VISVESVARAYA TECHNOLOGICAL UNIVERSITY

BELAGAVI

Scheme of Teaching and Examinations (2026)

M.Tech. in Aerospace Engineering

(Specialization in Aerospace Propulsion Technology)

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

	I SEMESTER (Common to all specialized programmes under one stream)												
Sl. No	Course Type	Course Code	Course Title	Teaching & Learning Scheme					Examination				Credits
				CI		LI	TW & SL	Total Hours/Sem	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P							
1	MAT	1MMAT101	Mathematical Concepts for Aerospace Engineering	42	0	0	48	90	03	50	50	100	3
2	PCC	1MAS102	Numerical Techniques for Propulsion Applications	42	0	0	48	90	03	50	50	100	3
3	PCC	1MAS103	Introduction to Space Technology	42	0	0	48	90	03	50	50	100	3
4	IPCC	1MAS104x	Integrated Professional Core Course-I	42	0	28	50	120	03	50	50	100	4
5	PEC	1MAS105x	Professional Elective Course-I	42	0	0	48	90	03	50	50	100	3
6	PEC	1MAS106x	Professional Elective Course-II	42	0	0	48	90	03	50	50	100	3
7	PCCL	1MASL107x	Professional Core Courses Lab	0	0	28	02	30	03	50	50	100	1
8	NCMC	1MRMI108	**Research Methodology and IPR (Online)**	Online courses (online.vtu.ac.in)									PP
								TOTAL		**350**	**350**	**700**	**20**

Professional Elective Courses (PECs):

Professional Elective Courses – PEC–I and PEC–II – are common to all branches of specialization within a particular Engineering stream. Students may choose the most appropriate elective based on their field of specialization and academic requirements. *Note: The number of courses listed under each PEC group may exceed four, depending on the specializations under one stream.*

Integrated Professional Core Courses (IPCC):

The 1MAS104x Group comprises specialization-specific core courses that are integrated with a practical component, ensuring application-oriented learning aligned with industry and research needs. The number of courses in the group depends on the number of specializations offered under a particular engineering stream.

Integrated Professional Core Course (IPCC)	
Code	**Title of the Course**
1MAS104A	Mechanics and Thermodynamics of Propulsion
1MAS104B	Materials and Manufacturing for High Temperature Applications
1MAS104C	Heat and Mass Transfer in Propulsion Systems
1MAS104D	Aircraft Engine Performance and Matching

Professional Elective Courses-I	
Code	**Title of the Course**
1MAS105A	Missiles and Launch Vehicles
1MAS105B	Turbomachinery Fundamentals for Propulsion
1MAS105C	Reacting Flows and Combustion Modelling
1MAS105D	Gas Dynamics

Professional Elective Courses-II	
Code	**Title of the Course**
1MAS106A	Advanced Aerodynamics for Air-Breathing Engines
1MAS106B	Gas Turbine Maintenance and Overhaul
1MAS106C	Hypersonic Aerodynamics
1MAS106D	AI and ML in Aerospace Engineering

Professional Core Courses Lab (PCCL)	
1MASL107A	Aircraft Propulsion Lab
1MASL107B	Gas Turbine Performance and Testing Lab
1MASL107C	Materials and Thermal Testing Lab for Engines
1MASL107D	Gas Dynamics Lab
1MASL107E	Computation and Flight Simulation Lab

	Specialization in Aerospace Propulsion Technology												
	II SEMESTER												
Sl. No	**Course**	**Course Code**	**Course Title**	**Teaching & Learning Scheme**					**Examination**				**Credits**
				Theory	**Tutorial**	**Practical/ Seminar**	**TW & SL**	**Total Hours /Semester**	**Duration in hours**	**CIE Marks**	**SEE Marks**	**Total Marks**	
				L	**T**	**P**							
1	PCC/IPCC	1MAS201	Computational Fluid Dynamics	42	0	28	50	120	03	50	50	100	4
2	PCC	1MAS202	Fuels, Combustion and Emissions in Engines	42	0	0	48	90	03	50	50	100	3
3	PCC	1MAS203	Cryogenic Engines	42	0	0	48	90	03	50	50	100	3
4	PCC	1MAS204	Electric and Hybrid Propulsion Systems	42	0	0	48	90	03	50	50	100	3
5	PEC	1MAS205x	Professional Elective Courses-III	42	0	0	48	90	03	50	50	100	3
6	PEC	1MAS206x	Professional Elective Course-IV	42	0	0	48	90	03	50	50	100	3
7	PCCL	1MASL207	Computational Fluid Dynamics Lab	0	0	28	02	30	03	50	50	100	1
8	PCC	1MAS208	Minor Project /Skill Development Project	--	--	--	60	60	03	50	50	100	2
									Total	**400**	**400**	**800**	**22**

About the Ability /Skill Development Project. Please see the pages 08 and 09

Professional Elective Courses (PECs)					
PEC-III			PEC-IV		
Code	Title of the Course		Code	Title of the Course	
1MAS205A	System Engineering Approach to Propulsion		1MAS206A	Advanced Combustion	
1MAS205B	Optimization Techniques in Aerospace Propulsion		1MAS206B	Mechanical Aspects of Rotating Machinery	
1MAS205C	Multiphase Flow and Atomization		1MAS206C	Engine Health Monitoring and Diagnostics	
1MAS205D	Structural Dynamics of Propulsion Systems		1MAS206D	Hypersonic Propulsion and High-Speed Air-Breathing Engines	

For the students who are willing to take an Industry Internship for a one-semester duration and an independent project work next semester												
III SEMESTER (A)												
Sl. No	**Course**	**Course Code**	**Course Title**	**Teaching Hours /Week**			**Examination**					**Credits**
				Theory	**Practical/ Mini–Project/ Internship**	**Tutorial/ Skill Development Activities**	**Duration in hours**	**CIE Marks**	**SEE Marks**	**Total Marks**		
				L	**P**	**SDA**						
1	MDC/PEC	1MAS301	Offline /(Online Course) (12 Weeks Duration)					50	50	100		3
		1MAS302	Offline/ (Online Course) (12 weeks courses)					50	50	100		3
2		1MAS303	Offline /(Online Courses) (8-week course)					50	50	100		2
3	INT	1MINT304	Teaching # / Industry /post Placement- Internship	One semester Duration			03	100	100	200		12
TOTAL				**06**	**00**	**00**		**250**	**250**	**500**		**20**

#Students who opt **Teaching Internship**, for them 1MAS301 and 302 and 303 courses are offline Courses. Students opt **Industry /Post Placement Internship**, then 1MAS301 and 302 and 303 are online courses (Teaching hours as per the online course) (BoS has to suggest courses suitable for the particular specialization)

IV SEMESTER (A)										
Sl. No	**Course**	**Course Code**	**Course Title**	**Teaching Hours /Week**		**Examination**				**Credits**
				Theory	**Practical/ Field work**	**Duration in hours**	**CIE Marks**	**SEE Marks Viva voce**	**Total Marks**	
				L	P					
1	PEC/PCC	1MAS401x	Offline/Online courses	3	0	03	50	50	100	3
2	**PEC/PCC/OEC**	**1MAS402x**	Offline/Online courses	**3**	**0**	**03**	**50**	**50**	**100**	**3**
3	**PROJECT**	1MAS403	Project work	02	20	03	100	100	200	12
				04	**08**	**03**	**200**	**200**	**400**	**18**

For the students who are willing to take up a two-semester duration Industry/Research Internship Leading to Project Work /Start-Up

III SEMESTER (B)

Sl. No	Course	Course Code	Course Title	Teaching Hours /Week			Examination				Credits
				Theory	Practical/ Mini-Project/ Internship	Tutorial/ Skill Development Activities	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	P	SDA					
1	PEC/PCC/ OEC	1MAS301x	(Online Courses) 12 weeks duration					50	50	100	3
2		1MAS302x	(Online Courses)12 weeks duration					50	50	100	3
		1MAS303x	(Online Courses)12 weeks duration					50	50	100	3
		1MAS304x	(Online Courses)8 weeks duration					50	50	100	2
3	INT	**1MINT304**	Research Internship /Industry-Internship leading to project work/ Startup (Phase-I)	Two-semester duration, SEE in the IV semester which leads to project work /start-up			03	100	---	100	3
TOTAL								**300**	**200**	**500**	**12**

IV SEMESTER (B)

Sl. No	Course	Course Code	Course Title	Teaching Hours /Week		Examination				Credits
				Theory	Practical/Field work	Duration in hours	CIE Marks	SEE Marks Viva voce	Total Marks	
				L	P					
1	PEC	1MAS401	Online courses (12 weeks duration)			03	50	50	100	03
2	INT	MAS402	Research Internship / Industry Internship Leading to Project Work/Start-up /Teaching Internship#	Two Semester Duration		03	100	100	200	09
3	PROJ	MAS403	Project (Outcome of training)			03	100	100	200	12
TOTAL						**06**	**250**	**250**	**500**	**24**
Total of III and IV semester							**450**	**350**	**800**	**38**

 # Teaching Internship- All courses that are offered may be offline or online. Project work should be on a new initiative in teaching (Pedagogy only)

For the students who are willing to take a research-leading paper publication in Q1/Q2/Q3 Journals and to a PhD Registration												
III SEMESTER (C)												
Sl. No	**Course**	**Course Code**	**Course Title**	**Teaching Hours /Week**			**Examination**				**Credits**
				Theory	**Practical/ Mini–Project/ Internship**	**Tutorial/ Skill Development Activities**	**Duration in hours**	**CIE Marks**	**SEE Marks**	**Total Marks**	
				L	P	SDA					
1	PCC/IPCC/ MDC/PEC	1MAS301	(Offline/Online Course) (12 weeks courses)					50	50	100	3
2		1MAS302	(Offline/Online Course) (12 weeks courses)					50	50	100	3
3		1MAS303	(Offline/Online Courses) (16-week course)					50	50	100	4
3	PROJ	1MAS304	Project Phase-I	One semester Duration			03	100	---	100	4
			TOTAL III semester	**06**	**00**	**00**	**09**	**300**	**200**	**500**	**14**

IV SEMESTER (C)										
Sl. No	**Course**	**Course Code**	**Course Title**	**Teaching Hours /Week**		**Examination**				**Credits**
				Theory	**Practical/ Field work**	**Duration in hours**	**CIE Marks**	**SEE Marks Viva voce**	**Total Marks**	
				L	P					
1	PCC/PEC	1MAS401	Offline/Online course	3	0	03	50	50	100	4
2	Project	1MAS402	Project work	--	08	03	100	100	200	20
			Total of IV semester	**04**	**08**	**03**	**100**	**100**	**200**	**24**
			Total of III and IV semesters				**400**	**300**	**700**	**38**

Overview of Courses, Credits, Projects, and Internships under VTU Curriculum

I. Abbreviations used in the Scheme of Teaching and Examinations

Abbreviations	Expanded Form of the Abbreviations
AICTE	**All India Council of Technical Education**
NCrF	**National Credit Framework**
VTU	**Visvesvaraya Technological University**
AEC	Ability Enhancement Course
ASC	Applied Science Course
BSC	Basic Science Course
CIE	Continuous Internal Evaluation
CI	Classroom Instruction

CCA	Continuous Comprehensive Assessment
CGPA	Cumulative Grade Point Average
CUL	Cultural
COE	Centre for Online Education
HSMC	Humanities Studies and Management Course
IPCC	Integrated Professional Core Course
LI	Laboratory Instruction
L	Lecture
NCMC	Non-Credit Mandatory Course
NSS	National Service Scheme
NPTEL	National Programme for Technical Enhanced Learning
OEC	Open Elective (Interdepartmental or interdisciplinary) Course
PCC	Professional Core Course
PCCL	Professional Core Course Laboratory
PEC	Professional Elective Courses
PE	Physical Education
P	Practical
SEC	Skill Enhancement Courses
SEE	Semester End Evaluation
SL	Self-Learning
SGPA	Semester Grade Point Average
SWAYAM	Study Webs of Active-Learning for Young Aspiring Minds
TW	Term Work

T	Tutorial
VTU online	VTU online courses offered by Centre for Online Education,
YOG	Yoga

II. Credit Representation

1-hour Lecture (L) per week=1Credit

2-hoursTutorial(T) per week=1Credit

2-hours Practical / Drawing (P) per week=1Credit

Teaching & Learning Scheme
As per the new National Credit Framework (NCrF), 30 hours of learning of a student is considered equivalent to 1 credit. A semester is considered as a 14-week period of academic interaction with students. The learning components are categorized as follows: 1. **Classroom Instruction (CI):** Includes different instructional / implementation strategies i.e. Lecture (L), Tutorial (T), Case method, Demonstrations, Video demonstration, Problem based learning etc. to deliver theoretical concepts within the classroom measured in Number of hours per semester. 2. **Laboratory Instruction (LI):** Expressed as number of hours per semester which Includes experiments / practical performances / problem-based experiences in laboratory, workshop, field or other locations using different instructional / Implementation strategies. 3. **Term work (TW):** Includes assignments, seminars, presentations, case studies, micro projects, field activities, industrial visits, academic preparation duration and any other student activities in Number of hours per semester. 4. **Self-Learning (SL):** MOOCs (SWAYAM/NPTEL/Industry certified courses), spoken tutorials, online educational resources, self-initiated projects, Learning through digital resources etc in Number of hours per semester. (If provided in curriculum structure).

	Course Details
1.	**One Credit Theory Courses:**

	Teaching-Learning sessions in a semester	14 hours
	Examination pattern for CIE and SEE	Multiple Choice Question (MCQ)
	Teaching hours per week - L:T:P	1:0:0
2.	**One Credit Laboratory Courses:**	
	Teaching-Learning sessions in a semester	28 hours (2 hours session /week)
	Examination pattern for CIE and SEE	Continuous assessments, lab Internal test and SEE
	Teaching hours per week - L:T:P	0:0:2
3.	**Two Credit Theory Courses:**	
	Teaching-Learning Sessions in a semester	28 hours
	Examination pattern for CIE and SEE	Descriptive
	Teaching hours per week - L:T:P	2:0:0
4.	**Three Credit ESC/ETC/PCC/PEC/OEC Courses:**	
	Teaching-Learning Sessions in a semester	42 hours
	Examination pattern for CIE and SEE	Descriptive
	Teaching hours per week for theory courses - L:T:P	3:0:0
5.	**Four Credit Program Core Courses (PCC):**	
	Teaching-Learning Sessions in a semester	56 hours
	Examination pattern for CIE and SEE	Descriptive
	Teaching hours per week for theory courses - L:T:P	4:0:0

6.	**Four Credit Integrated Professional Core Courses (IPCC):**	
	Teaching-Learning Sessions in a semester (Teaching sessions: 42 hours + Practical sessions: 28 hours)	70 hours
	Examination pattern for CIE and SEE	Descriptive
	Practical part of examination	CIE (No SEE).
	Teaching hours per week - L: T: P	3: 0: 2

III. Details of Courses

(1) Integrated Professional Core Course (IPCC): The Integrated Professional Core Course (IPCC) refers to a core theory course that is integrated with a laboratory of the same subject. Each IPCC carries 4 credits, with Teaching–Learning hours structured (L : T : P) as either (3:0:2). The theory component of the IPCC shall be evaluated through both Continuous Internal Evaluation (CIE) and Semester End Examination (SEE). The laboratory part shall be assessed exclusively through CIE, with no SEE. However, questions derived from the laboratory part may be included in the SEE question paper to ensure comprehensive evaluation

(2) Non-Credit Mandatory Courses (NCMC): are aimed at enhancing students' knowledge, skills, and awareness beyond the core curriculum. Successful completion of the NCMC is compulsory for fulfilling the requirements of the academic program. It shall not be considered for the computation of SGPA, CGPA and vertical progression. Each student shall register for the prescribed NCMC(s) in the prescribed semester. A student who fails to qualify in the prescribed NCMC shall not be eligible for the conferment of the degree.

(3) Professional Elective Courses (PEC): A professional elective course (PEC) is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum of the same discipline.

(4) Open Elective Courses (OEC): A open elective course (OEC) is a course offered by departments other than a student's parent department. These interdepartmental /interdisciplinary courses allow students to explore disciplines beyond their core area of study. These courses are intended to promote interdisciplinary learning, broad-based education, thereby enhancing a student's overall knowledge, creativity, and employability. Registration to open electives shall be documented under the guidance of the Program Coordinator/ Advisor/Mentor/Proctor.

(5) Ability Enhancement Course Laboratory (AEC): An Ability Enhancement Course Laboratory is a practical, skill-oriented lab course designed to strengthen students' practical abilities, professional competencies that support communication, environmental awareness, computational thinking, interdisciplinary learning, and application skills through hands-on learning experiences.

The laboratory may pertain to disciplinary or interdisciplinary involving experiments, design tasks, and mini-projects aligned with current industry practices.

(6) Skill Enhancement Courses (SEC): These courses are intended to develop specific practical skills and competencies that improve students' employability, technical proficiency, and professional readiness to bridge the gap between academic and industry requirements. These courses emphasize hands-on training, application of theoretical knowledge, and development of discipline-relevant and transferable skills required in industry and society, and develop entrepreneurship and start-up skills.

(7) Online Courses: Online courses are educational programs delivered over the Internet through a digital platform, allowing students to access lessons, assignments, and discussions from anywhere at any time. Most online courses offer flexibility, allowing students to access materials and complete assignments on their own schedule. However, students have to pass the course within a stipulated period as per the norms of the university.

(8) VTU Online Courses: VTU Online courses are online courses offered by Centre of Online Education (COE) Mysuru. A wide range of multidisciplinary courses are available to learners anywhere, anytime to earn university-prescribed credits through proctored examination for the award of a degree.

(9) NPTEL/SWAYAM Online Courses: The National Programme on Technology Enhanced Learning (NPTEL)/SWAYAM (Study Webs of Active Learning for Young Aspiring Minds) are the specific Indian platforms to host national Massive Open Online Courses (MOOCs). It offers online courses on a wide range of disciplines to learners anywhere, anytime, to earn university-prescribed credits through proctored examination for the award of a degree. All NPTEL/SWAYAM courses are MOOCs, but not all MOOCs are offered on these specific Indian platforms.

IV. Ability Enhancement Project (AEP) / Skill Development Project (SDP)

An Ability Enhancement Project (AEP) or Skill Development Project (SDP) is a focused project aimed at enhancing specific skills or abilities in a particular domain. It's designed to bridge the gap between theoretical knowledge and practical application.

Key Objectives:

1. Develop practical skills relevant to the industry or field.
2. Enhance problem-solving, critical thinking, and analytical abilities.
3. Improve communication, teamwork, and collaboration skills.
4. Apply theoretical concepts to real-world problems or scenarios.
5. Foster creativity, innovation, and entrepreneurship.

Characteristics:

1. Practical and hands-on approach.
2. Industry-relevant skills and tools.
3. Mentorship and guidance.
4. Opportunity to work on real-world projects or case studies.
5. Emphasis on skill development and enhancement.