VISVESVARAYA TECHNOLOGICAL UNIVERSITY

BELAGAVI

Scheme of Teaching and Examinations

M.Tech., in Mechanical Engineering

(Specialization in Material Science and Technology)

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

Specialization in Material Science and Technology

II SEMESTER

Sl. No	Course	Course Code	Course Title	Teaching Hours /Week			Examination				Credits
				Theory	Practical/ Seminar	Tutorial/ Skill Development Activities	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	P	T/SDA					
1	IPCC	MMST201	Advanced Materials Characterisation Techniques	03	02	00	03	50	50	100	4
2	PCC	MMST202	Composite science and Technology	03	00	00	03	50	50	100	3
3	PCC	MMST203	Mechanical Behaviour of Materials	03	00	00	03	50	50	100	3
4	PEC	MMST214x	Professional Elective 3	04	00	00	03	50	50	100	3
5	PEC	MMST215x	Professional Elective 4	04	00	00	03	50	50	100	3
6	PCC	MMST206	Materials Processing Technology	03	00	00	03	50	50	100	3
7	PCCL	MSTL207	Material Characterization Laboratory	01	02	00	03	50	50	100	2
8	AEC/SEC	MMST258x	Ability/Skill Enhancement Course (Offline)	00	02	---	02	50	50	100	1
				01	00	----	01				
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 Technology, **AUD**- Urban Design, **MBA**- Master of Business Administration, **MCA**-Master of Computer Application, etc

Ability / Skill Enhancement Courses

Course Code	Course title	L	T/SDA	P
MMST258A	IoT in manufacturing	01		

MMST258B	MICRO MACHINING PROCESSES	01			
MMST258C	ARTIFICIAL INTELLIGENCE IN MANUFACTURING	01			
MMST258D	MACHINE LEARNING	01			

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 coursedesignedtoprovide value-based or skill-based knowledge and should contain both theoryand lab/hands-on/training/fieldwork. The main purpose of these courses is to providestudents with life skills in the hands-on mode to increase their employability.
If AEC/SEC courses are ONLINE (MOOCs) courses suggested by the concerned board of studies. These courses will be made available on **www. online.vtu.ac.in**, howeveronlinecourses are not considered forvertical progression, but qualifying in online courses is mandatory for the award of the degree.

Specializations (for each course one individual below templates need to be filled

Core Courses

Specialization Course Code	Course Title
MMST201	Advanced Materials Characterisation Techniques
MMST202	Composite science and Technology
MMST203	Mechanical Behaviour of Materials
MMST214x	Professional Elective 3
MMST215x	Professional Elective 4
MMST206	Materials Processing Technology

Elective Courses

Professional Elective 1		Professional Elective 2	
Course Code under Mxxx204x	Course title	Course Code under Mxxx205x	Course title
MMST214A	Thermodynamics and Phase diagrams	MMST215A	Electronic, Optical and Magnetic Properties of Materials
MMST214B	Smart Materials and Structures	MMST215B	Advanced Foundry Technology
MMST214C	Mechanical Behaviour of thin films	MMST215C	Surface Treatment & finishing
MMST214D	Bio Materials & Technology	MMST215D	Modelling, Simulation & Analysis of Manufacturing Systems

PCC/PCCL/IPCC/PEC/MDC/PCC(PB): These are the courses which will suit the individual specializations

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

IIISEMESTER (A) Automobile Engineering

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/MDC	MMST301/401	(Online Courses) 12 weeks duration							100	3
2		MMST302/402	(Online Courses)12 weeks duration							100	3
		MMST303/403	(Online Courses)12 weeks duration							100	3
3	INT	**MINT304**	Research Internship /Industry-Internship leading to project work/ Startup	Two-semester duration, SEE in the IV semester which leads to project work /start-up			03	100	---	100	3
TOTAL										**400**	**12**

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	INT	MINT401	Research Internship / Industry Internship Leading to Project Work/Start-up	Two Semester Duration		03	100	100	200	12
2	PROJ	MPROJ402	Project			03	100	100	200	16
TOTAL						**06**	**200**	**200**	**400**	**28**

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.

Mxxx301/401 to 303/403:MOOC courses of 12 weeks duration are the courses suggested by the Board of Studies of the University and will be displayed on www.online.vtu.ac.in. The online courses selected should not be the same as those studied in the first and second semesters of the program. The student will not be eligible to get their degree if they unintentionally select online courses that match previously finished courses. These courses are not considered for the vertical progression; however, qualifying for these courses and earning the credits is a must for the award of the degree. It is permitted to complete these online MOOC courses either in 3rd semester or in 4th semester.

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

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IIISEMESTER (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	MDC/PEC	MMST301/401	(Online Course) (12 weeks courses)							100	3
		MMST302/402	(Online Course) (12 weeks courses)							100	3
2		MMST303/403	(Online Courses) (12-week course)							100	3
3	INT	24INT33	Industry Internship	One semester Duration			03	100	100	200	11
TOTAL				**06**	**00**	**00**				**500**	**20**

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	Project	MPROJ41	Project work	--	08	03	100	100	200	20
				04	**08**	**03**	**100**	**100**	**200**	**20**

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 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.

Mxxx301/401 to 303/403:MOOC courses of 12 weeks duration are the courses suggested by the Board of Studies of the University and will be displayed on www.online.vtu.ac.in. The online courses selected should not be the same as those studied in the first and second semesters of the program. The student will not be eligible to get their degree if they unintentionally select online courses that match previously finished courses. These courses are not considered for the vertical progression; however, qualifying for these courses and earning the credits is a must for the award of the degree. It is permitted to complete these online MOOC courses either in 3rd semester or in 4th semester.

For the students who are willing to take a research-leading paper publication in Q1/Q2/Q3 Journals and to a PhD Registration												
IIISEMESTER (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	MMST301/401	(Online Course) (12 weeks courses)							100		3
		MMST302/402	(Online Course) (12 weeks courses)							100		3
2		MMST303/403	(Online Courses) (12-week course)							100		3
		MMST304/404	(Online Courses) (12-week course)							100		3
3	PROJ	MPROJ305	Project Phase-I	One semester Duration			03	100	---	100		6
TOTAL				**06**	**00**	**00**	**09**			**500**		**18**

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	Project	MPROJ41	Project work	--	08	03	100	100	200	22
				04	**08**	**03**	**100**	**100**	**200**	**22**

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 collectthematerialrequiredfortheselectedproject,prepareasynopsis,andnarratethemethodologytocarryouttheprojectwork.Eachstudent, under theguidanceofafaculty,is required to

- Presentttheseminarontheselectedprojectorallyand/orthroughpowerpointslides.
- Answerthe queries and be involved in debate/discussion.
- Submittwocopiesofthetypedreportwithalistofreferences.
- Theparticipantsshalltakepartindiscussionstofostera friendlyandstimulatingenvironmentinwhichthestudentsaremotivatedtoreachhighstandardsand becomeself-confident.

ContinuousInternalEvaluation(100 Marks).

CIE marks for the project report (60 marks), seminar (20 marks) and question and answer(20marks)shallbeawarded(basedonthequalityofreportandpresentationskill,participationinthequestionandanswersessionbythestudent)bythecommitteeconstitutedforthepurposebythePrincipal.Thecommitteeshallconsistofan internalguide and afacultyfromthedepartment with theseniormostactingastheChairperson.

ProjectWorkPhase-II: Eachstudentshallbeinvolvedincarryingouttheprojectwork jointlyinconstantconsultationwithinternalguideandexternalguideandpreparetheprojectreport as perthe norms of the university to avoidplagiarism. 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 qualityofreportandpresentationskill,participationinthequestionandanswersession)bythe
examiners appointedbythe University.