MVJ College of Engineering, Whitefield, Bangalore

An Autonomous Institution, Affiliated to VTU, Belagavi

Scheme of Teaching and Examination 2024

Effective from the academic year 2024-25

Department of Aeronautical Engineering - PG Program

I SEMESTER M.Tech -AE

S. No	Course		Course Title	Teaching Department	Teaching hours/week			Examination				Credits
					Theory	Practical / Seminar	Tutorial /SDA	Duration in Hours	CIE Marks	SEE Marks	Total marks	
	Type	Code			L	T	T/SDA					
1	BSC	MVJMAE11	Applied Mathematics	Mathematics	3	0	0	3	50	50	100	3
2	IPCC	MVJMAE12	Advanced Aerodynamics (+Aerodynamic Lab)	AE	3	2	0	3	50	50	100	4
3	PCC	MVJMAE13	Aerospace Propulsion	AE	3	0	1	3	50	50	100	3
4	PCC	MVJMAE14	Aircraft Performance Engineering	AE	3	0	0	3	50	50	100	3
5	PCC(PB)	MVJMAE15	Airframe Structural Analysis	AE	3	0	1	3	50	50	100	3
6	PCCL	MVJMAEL16	Propulsion Lab	AE	1	2	0	3	50	50	100	2
7	NCMC	MVJRMI17	Research Methodology and IPR(**Online**)	AE	Online courses (online.vtu.ac.in)							PP
Total					**16**	**4**	**2**	-	**300**	**300**	**600**	**18**

Note: **BSC**-Basic Science Courses, **PCC**: Professional core. **IPCC**-Integrated Professional Core Courses, **PCC(PB)**: Professional Core Courses (Project Based), **PCCL**-Professional Core Course lab ,**NCMC**- None Credit Mandatory Course, ,L-Lecture, P-Practical, **T/SDA**-Tutorial / Skill Development Activities(Hours are for Interaction between faculty and students) **MRMI19**- Research Methodology and IPR

(**Online**) for the students who have **not studied** this course in the Undergraduate level. This course is not counted for vertical progression, Students have to qualify for the award of the master's degree.

BSC: Basic Science Courses: Courses like Mathematics/ Science are the prerequisite courses that the concerned engineering stream board of Studies will decide. **PCC:** Professional Core Course: Courses related to the stream of engineering, which will have both CIE and SEE components, students have to qualify in the course for the award of the degree. **Integrated Professional Core Course (IPCC)**: Refers to a Professional Theory Core Course Integrated with practical's of the same course. The IPCC's theory part shall be evaluated by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper. **Project Based Learning Course (PCC(PB)**: Project Based Learning course is a professional core Course. Only Students have to complete a project out of learning from the course and SEE will be viva voce on project work. **PCCL: Professional Core Course Laboratory**: Practical courses whose CIE will be evaluated by the class teacher and SEE will be evaluated by the two examiners.
Skill development activities: Under Skill development activities in a concerning course, the students should

1. Interact with industry (small, medium, and large).
2. Involve in research/testing/projects to understand their problems and help creative and innovative methods to solve the problem.
3. Involve in case studies and field visits/ fieldwork.
4. Accustom to the use of standards/codes etc., to narrow the gap between academia and industry.
5. Handle advanced instruments to enhance technical talent.
6. Gain confidence in the modelling of systems and algorithms for transient and steady-state operations, thermal study, etc
7. Work on different software/s (tools) to simulate, analyze and authenticate the output to interpret and conclude.

All activities should enhance student's abilities to employment and/or self-employment opportunities, management skills, Statistical analysis, fiscal expertise, etc. Students and the course instructor/s are to be involved either individually or in groups to interact together to enhance the learning and application skills of the study they have undertaken. The students with the help of the course teacher can take up relevant technical –activities that will enhance their skills. The prepared report shall be evaluated for CIE marks.

MVJ24IPR16-Research Methodology and IPR- None Credit Mandatory Course (NCMC) if students have not studied this course in their undergraduate program then he /she has to take this course at **http://online.vtu.ac.in** and to qualify for this course is compulsory before completion of the minimum duration of the program (Two years), however, this course will not be considered for vertical progression.

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Scheme of Teaching and Examination 2024

Effective from the academic year 2024-25

II SEMESTER M.Tech -AE

Sl. No	Course	Course Code	Course Title	Teaching Hours /Week			Examination				Credits
				Theory	Practical/ Seminar	Tutorial/ Skill Development	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	P	T/SDA					
1	IPCC	MVJMAE21	Flight Mechanics (+Simulation Lab)	03	02	00	03	50	50	100	4
2	PCC	MVJMAE22	Applied Computational Fluid Dynamics	03	00	00	03	50	50	100	3
3	PCC	MVJMAE23	Artificial Intelligence and Robotics	03	00	00	03	50	50	100	3
4	PCC	MVJMAE24	Aircraft Design	03	00	00	03	50	50	100	3
5	PEC	MVJMAE25X	Professional Elective Courses-1	03	00	00	03	50	50	100	3
6	PEC	MVJMAE26X	Professional Elective Courses-2	03	00	00	03	50	50	100	3
7	PCCL	MVJMAEL27	Modelling and Analysis Lab	01	02	00	03	50	50	100	2
8	AEC/SEC	MVJMAE28X	Ability/Skill Enhancement Course (Offline/Online)	00 01	02 00	--- ----	02 01	50	50	100	1
TOTAL								**400**	**400**	**800**	**22**

Note: **PCC**: Professional core. **IPCC**-Integrated Professional Core Courses, **PCC(PB):** Professional Core Courses (Project Based), **PCCL**-Professional Core Course lab**, PEC**-Professional Elective Courses, **MDC-** Multi-Disciplinary Courses

, **L-Lecture, P-Practical, T/SDA-Tutorial / Skill Development Activities** (Hours are for Interaction between faculty and students)

L-Lecture, P-Practical, T/SDA-Tutorial / Skill Development Activities (Hours are for Interaction between faculty and students) **PBLC**: Project Based Learning Course,

Note: **xxx**means specialization code for example **MDE- Design** Engineering, **LDN-** Digital Communication and Networking, **SCE**- Computer Engineering, **CCT**-Construction

Professional Elective Courses-I				
Course Code	**Course title**	L	T/SDA	P
MVJMAE251	Fatigue and Fracture Mechanics	03	00	00
MVJMAE252	Flight Dynamics and Automatic Flight Control	03	00	00
MVJMAE253	Aero Engine Testing and Evaluation	03	00	00
MVJMAE254	Theory of Aeroelasticity	03	00	00

Professional Elective Courses-II				
Course Code	**Course title**	L	T/SDA	P
MVJMAE261	Composite Materials & Fabrication Techniques	03	00	00
MVJMAE262	Flight Testing	03	00	00
MVJMAE263	Rocket and Missiles	03	00	00
MVJMAE264	Hypersonic Aerodynamics	03	00	00

Ability/Skill Enhancement Courses				
Course Code	**Course title**	L	T/SDA	P
MVJMAE281	Avionics	01	00	00
MVJMAE282	Unmanned Aerial Vehicles	01	00	00
MVJMAE283	Aircraft Systems and Instrumentation	01	00	00
MVJMAE284	Theory of Combustion	01	00	00

Ability Enhancement Courses (AEC):.These courses are designed to help students enhance their skills in communication, language, and personality development. They also promote a deeper understanding of subjects like social sciences and ethics, culture and human behaviour, human rights, and the law.

Skill Enhancement Course (SEC): Skill Enhancement Course means a course designed to provide value-based or skill-based knowledge and should contain both theory and lab/hands-on/training/fieldwork. The main purpose of these courses is to provide students with life skills in the hands-on mode to increase their employability.

AEC/SEC courses are ONLINE (MOOCs) courses These courses can also be conducted off-line

III SEMESTER M.Tech AE (A)

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

S. No	Course		Course Title	Teaching Department	Teaching hours/week			Examination				Credits
					Theory	Practical / Seminar	Tutorial / Skill Development Activity	Duration in Hours	CIE Marks	SEE Marks	Total marks	
	Type	Code			L	T	P					
1	PCC/MDC	MVJMAEA31	(Online Courses) 12 weeks duration	AE	-	-	-	-	-	-	100	3
2		MVJMAEA32	(Online Courses) 12 weeks duration	AE	-	-	-	-	-	-	100	3
3		MVJMAEA33	(Online Courses) 12 weeks duration	AE	-	-	-	-	-	-	100	3
4	INT	MVJINTA34	Research Internship /Industry-Internship leading to project work/ Startup		Two-semester duration, SEE in the IV semester which leads to project work /start-up			3	100	-	100	3
Total					-	-	-	-	**100**	-	**400**	**12**

Note:

PCC: Professional core courses, **MDC**- Multi-Disciplinary Courses, **INT**: Industry/ Research Internship leading to the project work /startup,

IV SEMESTER M.Tech AE (A)

S. No	Course		Course Title	Teaching Department	Teaching hours/week			Examination				Credits
					Theory	Practical / Field work	Tutorial / Skill Development Activity	Duration in Hours	CIE Marks	SEE Marks	Total marks	
	Type	Code			L	T	P					
1	INT	MVJINTA41	Research Internship / Industry Internship Leading to Project Work/Start-up	AE	Two Semester Duration			3	100	100	200	12
2	PROJ	MVJPRJA42	Project	AE				3	100	100	200	16
Total					-	-	-	**6**	**200**	**200**	**400**	**28**

Note:
INT: Industry/ Research Internship leading to the project work /startup,
PROJ: Project work outcome of Internship (Project Phase-II is Viva voce SEE)

Taking up a two-semester Industry/Research Internship that leads to project work or a start-up can be a highly rewarding experience for students. It allows them to apply theoretical knowledge in practical settings, gain valuable industry or research experience, and potentially develop innovative solutions or business ideas. Here are some key steps and considerations for students pursuing such an internship:

Industry Internship: The main objective of the industry internship is to ensure that the intern is exposed to a real-world environment and gain practical experience. Often, it may be a practical exposure to the theory that has been learned during the academic period. The industry internship helps students understand of analytical concepts and tools, hone their skills in real-life situations, and build confidence in applying the skills learned.

Research Internship: A research internship is an opportunity for students or early career professionals to gain hands-on experience in conducting research under the guidance of a mentor or within a research team. These internships can take place in academic institutions, research organizations, government agencies, or private companies

Research /Industry Internship: In the third-semester Students have to be in touch with a guide/mentor/coordinator and regularly submit the report referred to the progress internship. Based on the progress report the Guide/Mentor/coordinator has to enter the CIE marks at the end of the 3rd semester. At the beginning of the 4th semester, students have to define the project topic out of the learning due to the Internship, upon completion of the project work he/she has to attend the SEE at the parent Institute.

Internship Leading to Start-up: An internship that leads to a startup is an exciting pathway, blending real-world experience with entrepreneurial ambition. Here's a comprehensive guide to transitioning an internship experience into launching your startup: 1) Maximize your internship experience, 2) Identifying Viable Business Ideas, 3) Research and Validation 4) Building a Business Plan 5) Networking and Mentorship 6) Securing Funding 7) Establishing Startup 8) Launching and Marketing. By following these steps, you can effectively transition from an internship to launching a successful startup. This journey requires dedication, resilience, and a willingness to learn and adapt.

III SEMESTER M.Tech AE (B)

For the students who are willing to take an Industry Internship for one-semester duration and independent project work next semester

S. No	Course		Course Title	Teaching Department	Teaching hours/week			Examination				Credits
					Theory	Practical / Seminar	Tutorial / Skill Development Activity	Duration in Hours	CIE Marks	SEE Marks	Total marks	
	Type	Code			L	T	SDA					
1	MDC/PEC	MVJMAEB31	(Online Courses) 12 weeks duration	AE	-	-	-	-	-	-	100	3
2		MVJMAEB32	(Online Courses) 12 weeks duration	AE	-	-	-	-	-	-	100	3
3		MVJMAEB33	(Online Courses) 12 weeks duration	AE	-	-	-	-	-	-	100	3
4	INT	MVJINTB34	Industry-Internship		One Semester Duration			3	100	100	200	11
Total					-	-	-	-	**100**	100	**500**	**20**

Note: PCC: Professional core courses, PEC: Professional Elective Courses, IPCC-Integrated Professional Core Courses. MPS-Mini Project with Seminar; AUD/AEC; Audit Courses / Ability Enhancement Courses (Mandatory), PCCL-Professional Core Course lab, L-Lecture, P-Practical, T/SDA-Tutorial / Skill Development Activities (Hours are for Interaction between faculty and students) PP/NP-Passed / Not Passed (Only for non-Credit Course)

IV SEMESTER M.Tech AE (B)

S. No	Course		Course Title	Teaching Department	Teaching hours/week		Examination				Credits
					Theory	Tutorial / Skill Development Activity	Duration in Hours	CIE Marks	SEE Marks	Total marks	
	Type	Code			L	P					
1	PROJ	MVJPRJB41	Project	AE	-	8	3	100	100	200	20
Total					-	**8**	**3**	**100**	**100**	**200**	**20**

Note:
INT: Industry/ Research Internship leading to the project work /startup,
PROJ : Project work outcome of Internship (Project Phase-II is Viva voce SEE)

Industry Internship: The main objective of the industry internship is to ensure that the intern is exposed to a real-world environment and gains practical experience. Often, it may be a practical exposure to the theory that has been learned during the academic period. The industry internship helps students understand of analytical concepts and tools, hone their skills in real-life situations, and build confidence in applying the skills learned. The students who take up a one-semester Internship in the Industry have to appear SEE at the institute at the end of the semester as per the examination calendar.

Project Work: Students in consultation with the guide shall carry out literature survey/ visit industries to finalize the topic of the Project. Subsequently, the students shall collect the material required for the selected project, prepare a synopsis, and narrate the methodology to carry out the project work. Each student, under the guidance of a Faculty, is required to

- Present the seminar on the selected project orally and/or through Power Point slides.
- Answer the queries and be involved in debate/discussion.
- Submit two copies of the typed report with a list of references.
- The participants shall take part in discussions to foster a friendly and stimulating environment in which the students are motivated to reach high standards and become self-confident

CIE marks for the project report (20 marks), seminar (20 marks) and question and answer (10 marks) shall be awarded (based on the quality of report and presentation skill, participation in the question-and-answer session by the student) by the committee constituted for the purpose by the Principal. The committee shall consist of an internal guide and a faculty from the department with the senior most acting as the Chairperson.

Semester End Examination SEE marks for the project report (30 marks), seminar (10 marks) and question and answer session (10 marks) shall be awarded (based on the quality of the report and presentation skill, participation in the question and answer session) by the examiners appointed by the University.

III SEMESTER M.Tech AE (C)

For the students who are willing to take a research-leading paper publication in Q1/Q2/Q3 Journals and to a PhD Registration

S. No	Course		Course Title	Teaching Department	Teaching hours/week			Examination				Credits
					Theory	Practical / Seminar	Tutorial / Skill Development Activity	Duration in Hours	CIE Marks	SEE Marks	Total marks	
	Type	Code			L	T	SDA					
1	PCC/IPCC /MDC/PE C	MVJMAEC31	(Online Courses) 12 weeks duration	AE	-	-	-	-	-	-	100	3
2		MVJMAEC32	(Online Courses) 12 weeks duration	AE	-	-	-	-	-	-	100	3
3		MVJMAEC33	(Online Courses) 12 weeks duration	AE	-	-	-	-	-	-	100	3
4		MVJMAEC34	(Online Courses) 12 weeks duration	AE	-	-	-	-	-	-	100	3
4	PROJ	MVJPRJC35	Project-Phase-I		One Semester Duration			3	100	--	100	6
Total					-	-	-	-	**100**	-	**500**	**18**

IV SEMESTER M.Tech AE (C)

S. No	Course		Course Title	Teaching Department	Teaching hours/week		Examination				Credits
					Theory	Tutorial / Skill Development Activity	Duration in Hours	CIE Marks	SEE Marks	Total marks	
	Type	Code			L	P					
1	PROJ	MVJPRJC41	Project work	AE	-	8	3	100	100	200	22
Total					-	**8**	**3**	**100**	**100**	**200**	**22**

Note:

The research section of the university has to announce the number of seats for M.Tech. students who are seeking PhD (research study) admission through a project leading to the publication of the paper in Q1/Q2/Q3 journals. Only full-time research work will be permitted in the university department or approved research centers of the affiliated colleges of the university (guidelines need to be set up). Based on seat availability, the students are permitted to register for project work leading to the publication of papers in Q1/Q2/Q3 journals and admission to research (PhD) in their 3rd semester of the M.Tech., program

Project Phase-1 Project Phase-I, typically the initial phase in any project, is crucial as it lays the foundation for the entire project. This phase involves defining the project's scope, objectives, and initial planning. Here's a structured approach to effectively carry out Project Phase-I:

- **Project Charter**: Outlines the project's purpose, objectives, and stakeholders.
- **Scope Statement**: Defines the project boundaries and deliverables.
- **Requirements Document**: Captures all project requirements.
- **Project Plan**: Details the approach, timeline, and resource allocation.
- **Risk Management Plan**: Identifies and plans for potential risks.
- **Feasibility Study Report**: Assesses technical, economic, and operational feasibility.

Students in consultation with the guide shall carry out literature survey/visit industries to finalize the topic of the Project. Subsequently, the students shall collect the material required for the selected project, prepare synopsis, and narrate the methodology to carry out the project work. Each student, under the guidance of a faculty, is required to

• Present the seminar on the selected project orally and/or through power point slides. • Answer the queries and be involved in debate/discussion.

• Submit two copies of the typed report with a list of references. • The participants shall take part in discussions to foster friendly and stimulating environment in which the students are motivated to reach high standards and become self-confident.

Continuous Internal Evaluation (100 Marks). CIE marks for the project report (60 marks), seminar (20 marks) and question and answer(20marks) shall be awarded (based on the quality of report and presentation skill, participation in the question-and-answer session by the student) by the committee constituted for the purpose by the principal. The committee shall consist of an internal guide and a faculty from the department with the senior most acting as the Chairperson.

Project Work Phase-II: Each student shall be involved in carrying out the project work jointly in constant consultation with internal guide and external guide and prepare the project report as per the norms of the university to avoid plagiarism. Phase II of a project typically involves the detailed execution of the planned activities, continuous monitoring and control of the project's progress, and making necessary adjustments to ensure the project stays on track. Keep detailed records of all project activities, decisions, and changes. Ensure all project documentation is organized and accessible. Conduct a final project review to evaluate overall performance, achievements, and lessons learned. Document best practices and areas for improvement for future projects.

Paper Publication Process: Publishing a research paper based on your project in a Q1/Q2/Q3 journal involves several key steps, from writing the manuscript to navigating the peer review process. Here's a comprehensive guide: **Writing the Manuscript**: Choose a clear and concise title that accurately reflects the content. Write an abstract summarizing the research question, methods, results, and conclusions. **Literature Review**: Review relevant existing research to establish the foundation of your study. Identify gaps that your research aims to fill. **Methodology**: Describe the research design, methods, and procedures in detail. Include information on data collection, analysis, and any tools or software used. Results: Present the findings of your research clearly and logically. Use tables, figures, and charts to illustrate key results. **Discussion**: Interpret the results and explain their implications. Compare your findings with existing research and discuss any discrepancies or new insights. **Conclusion**: Summarize the main findings and their significance. Suggest potential future research directions. **References**: Cite all sources used in your research following the journal's citation style. **Journal Selection**: Choose a journal that aligns with the scope and focus of your research. Consider the journal's impact factor (Q1, Q2, Q3) and audience. **Review Journal Guidelines**: Carefully read the journal's submission guidelines and ensure your manuscript adheres to them. **Prepare Your Manuscript**: Format your manuscript according to the journal's guidelines. Include all required sections and supplementary materials. **Cover Letter**: Write a cover letter to the journal editor

highlighting the significance of your research and why it fits the journal. **Submit the Manuscript**: Use the journal's online submission system to submit your manuscript. Ensure all required information and documents are included.

Semester End Examination SEE marks for the project report (60 marks), seminar (20marks) and question and answer session (20 marks) shall be awarded (based on the quality of report and presentation skill, participation in the question-and-answer session) by the examiners appointed by the University.