Introduction, Prentice Hall of India Private Ltd, 2016.
3. Cengel Y A and Cimbala J M, Fluid Mechanics, McGraw Hill Education Pvt. Ltd., 2014.
4. S K Som; Gautam Biswas and S Chakraborty, Introduction to Fluid Mechanics and Fluid Machines, Tata-McGraw Hill Education Pvt. Ltd., 2012.
5. Streeter, V. L. and Wylie E. B., Fluid Mechanics, McGraw Hill Publishing Co., 2010.

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Programme	Course Code	Name of the Course	L	T	P	C
BE	22AE3001	Strength of materials Laboratory	0	0	3	2

Course Objective

1. To enhance the basic knowledge on strength behavior of various materials.
2. To determine the compressive strength on helical springs and deflection of beams.

Expt. No.	Description of the Experiments
1.	Tension test on mild steel rod.
2.	Double shear test on mild steel and Aluminum rods.
3.	Torsion test on mild steel rod.
4.	Impact test on metal specimen.
5.	Hardness test on metals -Brinell and Rockwell Hardness Number
6.	Compression test on helical spring.
7.	Deflection of a simply supported beam and cantilever beam.
8.	Strain Measurement using Rosette strain gauge.
9.	Tempering- Improvement Mechanical properties Comparison (i) Unhardened specimen (ii) Quenched Specimen and (iii) Quenched and tempered specimen.
10.	Microscopic Examination of (i) Hardened samples and (ii) Hardened and tempered samples.
11.	Study of photoelsticity and DIC measurement techniques

Total Practical Hours;45

Course Outcome

CO1: Understand the structural behavior of various materials.
CO2: Able to experimentally evaluate the structural characteristics of helical spring and beams.

List of Equipment (for a batch of 30 students)

Sl. No.	Name of the Equipment	Qty.	Exp. No.
1.	400 kN Universal Testing Machine	1	1,2
2.	Torsion testing machine (60 NM capacity)	1	3
3.	Impact testing machine (300 J Capacity)	1	4
4.	Brinell Hardness testing machine	1	5
5.	Rockwell Hardness testing machine	1	5
6.	Spring Testing Machine for tensile and compressive loads (2500 N)	1	6
7.	Metallurgical Microscopes	3	5
8.	Beams with weight hangers and dial gauges	2	7
9.	Muffle Furnace (800° C)	1	9,10

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Programme	Course Code	Name of the Course	L T P C
B.E.	22AE3002	Aircraft Component Drawing Laboratory	0 0 3 1.5

Course Objective

1. To familiarize the knowledge of modelling software package and tools used.

2. To design and draft the different aircraft components and aircraft control system.

3. To introduce the knowledge on operations using CNC machine and 3D printing machine.

Expt. No. **Description of the Experiments**

1. Study of modeling softwares
2. Design and modeling of riveted and welded joints.
3. Design and modeling of truss and beam.
4. Design and modeling of various structural components of wing and fuselage.
5. Layout of Landing gear structure.
6. Layout of aircraft conventional control system components (cam, bell crank, push pull rod and gears)
7. Drafting three views of a typical aircraft
8. Design of engine cowl using sheet metal module.
9. Study of basic principles of geometric dimensioning and tolerance.
10. Study of CNC Machine and 3D printing machine.

Total Practical Hours 45

Course Outcome

CO1: Ability to identify the tools used in modelling software.

CO2: Ability to design various aircraft components and control systems.

CO3: Acquire the knowledge on operations using CNC machine and 3D printing machine.

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Programme	Course Code	Course Title	L	T	P	C
BE/BTECH	22HE3071	Soft Skills and Aptitude - II	0	0	0	1

Course Objectives:

1. Solve Logical Reasoning questions of easy to intermediate level
2. Solve Quantitative Aptitude questions of easy to intermediate level
3. Solve Verbal Ability questions of easy to intermediate level
4. Display good writing skills while dealing with essays

Unit	Description	Instructional Hours
I	**Logical Reasoning** Clocks - Calendars - Direction Sense - Cubes - Data Interpretation: Tables, Pie Chart, Bar Graph - Data Sufficiency	9
II	**Quantitative Aptitude** Time and work: Work with different efficiencies, Pipes and cisterns, Work equivalence, Division of wages - Time, Speed and Distance: Basics of time, speed and distance, Relative speed, Problems based on trains, Problems based on boats and streams, - Profit and loss, Basic terminologies in profit and loss - Averages - Weighted average	12
III	**Verbal Ability** Sentence Correction: Subject-Verb Agreement, Modifiers, Parallelism, Pronoun-Antecedent Agreement, Verb Time Sequences, Comparisons, Prepositions, Determiners - Sentence Completion and Para-jumbles: Pro-active thinking, Reactive thinking (signpost words, root words, prefix suffix, sentence structure clues), Fixed jumbles, Anchored jumbles.	7
IV	**Writing skills for placements** Essay writing: Idea generation for topics, Best practices, Practice and feedback	2
	Total Instructional Hours	30

Course Outcome:

CO1: Students will avoid the various fallacies that can arise through the misuse of logic.

CO2: Students would opt for alternate methods to solve the problems rather than conventional methods.

CO3: Students will heighten their awareness of correct usage of English grammar in writing and speaking

CO4: Students will be concise and clear, using professional language for placements.

REFERENCE BOOKS:

R1: A New Approach To Reasoning Verbal & Non-Verbal By B.S. Sijwali

R2: How to prepare for data interpretation for CAT by Arun Sharma.

R3: How to Crack TEST OF REASONING in all competitive examinations by Jaikishan and Premkishan.

R4: Quantitative Aptitude for Competitive Examinations - Dr. R.S. Aggarwal, S. Chand

R5: Word Power Made Easy by Norman Lewis

R:6 Six weeks to words of power by Wilfred Funk

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Programme	Course Code	Name of the Course	L	T	P	C
B.E.	22AE3072	INTRODUCTION TO MATLAB	0	0	3	2

Course objectives:

1. To learn features of MATLAB as a programming tool.
2. To promote new teaching model that will help to develop programming skills and technique to solve mathematical problems.
3. To understand MATLAB graphic feature and its applications.
4. To use MATLAB as a programming and simulation tool.
5. To understand the mathematical computing with MATLAB

Unit 1	**Introduction**	**7 hrs**
The MATLAB Environment-MATLAB Basics – Variables, Numbers, Operators, Expressions, Input and output-Vectors, Arrays – Matrices		
Unit 2	**MATLAB Functions**	**5 hrs**
Built-in Functions-User defined Functions		
Unit 3	**Graphics with MATLAB**	**5 hrs**
Files and File Management – Import/Export-Basic 2D, 3D plots-Graphic handling		
Unit 4	**Programming with MATLAB**	**7 hrs**
Conditional Statements, Loops-MATLAB Programs – Programming and Debugging-Applications of MATLAB Programming-Case study		
Unit 5	**Mathematical computing**	**6 hrs**
Algebraic equations-Basic Symbolic Calculus and Differential equations-Numerical Techniques and Transforms- Case study		

Course Outcome:

CO1: Ability to carry out basic functions in MATLAB.
CO2: Capable of Understanding the MATLAB functions.
CO3: Ability to perform graphic handling and File management.
CO4: Able to do programming with MATLAB software.
CO5: Ability to do mathematical computing with MATLAB.

References:

1. "A Guide to MATLAB - for Beginners and Experienced Users", 2nd Ed., Brian R. Hunt, Ronald L. Lipsman, Jonathan M. Rosenberg, Cambridge University Press, (2006).
2. "Essentials of MATLAB Programming", 2nd Ed., Stephen J. Chapman, Cengage Learning, (2009).
3. "MATLAB Demystified", David McMahon, The McGraw-Hill Companies, (2007).
4. "MATLAB® for Engineers", 3rd Ed., Holly Moore, Pearson Education, Inc., (2012).
5. "Engineering computation with MATLAB", 2nd Ed., David M. Smith, Pearson Education, Inc. (2010)

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PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E	22MC3191	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	2	0	0	0

Course Objective

1. *To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.*
2. *To make the students understand the traditional knowledge and analyze it and apply it to their day to day life.*
3. To impart basic principles of thought process, Itihas and Dharma Shastra and connecting society and nature.
4. To understand the concept of Intellectual and intellectual property rights with special Reference.
5. The course focuses on introduction to Indian Knowledge System, Indian perspective of modern scientific world-view and basic principles of Yoga and Indian philosophy.

Unit	Description	Instructional Hours
I	**Introduction to traditional knowledge:** Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, Indigenous Knowledge (IK), characteristics, traditional knowledge vs indigenous knowledge, traditional knowledge vs western knowledge	6
II	**Protection of traditional knowledge:** The need for protecting traditional knowledge, Significance of TK Protection, value of TK in global economy, Role of Government to harness TK	6
III	**Itihas and Dharma-Shastra** **Itihas:** The Mahabharata - The Puranas - The Ramayana **Dharma-Shastra**: Manu Needhi - The Tirukkural – Thiru Arutpa	6
IV	**Traditional knowledge and intellectual property:** Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge	6
V	**Indian philosophy** Jain – Buddhist – Charvaka – Samkhya - Yoga - Nyaya - Vaisheshika - Saiva Siddhanta	6

Course Outcome

1. *Identify the concept of Traditional knowledge and its importance.*
2. *Explain the need and importance of protecting traditional knowledge.*
3. Explain the need and importance of Itihas and Dharma Shastra.

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4. *Interpret the concepts of Intellectual property to protect the traditional knowledge.*
5. Interpret the concepts of indian philosophy to protect the traditional knowledge.

REFERENCES

1. Traditional Knowledge System in India, by Amit Jha, 2009.

2. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002.

3. "Knowledge Traditions and Practices of India" Kapil Kapoor1, Michel Danino2.

4. V. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014.

5. V N Jha (Eng. Trans,), Tarkasangraha of Annam Bhatta, Inernational Chinmay Foundation, Velliarnad, Amaku,am.

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Minor Degree course syllabus (V Semester)

Programme	Course Code	Name of the Course	L	T	P	C
BE	21AE5231	Fundamentals of Aeronautics	3	0	0	3

Course Objective

1. To introduce the history, concept of flying, aircraft components and materials.
2. To study about the various configurations, systems and instruments used in aircraft.
3. To understand the structure of atmosphere and concept of flight mechanics.
4. To impart the knowledge about various propulsion systems used in aircraft and rocket.
5. To comprehend the various structures and materials used in aircraft.

Unit	Description	Instructional Hours
I	**HISTORY OF FLIGHT** Early Airplanes by Wright Brothers - Balloon flight- Ornithopers, biplanes and monoplanes, Developments in aerodynamics, materials, structures and propulsion over the years. Introduction to rotorcraft - UAV and MAVs-Overview of Aviation Industries.	7
II	**AIRCRAFT CONFIGURATIONS AND ITS CONTROLS** Different types of flight vehicles, Classifications-Components of an airplane and their functions-Conventional control, powered control- Basic instruments for Flying-Typical systems for control actuation.	9
III	**BASICS OF AERODYNAMICS** Physical Properties and structures of the Atmosphere, Temperature, pressure and altitude relationships, Newton's Law of Motions applied to Aeronautics-Evolution of lift, drag and moment. Aerofoils, Mach number, Maneuvers.	10
IV	**BASICS OF PROPULSION** Basic ideas about piston, turboprop and jet engines – use of propeller and jets for thrust production-Comparative merits, Principle of operation of rocket, types of rocket and typical applications, Exploration into space.	9
V	**BASICS OF AIRCRAFT STRUCTURES** Stresses and Strains-Hooke's law- stress-strain diagrams - elastic Constants-Factor of Safety. General types of construction, Monocoque, semi-monocoque and geodesic constructions, typical wing and fuselage structure. Metallic and non-metallic materials. Use of Aluminum alloy, titanium, stainless steel and composite materials.	10
	Total Instructional Hours	**45**

Course Outcome	CO1: Understand the functions of aircraft components. CO2: Able to identify the types of flight vehicles and control systems. CO3: Understand the basic concepts of flight mechanics. CO4: Understand the working principle of various aircraft propulsion system. CO5: Acquire the knowledge about various materials used for aircraft construction.

TEXT BOOKS:

T1 - Anderson J.D., Introduction to Flight, McGraw-Hill 8th edition, 2015.
T2 - Stephen.A. Brandt, Introduction to aeronautics: A design perspective, 2nd edition, AIAA Education Series, 2004.

REFERENCE BOOKS:

R1 - Kermode A.C, "Flight without formulae", Pearson Education,, Fifth edition,2011.
R2 - Kermode A.C," Mechanics of Flight", Pearson Education, 12 th edition,2012.
R3 - Mekinley, J.L. and R.D. Bent, Aircraft Power Plants, McGraw Hill 1993.
R4 - Handbooks of Airframe and Power Plant Mechanics, US dept. of Transportation, Federal, Aviation Administration, the English Book Store, New Delhi, 1995.

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Programme	Course Code	Name of the Course	L	T	P	C
B.E	21CS5602	FINANCIAL MANAGEMENT	3	0	0	3

Course Objective

1. To acquire the knowledge of the decision areas in finance.
2. To learn the various sources of Finance
3. To describe about capital budgeting and cost of capital
4. To discuss on how to construct a robust capital structure and dividend policy
5. To develop an understanding of tools on Working Capital Management.

Unit	Description	Instructional Hours
I	**INTRODUCTION TO FINANCIAL MANGEMENT** Definition and Scope of Finance Functions - Objectives of Financial Management - Profit Maximization and Wealth Maximization- Time Value of money- Risk and return concepts	9
II	**SOURCES OF FINANCE** Long term sources of Finance -Equity Shares – Debentures - Preferred Stock – Features – Merits and Demerits. Short term sources - Bank Sources, Trade Credit, Overdrafts, Commercial Papers, Certificate of Deposits, Money market mutual funds etc	9
III	**INVESTMENT DECISIONS:** Investment Decisions: capital budgeting – Need and Importance – Techniques of Capital Budgeting -– Payback -ARR – NPV – IRR –Profitability Index. Cost of Capital - Cost of Specific Sources of Capital - Equity -Preferred Stock- Debt - Reserves - Concept and measurement of cost of capital - Weighted Average Cost of Capital.	9
IV	**FINANCING AND DIVIDEND DECISION** Operating Leverage and Financial Leverage- EBIT-EPS analysis. Capital Structure – determinants of Capital structure- Designing an Optimum capital structure . Dividend policy - Aspects of dividend policy - practical consideration - forms of dividend policy - - Determinants of Dividend Policy	9
V	**WORKING CAPITAL DECISION** Working Capital Management: Working Capital Management - concepts - importance - Determinants of Working capital. Cash Management: Motives for holding cash – Objectives and Strategies of Cash Management. Receivables Management: Objectives - Credit policies	9
	Total Instructional Hours	**45**

Course Outcome

CO1: Acquire the knowledge of the decision areas in finance.

CO2: learn the various sources of Finance
CO3: describe about capital budgeting and cost of capital
CO4: construct a robust capital structure and dividend policy
CO5: develop an understanding of tools on Working Capital Management.

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TEXT BOOKS:

1.M.Y. Khan and P.K.Jain Financial management, Text, Tata McGraw Hill

2.M. Pandey Financial Management, Vikas Publishing House Pvt. Ltd

REFERENCE BOOK:

1 James C. Vanhorne –Fundamentals of Financial Management– PHI Learning,.

2. Prasanna Chandra, Financial Management,

3. Srivatsava, Mishra, Financial Management, Oxford University Press, 2011

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Programme	Course Code	Name of the course	L	T	P	C
BE/B.Tech	**21BA5601**	**Foundations of Entrepreneurship**	**3**	**0**	**0**	**3**

Course Objective	CO1: To enable students gain insights on entrepreneurship. CO2: To make students understand the sources of product & business ideas. CO3: To provide knowledge on business opportunity identification. CO4: To enable students to develop business plan CO5: To enable students to prepare feasibility reports and understand trends in entrepreneurship.

Unit	Description	Instructional Hours
I	**Introduction to Entrepreneurship:** Entrepreneurial growth in India; sources of entrepreneurship in India. Entrepreneurship process; entrepreneurial mindset: concept and impact; Entrepreneurial growth strategies. Characteristics of an Entrepreneur – Qualities of an Entrepreneur. Entrepreneurial success and failure - reasons and remedies.	9
II	**Product Development:** Introduction and Meaning of a Product – Sources of Business or Product Ideas – Criteria for Selecting a Product – Barriers to the successful development of New Products – Why do new products fail. Technology - Considerations in selecting technology.	9
III	**Business Opportunity Identification:** Need and Importance - Steps in identification of Business Opportunity. Techniques of market Survey – Market Research Procedure.	9
IV	**Business Plan Development**: Business modelling: concept, types and functions; Innovation and Entrepreneurship: concept and challenges. The business plan as an entrepreneurial tool, Elements of business planning, Objectives, Market analysis, development of Product/idea, Marketing, Finance, Organization and management, Ownership, Critical risk contingencies of the proposal, Scheduling and milestones.	9
V	**Feasibility Report & trends:** Contents of a feasibility report – Considerations while preparing a feasibility report – Proforma of a feasibility report. Technical, Financial, Marketing, Personnel, and management feasibility reports. Trends in entrepreneurship: Rural, Social and women entrepreneurship.	9
	Total Instructional Hours	**45**

Course Outcome	CO1: Understand the basics of entrepreneurship and its process.
	CO2: Understand the concept of product development and the role of technology.
	CO3: Able to understand and identify business opportunity
	CO4: Able to develop business plan / business model
	CO5: Able to prepare feasibility reports and understand the trends in entrepreneurship.

TEXT BOOKS:
T1- S.Anil Kumar, S.C.Poornima, Mini KAbraham, K.Jayashree "Entrepreneurship Development",New Age International Publishers.
T2- Jasmer singh Sain, Entrepreneurship and small Business" Deep and Deep publication
T3- Shankar Raj, "Entrepreneurship Theory and Practice" Vijay Nicole Imprints Pvt ltd.
T4- Khanka, S.S, "Entrepreneurship Development", S. Chand & company
T5- Vasant Desai, "Fundamentals of Entrepreneurship "Himalaya Publishing House.
REFERENCE BOOKS:
R1- Khanna, S. S., Entrepreneurial Development, S. Chand, New Delhi.
R2- Hisrich D. Robert, Michael P. Peters, Dean A. Sheperd, Entrepreneurship, McGraw-Hill,6 ed.

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R3- Zimmerer W. Thomas,Norman M.Scarborough, Essentials of Entrepreneurship and Small Business Management, PHI,4 ed.
R4- Holt H. David, Entrepreneurship: New Venture Creation, Prentice- Hall of India, New Delhi, Latest edition.
R5- Kuratko, F. Donald, Richard M. Hodgetts, Entrepreneurship: Theory, Process, Practice, Thomson, 7ed.
R6- Desai, Vasant, Dynamics of Entrepreneurship: New Venture Creation, Prentice-Hall of India, New Delhi, Latest edition.
R7- Patel, V. G., The Seven Business Crises and How to Beat Them, Tata McGraw-Hill, New Delhi, 1995.
R8- Roberts, Edward B.(ed.), Innovation: Driving Product, Process, and Market Change, San Francisco: Jossey Bass, 2002.

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Course Code	Name of the Course	L	T	P	C
21CEXXXX	SUSTAINABLE INFRASTRUCTURE DEVELOPMENT	3	0	0	3

Course Objective

1. To gain knowledge on concepts and socio-economic policies of sustainable development.
2. To examine the strategies for implementing sustainable development programmes.
3. To learn the various sustainability and performance indicators, their assessment techniques and constraints
4. To explore the different approaches for resource management for a sustainable urban planning.
5. To understand the principles of urban planning and built-in environment.

Description	Instructional Hours
INTRODUCTION TO SUSTAINABLE DEVELOPMENT Definitions and principles of Sustainable Development - History and emergence of the concept of Sustainable Development - Environment and Development linkages- Globalization and environment – Millennium Development Goals: Status (global and Indian) Impacts on approach to development policy and practice in India, future directions.	9
ENVIRONMENTAL SUSTAINABILITY Land, Water and Food production - Moving towards sustainability: Energy powering Sustainable Development - Financing the environment and Sustainable Development.	9
SUSTAINABILITY INDICATORS Sustainability indicators – Hurdles to Sustainability-Operational Guidelines-Interconnected prerequisites for sustainable development - Science and Technology for sustainable development – Performance indicators of sustainability and Assessment mechanism – Constraints and barriers for sustainable development.	9
URBAN PLANNING AND ENVIRONMENT Environment and Resources, Sustainability Assessment, Future Scenarios, Form of Urban Region, Managing the change, Integrated Planning, Sustainable Development.	9
THE BUILT-IN ENVIRONMENT Urban Form, Land Use, Compact Development, Principles of street design- complete streets, Transport Integrated Urban land use Planning, Guidelines for Environmentally Sound Transportation.	9
Total Instructional Hours	**45**

The students will be able to:
CO1: Describe the concepts and socio-economic policies of sustainable development.
CO2: Recognize and identify the strategies for implementing sustainable development programmes.
CO3: Comprehend the various sustainability and performance indicators, their assessment techniques and constraints
CO4: Identify the different approaches for resource management for a sustainable urban planning
CO5: Illustrate the principles of urban planning and built-in environment.

REFERENCE BOOKS:

R1. Gilg A W and Yarwood R," Rural Change and Sustainability-Agriculture, the Environment and Communities", CABI Edited by S J Essex, September 2005.
R2. Ganesha Somayaji and Sakarama Somayaji, "Environmental Concerns and Sustainable development: Some perspectives from India", Editors: publisher TERI Press, ISBN 8179932249.
R3. James H. Weaver, Michael T. Rock, Kenneth Kustere, "Achieving Broad-Based Sustainable Development: Governance, Environment, and Growth with Equity", Kumarian Press, West Hartford, CT. Publication Year,1997.
R4. Kirkby. J, O'Keefe P. and Timberlake, "Sustainable development" Earth Scan Publication, London,1996.
R5. Kerry Turner. R, "Sustainable Environmental Management", Principles and Practice Publisher: Belhaven Press,ISBN:1852930039.
R6. Munier N, "Introduction to Sustainability", Springer2005

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Honors Degree course syllabus (V Semester)

Programme	Course Code	Course Title	L	T	P	C
B.E	21 AE5205	Space Flight Mechanics	3	0	0	3

Course Objectives:

CO1: Understand the basic concepts of space mechanics and its laws
CO2: To understand orbital elements and solve N- body and Two body problems in orbital mechanics
CO3: Study of satellite injection and satellite orbit perturbations.
CO4: Study various applications of orbital mechanics such as planetary motions and interplanetary trajectories.
CO5: Acquire the knowledge of ballistic missile trajectories and spacecraft materials

Unit	Description	Instructional Hours
	BASIC CONCEPTS	
I	Peculiarities of space environment and its description– effect of space environment on materials of spacecraft structure and astronauts- manned space missions – effect on satellite life time. The solar system – reference frames and coordinate systems – terminology related to the celestial sphere and its associated concepts – Kepler's laws of planetary motion and proof of the laws –Newton's universal law of gravitation - the many body problem -The Celestial Sphere.	8
	THE GENERAL N-BODY PROBLEM	
II	The Ecliptic Motion of Vernal Equinox – Sidereal Time – Solar Time –Standard Time – The Earth's Atmosphere. Study the basic concepts of orbital Mechanics with particular emphasis on interplanetary trajectories. The many bodies Problem – Lagrange, Jacobian identity The Circular Restricted Three Body Problem – Libration Points – Relative Motion in the N-body Problem – Two – Body Problem – Satellite Orbits – Relations Between Position and Time – Orbital Elements.	8
	SATELLITE INJECTION AND SATELLITE ORBIT PERTURBATIONS	
III	General Aspects of satellite Injections, Satellite Orbit Transfer, Various Cases – Orbit Deviations Due to Injection – Errors – Special and General Perturbations – Cowell's Method – Encke's Method - Method of vibrations of Orbital Elements- General Perturbations Approach.	8
	INTERPLANETARY TRAJECTORIES	
IV	Two Dimensional Interplanetary Trajectories – Fast Interplanetary Trajectories – Three Dimensional Interplanetary Trajectories – 3-Dimensional Interplanetary Trajectories – Launch if Interplanetary Spacecraft – Trajectory estimation about the Target Planet. Concept of the sphere of influence. Lamberts theorem.	8
	BALLISTIC MISSILE TRAJECTORIES AND MATERIALS	
V	The Boost Phase – The Ballistic Phase – Trajectory Geometry – Optimal Flights – Time of Flight – Re-entry Phase – The Position of the Impact Point – Influence Coefficients. Space Environment - Peculiarities - Effect of Space Environment, the Selection of Spacecraft Material	8
	Total Instructional Hours	40

Course Outcome:

CO1	Understand classical orbital elements, physical principles of orbital motion and various coordinate systems used
CO2	Orbit element determination from position and velocity vectors for N-body and Two Body
CO3	Understand about satellite injection and satellite orbit perturbations.
CO4	To calculate orbital parameters and perform conceptual trajectory designs for interplanetary missions.
CO5	Understand about ballistic missile trajectories and materials.

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Text Books:

1. Cornelisse, J.W. “Rocket Propulsion and Space Dynamic”, W.H. Freeman & Co., 1984.
2. Thomson, Introduction to Space Dynamics, Dover Publications, Revised edition,2012.
3. Sutton, G.P., “Rocket Propulsion Elements”, John Wiley, 9th edition, 2016.

Reference Books:

1. Van de Kamp, P., “Elements of Astro-mechanics”, Pitman, 1979.
2. Parker E.R., “Material for Missiles and Spacecraft”, McGraw – Hill Book Co., Inc., 1982.

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Programme	Course Code	Name of the Course	L	T	P	C
B.E	21 AE5206	Wind Engineering	2	1	0	3

Course Objective

1. To understand the Fundamentals of Atmosphere
2. To understand the fundamental principles and concepts of wind energy
3. To evaluate Wind Resources
4. To understand the basic principles of wind turbines
5. To provide knowledge about wind generators and its equipment.

Unit	Description	Instructional Hours
I	**The Atmosphere** – Atmospheric Boundary Layer-Atmospheric stability and turbulence-Wind profiles and wind velocity measurements-Boundary layer flows and boundary layer theory.	9
II	**Wind Energy Fundamentals -**Wind Energy Basics, Wind Speeds and scales, Terrain, Roughness, Wind Mechanics, Wind Farms and maintenance of wind turbines, Power Content, Turbulence.	9
III	**Wind Measurements-**Instrumentation for wind measurements, Wind data analysis, tabulation, Wind resource estimation, Turbulence Analysis-Biological indicators, Rotational anemometers, other anemometers, Wind direction	9
IV	**Wind Turbine Power, Energy and Torque-** Class of wind turbines, Power output from an ideal turbine, Aerodynamics, Power output from practical turbines, Betz's Limit, Transmission and generation efficiency, Energy production and capacity factor, Torque at constant speeds, Drive train oscillations, Turbine shaft power and torque at variable speeds.	9
V	**Wind Turbines with Asynchronous Electric Generators** Piston water pumps, Centrifugal pumps, Paddle wheel heaters, Batteries, Hydrogen economy, and Electrolysis cells.	9
	Total Instructional Hours	**45**

Course Outcome

CO1- Attain knowledge about the atmosphere properties
CO2- Develop more understanding on the basics of wind energy.
CO3- Introduced to gain information of the wind measurements.
CO4- acquired various methods to determine parameters on wind energy.
CO5- Improve the knowledge about the various equipment of wind turbines

TEXT BOOKS:

T1- S. Ahmad, Wind Energy: Theory and Practice, Prentice Hall of India Pvt. Ltd., 2011.
T2- J F Walker, and N Jenkins, Wind Energy Technology, John Wiley and Sons, 1997.

REFERENCE BOOKS:

R1- D M Eggleston, and F S Stoddard, Wind Turbine Engg. Design, Von Nostrand, New York, 1987.
R2- L L Freris, (Ed.), Wind Energy Conversion Systems, Prentice Hall, London, 2007.
R3- D M Simmons, Wind Power, Noyes Data Corp. New Jersey, 1975.

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MAPPING OF COURSE OUTCOMES (COs), PROGRAM OUTCOMES (POs) AND PROGRAM SPECIFIC OUTCOME (PSOs)

B. E. AERONAUTICAL ENGINEERING (UG)

Academic Year 2023-2024

REGULATION-2019, 2019 (Amendment) & 2022

SEMESTER-I														
22MA1101/ MATRICES AND CALCULUS														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	-	-	-	-	-	-	2	2	1
CO2	3	3	3	2	2	-	-	-	-	-	-	2	2	2
CO3	3	3	3	2	3	-	-	-	-	-	-	2	2	2
C04	3	3	3	3	3	-	-	-	-	-	-	2	2	3
C05	3	3	3	3	3	-	-	-	-	-	-	2	1	2
AVG	3	3	3	2.6	2.8	-	-	-	-	-	-	2	1.8	2
22ME1201 - Engineering Drawing														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	2	-	1	-	1	-	-	1	1	1	1	2
CO2	3	3	2	1	1	-	1	-	-	1	1	1	1	2
CO3	3	3	3	-	1	1	1	-	-	1	1	-	1	1
C04	3	3	3	1	1	2	1	-	-	1	1	1	1	1
C05	3	3	3	1	1	3	1	-	-	1	1	1	1	1
AVG	2.8	3	2.6	1	1	2	1	-	-	1	1	1	1	1.4
22PH1151/ PHYSICS FOR NON CIRCUIT ENGINEERING														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	3	1	1	-	1	-	2	3	3	2
CO2	3	3	2	2	1	1	1	-	1	-	2	2	3	1
CO3	3	3	2	2	2	1	1	-	1	-	1	2	2	2
CO4	3	2	3	1	3	1	1	-	1	-	1	2	2	1
CO5	3	2	3	1	2	1	1	-	1	-	2	2	2	1
Avg	3	2.6	2.6	1.6	2.2	1	1	-	1	-	1.6	2.2	2.4	1.4
22HE1151 / ENGLISH FOR ENGINEERS														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

CO1	2	-	-	-	-	1	2	2	2	3	1	1	1	2
CO2	2	1	-	-	1	1	1	2	2	3	-	2	-	2
CO3	2	1	-	-	1	1	2	3	3	3	-	1	1	2
CO4	2	1	-	-	-	1	2	2	2	3	1	1	-	-
CO5	2	-	-	-	-	1	1	2	3	3	-	1	1	2
Avg	2	1	-	-	1	1	1.6	2.2	2.4	3	1	1.2	1	2
22IT1151 - Python Programming and practices														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3	-	2	-	-	-	-	-	-	2	2	2
CO2	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO3	2	3	3	-	2	-	-	-	2	-	-	2	2	2
C04	2	3	3	-	2	-	-	-	2	-	-	2	2	2
C05	2	3	3	-	2	-	-	-	2	-	-	2	2	2
AVG	2	3	3	-	2	-	-	-	2	-	-	2	2	2
SEMESTER-III														
22MA3104 & Fourier Analysis and Numerical Techniques														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	2	-	-	-	-	-	-	2	3	1
CO2	3	3	3	2	1	-	-	-	-	-	-	3	2	3
CO3	3	3	3	1	1	-	-	-	-	-	-	2	2	2
C04	3	3	3	1	2	2	-	-	-	-	-	2	2	2
C05	3	3	3	2	1	1	-	-	-	-	-	2	2	3
AVG	3	2.8	3	1.4	1.4	2	-	-	-	-	-	2.2	2.2	2.2
22AE3201 & Elements of Aeronautics														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	1
CO2	3	-	-	-	-	-	-	-	-	-	-	-	2	1
CO3	3	-	-	-	-	-	-	-	-	-	-	-	2	1
C04	3	-	-	-	-	-	-	-	-	-	-	-	2	1
C05	3	-	-	-	-	-	-	-	-	-	-	-	2	1
AVG	3	-	-	-	-	-	-	-	-	-	-	-	2	1
22AE3202 & Solid Mechanics														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	-	-	-	-	-	-	-	-	-	3	2
CO2	3	2	2	-	-	-	-	-	-	-	-	-	3	2
CO3	3	2	1	-	-	-	-	-	-	-	-	-	3	2
C04	3	2	1	-	-	-	-	-	-	-	-	-	3	2

C05	3	1	1	-	-	-	-	-	-	-	-	-	3	2
AVG	3	1.6	1.2	-	-	-	-	-	-	-	-	-	3	2
22AE3251 & Aero Engineering Thermodynamics														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	-	-	-	-	-	-	-	-	3	2
CO2	3	3	2	1	-	-	-	-	-	-	-	-	3	2
CO3	3	3	2	1	-	-	-	-	-	-	-	-	3	2
C04	3	2	2	1	-	-	-	-	-	-	-	-	3	2
C05	3	1	1	-	-	-	-	-	-	-	-	-	3	2
AVG	3	2.2	1.6	1	-	-	-	-	-	-	-	-	3	2
22AE3252 & Engineering Fluid Mechanics														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	2	3	1
CO2	3	2	-	-	-	-	-	-	-	-	-	2	3	1
CO3	3	3	2	2	-	-	-	-	-	-	-	2	3	1
C04	3	3	2	3	-	-	-	-	-	-	-	2	2	2
C05	3	3	2	3	-	-	-	-	-	-	-	2	2	2
AVG	3.0	2.8	2.0	2.7	-	-	-	-	-	-	-	2.0	2.6	1.4
22AE3001 & Strength of Materials Laboratory														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	-	-	-	-	-	-	-	-	3	3
CO2	3	3	2	2	-	-	-	-	-	-	-	-	3	3
AVG	3	3	2	2	-	-	-	-	-	-	-	-	3	3
22AE3002 & Aircraft Component Drawing Laboratory														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	3	3	2	-	-	-	-	2	3	2	3
CO2	3	3	2	3	3	2	-	-	-	-	2	3	2	3
CO3	3	2	1	2	3	2	-	-	-	-	2	2	1	3
AVG	3	2.7	1.7	2.7	3.0	2.0	-	-	-	-	2.0	2.7	1.7	3
22AE3072 & Introduction To MATLAB														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	3	3	-	-	-	-	-	2	3	1
CO2	3	2	-	-	3	3	-	-	-	-	-	2	3	1
CO3	3	3	2	2	3	3	-	-	-	-	-	2	3	1
C04	3	3	2	3	3	3	-	-	-	-	-	2	2	2

C05	3	3	2	3	3	3	-	-	-	-	-	2	2	2
AVG	3.0	2.8	2.0	2.7	3	3	-	-	-	-	-	2.0	2.6	1.4
SEMESTER-V														
21AE5201 & Advanced Propulsion														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	-	-	-	-	-	-	-	2	3	2
CO2	3	3	3	2	-	-	-	-	-	-	-	2	3	2
CO3	3	3	2	2	-	-	2	-	-	-	-	2	3	2
C04	3	3	2	2	-	-	2	-	-	-	-	2	3	2
C05	3	-	-	-	-	-	2	-	-	-	-	2	3	2
AVG	3.0	3.0	2.3	2.0	-	-	2.0	-	-	-	-	2.0	3.0	2.0
21AE5202 & Aircraft Structures - II														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	1	3	2
CO2	3	3	-	-	-	-	-	-	-	-	-	1	3	2
CO3	3	3	-	-	-	-	-	-	-	-	-	1	3	2
C04	3	3	2	2	-	-	-	-	-	-	-	1	3	2
C05	3	3	3	3	-	-	-	-	-	-	-	1	3	2
AVG	3	2.8	2.5	2.5	-	-	-	-	-	-	-	1	3	2
21AE5203 & Flight Dynamics														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	-	-	-	-	-	-	-	-	3	2
CO2	3	2	2	2	-	-	-	-	-	-	-	-	3	2
CO3	3	2	2	1	-	-	-	-	-	-	-	-	3	2
C04	3	2	1	1	-	-	-	-	-	-	-	-	3	2
C05	3	2	1	1	-	-	-	-	-	-	-	-	3	2
AVG	3	2	1.4	1.2	-	-	-	-	-	-	-	-	3	2
21AE5204 & High Speed Aerodynamics														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	1
CO2	3	3	2	2	2	-	-	-	-	-	-	-	3	1
CO3	3	3	-	2	2	-	-	-	-	-	-	-	3	1
C04	3	3	3	2	2	-	-	-	-	-	-	-	3	-
C05	3	-	2	-	2	-	-	-	-	1	-	2	3	3
AVG	3.0	3.0	2.3	2.0	2.0	-	-	-	-	1.0	-	2.0	3.0	1.5
21AE5251 & Aircraft Systems and General Maintenance Practices														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	3	3	-	2	-	-	2	1	1
CO2	-	-	-	-	2	3	3	-	3	-	-	-	1	1
CO3	-	-	-	-	-	3	3	-	3	2	-	-	1	1
C04	-	-	-	-	-	3	3	-	3	2	-	-	1	1

C05	-	-	-	-	2	-	-	-	-	-	-	-	1	1
AVG	-	-	-	-	2.0	3.0	3.0	-	2.8	2.0	-	2.0	1.0	1.0
21AE5001 & UAV design and Aeromodelling Laboratory														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	-	-	-	-	-	-	2	2	1
CO2	3	2	2	2	1	-	-	-	-	-	-	2	2	1
CO3	3	2	2	2	2	-	-	-	-	-	-	2	2	1
AVG	3	2	2	2	1.3	-	-	-	-	-	-	2	2	1
21AE5002 & Aircraft Structures Laboratory -II														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	2	-	-	-	-	-	2	-	-	2	3	3
CO2	3	-	2	-	-	-	-	-	2	-	-	2	3	3
CO3	3	-	2	-	2	-	-	-	2	-	-	2	3	3
AVG	3	-	2	-	2	-	-	-	2	-	-	2	3	3
SEMESTER-VII														
19AE7201 & Computational Fluid Dynamics														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	-	-	-	-	-	-	-	-	2	2
CO2	2	2	2	2	2	-	-	-	-	-	-	-	2	2
CO3	2	2	2	2	2	-	-	-	-	-	-	-	2	2
C04	2	2	2	2	2	-	-	-	-	-	-	-	2	2
C05	3	3	3	2	2	-	-	-	-	-	-	-	2	2
AVG	2.4	2.2	2.2	2	2	-	-	-	-	-	-	-	2	2
19AE7202 & Vibrations and Elements of Aero Elasticity														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	-	-	-	-	3	2
CO2	3	3	2	-	-	-	-	-	-	-	-	-	3	2
CO3	3	3	2	-	-	-	-	-	-	-	-	-	3	2
C04	3	3	2	-	-	-	-	-	-	-	-	-	3	2
C05	2	2	2	-	-	-	-	-	-	-	-	-	2	2
AVG	2.8	2.8	2	-	-	-	-	-	-	-	-	-	2.8	2
19AE7251 & Avionics														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	3	2	2	-	-	-	1	3	3	2
CO2	3	1	3	3	3	1	-	-	-	-	-	-	3	2
CO3	3	2	3	3	3	1	-	-	-	-	-	3	3	3
C04	3	3	3	-	3	3	2	-	-	-	-	2	3	2
C05	3	3	1	2	3	-	-	-	-	-	-	3	3	2
AVG	3.0	2.2	2.4	2.7	3.0	1.8	2.0	-	-	-	1.0	2.8	3.0	2.2
19AE7001 & Aircraft Design Project														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	1	1	2	3	2	2	2	3	3

CO2	3	3	3	3	2	-	1	1	3	2	2	2	3	3
CO3	3	3	3	3	1	1	-	1	3	2	2	2	3	3
C04	3	3	3	3	2	-	2	1	3	2	2	2	3	3
C05	3	2	3	3	3	2	-	-	3	2	2	2	3	3
AVG	3.0	2.8	3.0	3.0	2.2	1.3	1.3	1.3	3.0	2.0	2.0	2.0	3.0	3.0
19AE7002 & Flow Simulation Laboratory														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	3	2	-	-	-	-	-	1	2	3	3
CO2	3	3	2	2	1	-	-	-	-	-	-	2	2	2
CO3	3	3	3	3	1	-	-	-	-	-	-	2	3	3
AVG	3.0	3.0	2.3	2.7	1.3	-	-	-	-	-	1.0	2.0	2.7	2.7
19AE7901 & Project Phase I														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	2	2	3	3	3	3	2	3	3
CO2	3	3	3	3	3	2	2	3	3	3	3	2	3	3
CO3	3	3	3	3	3	2	2	3	3	3	3	2	3	3
CO4	3	3	3	3	3	2	2	3	3	3	3	2	3	3
CO5	3	3	3	3	3	2	2	3	3	3	3	2	3	3
AVG	3	3	3	3	3	2	2	3	3	3	3	2	3	3

PROFESSIONAL ELECTIVES

21EI5331 & Control Engineering														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	-	-	-	-	-	-	-	1	1	-
CO2	3	1	-	1	-	-	-	-	-	-	-	1	1	-
CO3	3	1	2	1	2	-	-	-	-	-	-	1	1	-
C04	3	1	2	1	2	-	-	-	-	-	-	1	1	-
C05	3	1	-	-	-	-	-	-	-	-	-	1	1	-
AVG	3	1	2	1	2	-	-	-	-	-	-	1	1	-
21AE5301 & Aircraft Materials and Process														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-	3	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-	3	-
C04	3	2	2	-	-	-	-	-	-	-	-	-	3	-
C05	3	2	1	-	-	-	-	-	-	-	-	-	3	-
AVG	3	2	1.3	-	-	-	-	-	-	-	-	-	3	-
21AE5302 & Wind tunnel techniques														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	2	2	-	-	-	-	-	-	-	-	-
CO2	3	3	1	2	2	1	-	-	-	-	-	-	-	-

CO3	3	3	1	2	2	1	-	-	-	-	-	-	-	-
C04	3	3	1	2	2	1	-	-	-	-	-	-	-	-
C05	3	2	1	2	2	1	-	-	-	-	-	-	-	-
AVG	3	2.8	1	2	2	1	-	-	-	-	-	-	-	-
21AE5303 & UAV and MAV design														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	-	-	-	-	-	-	-	3	2
CO2	3	2	2	2	-	-	-	-	-	-	-	-	3	2
CO3	3	3	2	1	-	-	-	-	-	-	-	-	3	2
C04	3	3	2	2	-	-	-	-	-	-	-	-	3	2
C05	3	2	2	1	-	-	-	-	-	-	-	-	3	2
AVG	3	2.4	2	1.6	1	-	-	-	-	-	-	-	3	2
21AE5304 & Non Destructive Evaluation														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	2	1	1	2	2	2	2	2	3	2
CO2	3	2	2	1	2	1	1	2	2	2	2	2	3	2
CO3	3	2	2	1	2	1	1	2	3	2	2	2	3	2
C04	2	2	2	1	2	1	1	2	3	2	2	2	3	1
C05	3	2	2	1	2	1	1	2	3	1	1	2	3	2
AVG	2.8	2	2	1	2	1	1	2	2.6	1.8	1.8	2	3	1.8
19AE7301 & Nano Science and Technology														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	1	-	-	-	-	-	-	-	3	2
CO2	3	2	2	2	-	-	-	-	-	-	-	-	3	2
CO3	3	1	1	-	-	-	-	-	-	-	-	-	3	2
C04	3	1	1	1	-	-	-	-	-	-	-	-	3	2
C05	3	2	1	1	1	-	-	-	-	-	-	-	3	2
AVG	3	1.6	1.4	1.3	1	-	-	-	-	-	-	-	3	2
19AE7302 & Satellite Technology														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1	1	-	-	-	-	-	-	-	3	1
CO2	3	2	1	1	1	-	-	-	-	-	-	-	3	1
CO3	3	2	2	1	-	-	-	-	-	-	-	-	3	1
C04	3	2	1	-	-	-	-	-	-	-	-	-	3	2
C05	3	2	1	-	-	-	-	-	-	-	-	-	3	1
AVG	3	1	1	1	1	-	-	-	-	-	-	-	3	1
19AE7303 & Fatigue and Fracture Mechanics														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3.00	2.00	2.00	3.00	-	-	-	-	-	-	-	2.00	3.00	1.00
CO2	3.00	2.00	3.00	2.00	-	-	-	-	-	-	-	2.00	3.00	2.00
CO3	3.00	2.00	3.00	3.00	2.00	-	-	-	-	-	-	2.00	2.00	3.00
C04	3.00	2.00	3.00	3.00	3.00	-	-	-	-	-	-	2.00	3.00	2.00

C05	3.00	2.00	3.00	3.00	2.00	-	-	-	-	-	-	2.00	3.00	2.00
AVG	3.00	2.00	2.80	2.80	2.33	-	-	-	-	-	-	2.0	2.80	2.00
19AE7304 & Aero Engine Maintenance and Repair														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	-	-	-	-	-	-	-	-	-	3	3
CO2	3	3	2	-	-	-	-	-	-	-	-	-	3	2
CO3	3	2	1	-	-	-	-	-	-	-	-	-	3	2
C04	2	3	2	-	-	-	-	-	-	-	-	-	3	2
C05	2	3	2	-	-	-	-	-	-	-	-	-	3	2
AVG	2.6	2.4	1.6	-	-	-	-	-	-	-	-	-	3	2.2
19AE7305 & Space Mechanics														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	-	-	-	-	-	-	-	3	2
CO2	3	3	2	1	-	-	-	-	-	-	-	-	3	2
CO3	3	3	2	1	-	-	-	-	-	-	-	-	3	2
C04	3	3	2	1	-	-	-	-	-	-	-	-	3	2
C05	3	3	2	1	-	-	-	-	-	-	-	-	3	2
AVG	3	3	2	1	-	-	-	-	-	-	-	-	3	2

OPEN ELECTIVES

19AE7401-Introduction to Drones														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	-	-	-	-	-	-	-	1	2	2
CO2	3	2	2	2	1	-	-	-	-	-	-	1	2	2
CO3	3	2	2	2	1	-	-	-	-	-	-	1	2	2
C04	3	3	2	2	2	-	-	-	-	-	-	3	2	2
C05	2	2	1	2	-	-	-	-	-	-	-	3	1	2
AVG	2.8	2.2	1.8	2	1.3	-	-	-	-	-	-	1.8	1.8	2

Chairman - BoS
AERO - HiCET

Chairman

Dean (Academics)
HiCET