M.TECH CURRICULUM TEMPLATE

PROGRAM OUTCOMES - PO

Outcomes are the attributes that are to be demonstrated by a graduate after completing the programme

- **PO1:** An ability to independently carry out research/investigation and development work in engineering and allied streams
- **PO2:** An ability to communicate effectively, write and present technical reports on complex engineering activities by interacting with the engineering fraternity and with society at large.
- **PO3:** An ability to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program
- **PO4:** An ability to apply stream knowledge to design or develop solutions for real world problems by following the standards
- **PO5:** An ability to identify, select and apply appropriate techniques, resources and state-of-the-art tool to model, analyse and solve practical engineering problems.
- **PO6:** An ability to engage in life-long learning for the design and development related to the stream related problems taking into consideration sustainability, societal, ethical and environmental aspects
- **PO7:** An ability to develop cognitive load management skills related to project management and finance which focus on Entrepreneurship and Industry relevance.

The departments conducting the M.Tech programme shall define their own PSOs, if required, and assessment shall also be done for the same.

SEMESTER I

Slot	Courses	Ма	rks	ітр	Hours	Credit	
3101	Courses	CIA	ESE	L-1- F	Hours		
А	Discipline Core 1	40	60	3-0-0	3	3	
В	Program Core 1	40	60	3-0-0	3	3	
С	Program Core 2	40	60	3-0-0 3		3	
D	Program Elective 1	40	60	3-0-0	3	3	
Е	Program Elective 2	40	60	3-0-0	3	3	
S	Research Methodology & IPR	40	60	2-0-0	2	2	
Т	Laboratory 1	100		0-0-2	2	1	
	Total	340	360		19	18	

Teaching Assistance: 6 hours

SEMESTER II

Slat	Courses	Ма	rks		Heuro	Cradit	
5101	Courses	CIA	ESE	L-1-P	nours	Credit	
А	Discipline Core 2	40	60	3-0-0	3	3	
В	Program Core 3	40	60	3-0-0	3	3	
С	Program Elective 3	40 60 3-0-0		3-0-0	3	3	
D	Program Elective 4	40	60	3-0-0	3	3	
E	Industry/Interdisciplinary Elective	40	60	3-0-0	3	3	
S	Mini project	100		0-0-4	4	2	
Т	Laboratory 2	100		0-0-2	2	1	
	TOTAL	400	300		21	18	

Teaching Assistance: 6 hours

A few recommended Discipline Core Courses

- Advanced Computational Mathematics
- Linear Algebra
- Advanced Numerical Methods
- Optimization Techniques
- Probability, Statistics & Stochastic Processes
- Quantitative Methods for Artificial Intelligence
- Big Data Technologies
- Machine Learning with Python
- Automata & Languages
- Deep Learning & Neural Networks
- Computer Vision
- Natural Language Processing
- Advanced Machine Learning
- Internet of Things

SEMESTER III

Slot	Courses	Ma	rks	ітр	Hours	Cradit	
3101	Courses	CIE	ESE	L-1-P	HOUIS	Credit	
A*	МООС	To be co succes	mpleted ssfully			2	
В	Audit Course	60	3-0-0	3	-		
С	Internship	50	50			3	
D	Dissertation Phase 1	100		0-0-17	17	11	
		TRACK	2				
A*	МООС	To be co succes	mpleted ssfully			2	
В	Audit Course	40	60	3-0-0	3	-	
С	Internship	50	50			3	
D	Research Project Phase 1	100		0-0-17	17	11	
	TOTAL	190	110		20	16	

Teaching Assistance: 6 hours

*MOOC Course to be successfully completed before the commencement of fourth semester (starting from semester 1).

Sample Audit Courses

- English for Research Paper Writing
- Business Communication and Presentation Skills
- Ethics & Human Values
- Pedagogy Studies
- Cost Management of Engineering Projects
- Personality Development through Life Enlightenment Skills
- Operations Research
- Composite Materials
- Energy from Waste
- Entrepreneurship Development
- Principles of Automation

SEMESTER IV

Slot	Courses	Ma	arks	ТТР	Hours	Credit	
3101	Courses	CIA	ESE	L-1- P	Hours		
		K 1					
А	Dissertation Phase II	100 100		0-0-24	24	16	
		TRAC	K 2	•			
А	Research Project Phase	100 100 0-0-2		0-0-24	24	16	
	TOTAL	100	100		24	16	

Teaching Assistance: 5 hours

TRACK 1 / TRACK 2

In second year, the students can choose either of the two tracks: TRACK 1 or TRACK 2. Track 1 is conventional M.Tech programme and Track 2 is M.Tech programme designed for students with scientific vigor for research and scientific knowledge. An aspirant in track 2 needs to have a flavour for research and passion for the topic. The candidates should also be good with performing in-depth research and colluding the conclusions of research led by them. Such students are expected to have the following skills: Technical Skills, Research Skills, Communication Skills, Critical Thinking Skills, and Problem Solving Skills.

The eligibility for Track 2:

- Shall have qualified in the GATE or have a SGPA above 8.5 during the first semester, and
- Qualify an interview during the end of second semester by an expert committee constituted by the respective Institutions

In research project track, the research work shall be accepted or published in a journal (indexed in SCI/Unpaid SCOPUS).

COURSE NUMBERING SCHEME

The course number consists of digits/alphabets. The pattern to be followed is **YYSCDDNNN.**

It is illustrated below: Examples:

>222TCE002 is a Core offered by the Civil department in semester 2

> 222EEX001 is an Elective offered by the Industry in semester2

>221RGE001 is Research Methodology & IPR for all programmes offered in semester 1

YY: Last two digits of year of regulation

S: Semester of study

- 1- Semesters 1
- 2- Semester 2
- 3- Semester 3
- 4- Semester 4

C: Course Type

- T- Core Course
- E- Elective Course
- A- Audit Course
- R- Research Methodology & IPR
- L- Laboratory Course
- I- Internship
- M- MOOC
- P- Project/Dissertation

DD: Department offering the course

Sl.No	Department	Course Prefix	ix Sl.No Department			
01	AE & Instrumentation	AE	08	Electronics & Communication	EC	
02	Biomedical Engg	BM	09	Any	GE	
03	Biotechnology	BT	10	Information Technology	IT	
04	Chemical Engg	СН	11	Instrumentation & Control	IC	
05	Civil Engg	CE	12	Mechanical Engg	ME	
06	Computer Science	CS	13	Production Engg	PE	
07	Electrical & Electronics	EE	14	EX		

NNN: Course sequence number

ASSESSMENT PATTERN

(i) CORE COURSES

Evaluation shall only be based on application, analysis or design based questions (for both internal and end semester examinations).

Continuous Internal Evaluation: 40 marks

Micro project/Course	based	project	:	20	marks
Course based task/Se	eminar/C	Quiz :		10	marks
Test paper, 1 no.		:	10	mar	ks

The project shall be done individually. Group projects not permitted. Test paper shall include minimum 80% of the syllabus.

End Semester Examination: 60 marks

The end semester examination will be conducted by the University. There will be two parts; Part A and Part B. Part A contain 5 numerical questions (such questions shall be useful in the testing of knowledge, skills, comprehension, application, analysis, synthesis, evaluation and understanding of the students), with 1 question from each module, having 5 marks for each question. Students shall answer all questions. Part B contains 7 questions (such questions shall be useful in the testing of overall achievement and maturity of the students in a course, through long answer questions relating to theoretical/practical knowledge, derivations, problem solving

and quantitative evaluation), with minimum one question from each module of which student shall answer any five. Each question can carry 7 marks. Total duration of the examination will be 150 minutes.

(ii) ELECTIVE COURSES

Evaluation shall only be based on application, analysis or design based questions (for both internal and end semester examinations).

Continuous Internal Evaluation: 40 marks

Preparing a review article based on peer reviewed

Original publications (minimum 10 publications shall be referred)	:	15 marks
Course based task/Seminar/Data collection and interpretation	:	15 marks
Test paper, 1 no.	:	10 marks

Test paper shall include minimum 80% of the syllabus.

End Semester Examination: 60 marks

The end semester examination will be conducted by the respective College. There will be two parts; Part A and Part B. Part A will contain 5 numerical/short answer questions with 1 question from each module, having 5 marks for each question (such questions shall be useful in the testing of knowledge, skills, comprehension, application, analysis, synthesis, evaluation and understanding of the students). Students should answer all questions. Part B will contain 7 questions (such questions shall be useful in the testing of overall achievement and maturity of the students in a course, through long answer questions relating to theoretical/practical knowledge, derivations, problem solving and quantitative evaluation), with minimum one question from each module of which student should answer any five. Each question can carry 7 marks.

Note: The marks obtained for the ESE for an elective course shall not exceed 20% over the average ESE mark % for the core courses. ESE marks awarded to a student for each elective course shall be normalized accordingly. For example if the average end semester mark % for a core course is 40, then the maximum eligible mark % for an elective course is 40+20 = 60 %.

(iii) RESEARCH METHODOLOGY & IPR/AUDIT COURSE

Continuous Internal Evaluation: 40 marks

Course based task	:	15 marks
Seminar/Quiz	:	15 marks
Test paper, 1 no.	:	10 marks

Test paper shall include minimum 80% of the syllabus.

End Semester Examination: 60 marks

The examination will be conducted by the respective College. The examination will be for 150 minutes and will contain 7 questions, with minimum one question from each module of which student should answer any five. Each question can carry 12 marks.

(iv) INTERNSHIP

Internships are educational and career development opportunities, providing practical experience in a field or discipline. They are structured, short-term, supervised placements often focused around particular tasks or projects with defined timescales. An internship may be compensated or non-compensated by the organization providing the internship. The internship has to be meaningful and mutually beneficial to the intern and the organization. It is important that the objectives and the activities of the internship program are clearly defined and understood. The internship offers the students an opportunity to gain hands-on industrial or organizational exposure; to integrate the knowledge and skills acquired through the coursework; interact with professionals and other internship often acts as a gateway for final placement for many students.

A student shall opt for carrying out the Internship at an Industry/Research Organization or at another institute of higher learning and repute (Academia). The organization for Internship shall be selected/decided by the students on their own with prior approval from the faculty advisor/respective PG Programme Coordinator/Guide/Supervisor. Every student shall be assigned an internship Supervisor/Guide at the beginning of the Internship. The training shall be related to their specialisation after the second semester for a minimum duration of six to eight weeks. On completion of the course, the student is expected to be able to develop skills in facing and solving the problems experiencing in the related field.

Objectives

- Exposure to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry.
- Provide possible opportunities to learn understand and sharpen the real time technical / managerial skills required at the job.
- Exposure to the current technological developments relevant to the subject area of training.
- Create conducive conditions with quest for knowledge and its applicability on the job.
- Understand the social, environmental, economic and administrative considerations that influence the working environment.
- > Expose students to the engineer's responsibilities and ethics.

Benefits of Internship

Benefits to Students

- > An opportunity to get hired by the Industry/ organization.
- > Practical experience in an organizational setting & Industry environment.
- Excellent opportunity to see how the theoretical aspects learned in classes are integrated into the practical world. On-floor experience provides much more professional experience which is often worth more than classroom teaching.
- Helps them decide if the industry and the profession is the best career option to pursue.
- > Opportunity to learn new skills and supplement knowledge.
- > Opportunity to practice communication and teamwork skills.
- Opportunity to learn strategies like time management, multi-tasking etc in an industrial setup.
- > Makes a valuable addition to their resume.
- > Enhances their candidacy for higher education/placement.
- Creating network and social circle and developing relationships with industry people.

Provides opportunity to evaluate the organization before committing to a full time position.

Benefits to the Institute

- > Build industry academia relations.
- > Makes the placement process easier.
- > Improve institutional credibility & branding.
- > Helps in retention of the students.
- Curriculum revision can be made based on feedback from Industry/ students.
- > Improvement in teaching learning process.

Benefits to the Industry

- > Availability of ready to contribute candidates for employment.
- > Year round source of highly motivated pre-professionals.
- Students bring new perspectives to problem solving.
- Visibility of the organization is increased on campus.
- Quality candidate's availability for temporary or seasonal positions and projects.
- > Freedom for industrial staff to pursue more creative projects.
- Availability of flexible, cost-effective workforce not requiring a long-term employer commitment.
- Proven, cost-effective way to recruit and evaluate potential employees.
- Enhancement of employer's image in the community by contributing to the educational enterprise.

Types of Internships

- Industry Internship with/without Stipend
- Govt / PSU Internship (BARC/Railway/ISRO etc)
- Internship with prominent education/research Institutes
- Internship with Incubation centres /Start-ups

Guidelines

- All the students need to go for internship for minimum duration of 6 to 8 weeks.
- Students can take mini projects, assignments, case studies by discussing it with concerned authority from industry and can work on it during internship.
- All students should compulsorily follow the rules and regulations as laid by industry.
- Every student should take prior permissions from concerned industrial authority if they want to use any drawings, photographs or any other document from industry.
- > Student should follow all ethical practices and SOP of industry.
- Students have to take necessary health and safety precautions as laid by the industry.
- Student should contact his /her Guide/Supervisor from college on weekly basis to communicate the progress.
- > Each student has to maintain a diary/log book
- > After completion of internship, students are required to submit
 - Report of work done
 - o Internship certificate copy
 - Feedback from employer / internship mentor
 - Stipend proof (in case of paid internship).

Total Marks 100: The marks awarded for the Internship will be on the basis of (i) Evaluation done by the Industry (ii) Students diary (iii) Internship Report and (iv) Comprehensive Viva Voce.

Continuous Internal Evaluation: 50 marks

Student's diary	-	25 Marks
Evaluation done by the Industry	-	25 Marks

Student's Diary/ Daily Log: The main purpose of writing daily diary is to cultivate the habit of documenting and to encourage the students to search for details. It develops the students' thought process and reasoning abilities. The students should record in the daily training diary the day to day account of the observations,

impressions, information gathered and suggestions given, if any. It should contain the sketches & drawings related to the observations made by the students. The daily training diary should be signed after every day by the supervisor/ in charge of the section where the student has been working. The diary should also be shown to the Faculty Mentor visiting the industry from time to time and got ratified on the day of his visit. Student's diary will be evaluated on the basis of the following criteria:

- > Regularity in maintenance of the diary
- > Adequacy & quality of information recorded
- > Drawings, design, sketches and data recorded
- > Thought process and recording techniques used
- > Organization of the information.

The format of student's diary

Name of the Organization/Section:

Name and Address of the Section Head:

Name and Address of the Supervisor:

Name and address of the student:

Internship Duration: From To

Brief description about the nature of internship:

Day	Brief write up about the Activities carried out: Such as design, sketches, result observed, issues identified, data recorded, etc.
1	
2	
3	

Signature of Industry Supervisor

Signature of Section Head/HR Manager

Office Seal

Attendance Sheet

Name of the Organization/Section:

Name and Address of the Section Head:

Name and Address of the Supervisor:

Name and address of the student:

Internship Duration: From To

Month & Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Month																					
& Year																					
Month																					
& Year																					

Signature of Industry Supervisor

Signature of Section Head/HR Manager

Office Seal

Note:

- Student's Diary shall be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the Institute immediately after the completion of the training.
- Attendance Sheet should remain affixed in daily training diary. Do not remove or tear it off.
- Student shall sign in the attendance column. Do not mark 'P'.
- Holidays should be marked in red ink in the attendance column. Absent should be marked as 'A' in red ink.

Evaluation done by the Industry (Marks 25)

Format for Supervisor Evaluation of Intern

Student Name :	Date:
Supervisor Name :	_Designation:
Company/Organization :	
Internship Address:	
Dates of Internship: From	То

Please evaluate intern by indicating the frequency with which you observed the following parameters:

Parameters	Marks	Needs improvement (0 – 0.25 mark)	Satisfactory (0.25 – 0.50 mark)	Good (0.75 mark)	Excellent (1 mark)
Behavior					
Performs in a dependable Manner					
Cooperates with coworkers and supe	ervisor				
Shows interest in work					
Learns quickly					
Shows initiative					
Produces high quality work					
Accepts responsibility					
Accepts criticism					
Demonstrates organizational skills					
Uses technical knowledge and expe	rtise				
Shows good judgment					
Demonstrates creativity/originality					
Analyzes problems effectively					
Is self-reliant					
Communicates well					
Writes effectively					
Has a professional attitude					
Gives a professional appearance					
Is punctual					
Uses time effectively					

Overall performance of student

Intern (Tick one) : Needs improvement (0 - 0.50 mark) / Satisfactory (0.50 – 1.0 mark) / Good (1.5 mark) / Excellent (2.0 mark)

Additional comments, if any (2 marks):

Signature of Industry Supervisor

Signature of Section Head/HR Manager

Office Seal

End Semester Evaluation (External Evaluation): 50 Marks

Internship Report	-	25 Marks
Viva Voce	-	25 Marks

Internship Report: After completion of the internship, the student should prepare a comprehensive report to indicate what he has observed and learnt in the training period and should be submitted to the faculty Supervisor. The student may contact Industrial Supervisor/ Faculty Mentor for assigning special topics and problems and should prepare the final report on the assigned topics. Daily diary will also help to a great extent in writing the industrial report since much of the information has already been incorporated by the student into the daily diary. The training report should be signed by the Internship Supervisor, Programme Coordinator and Faculty Mentor.

The Internship report (25 Marks) will be evaluated on the basis of following criteria:

- Originality
- Adequacy and purposeful write-up
- > Organization, format, drawings, sketches, style, language etc.
- > Variety and relevance of learning experience
- Practical applications, relationships with basic theory and concepts taught in the course

Viva Voce (25 Marks) will be done by a committee comprising Faculty Supervisor, PG Programme Coordinator and an external expert (from Industry or research/academic Institute). This committee will be evaluating the internship report also.

(v) LABORATORY COURSES

The laboratory courses will be having only Continuous Internal Evaluation and carries 100 marks. Final assessment shall be done by two examiners; one examiner will be a senior faculty from the same department.

(vi) INDUSTRY BASED ELECTIVE/INTERDISCIPLINARY ELECTIVE

Engineering students frequently aspire to work in areas and domains that are key topics in the industry. There are concerns by recruiters that skill sets of engineering students did not match with the Industry requirements, especially in the field of latest topics. In response to their desires, the University has incorporated Industry/Interdisciplinary electives in the curriculum.

Interdisciplinary knowledge is critical for connecting students with current industry trends, where multitasking is the norm. Interdisciplinary knowledge aids in the bridgebuilding process between academic institutions and industry. It aids pupils in expanding their knowledge and innovating by allowing them to create something new. While core engineering courses provide students with a strong foundation, evolving technology necessitates new methods and approaches to progress, prosperity, and the inculcation of problem-solving techniques. Other courses' knowledge, on the other hand, can assist them to deal with any scenario more effectively. Interdisciplinary courses may be one approach to address such needs, as they can aid in the enhancement of engineering education and the integration of desirable specialised subjects into the current engineering education system. This will enable students to fulfil the current industry demands. Students with multidisciplinary knowledge and projects are more likely to be placed in top industries, according to the placement trend. The future of developing engineers will be influenced by their understanding of emerging technology and interdisciplinary approaches such as big data, machine learning, and 3-D printing.

Rapid technological advancements and the onset of the Fourth Industrial Revolution have resulted in a massive revival in the way engineering works in the industry. Projects necessitate the integration of knowledge and abilities from a diverse variety of engineering specialities, with the barriers between them becoming increasingly blurred.

Students can choose courses offered by other departments/nearby Industries that cover a wide range of highly relevant topics such as artificial intelligence, internet of things, big data, automation, and other software or other relatable courses.

The assessment pattern for Interdisciplinary electives is as follows:

Continuous Internal Evaluation: 40 marks

Preparing a review article based on peer reviewed

Original publications (minimum 10 publications shall be		
referred)	:	15 marks
Course based task/Seminar/Data collection and interpretation	:	15 marks
Test paper, 1 no.	:	10 marks

Test paper shall include minimum 80% of the syllabus.

End Semester Examination: 60 marks

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The end semester examination will be conducted by the respective College. There will be two parts; Part A and Part B. Part A will contain 5 numerical/short answer questions with 1 question from each module, having 5 marks for each question (such questions shall be useful in the testing of knowledge, skills, comprehension, application, analysis, synthesis, evaluation and understanding of the students). Students should answer all questions. Part B will contain 7 questions (such questions shall be useful in the testing of overall achievement and maturity of the students in a course, through long answer questions relating to theoretical/practical knowledge, derivations, problem solving and quantitative evaluation), with minimum one question from each module of which student should answer any five. Each question can carry 7 marks.

The assessment pattern for Industry based electives is as follows:

Continuous Internal Evaluation: 40 marks

The continuous internal evaluation will be done by the expert in the Industry handling the course.

Micro project/Course based project	:	20 marks
Course based task/Seminar/Quiz	:	10 marks
Test paper, 1 no.	:	10 marks

The project shall be done individually. Group projects not permitted. Test paper shall include minimum 80% of the syllabus.

End Semester Examination: 60 marks

The examination will be conducted by the respective College with the question paper provided by the Industry. The examination will be for 150 minutes and will contain 7 questions, with minimum one question from each module of which student should answer any five. Each question can carry 12 marks. The valuation of the answer scripts shall be done by the expert in the Industry handling the course.

(vii) MOOC COURSES

The MOOC course shall be considered only if it is conducted by the agencies namely AICTE/NPTEL/SWAYAM or NITTTR. The MOOC course should have a minimum duration of 8 weeks and the content of the syllabus shall be enough for at least 40 hours of teaching. The course should have a proctored/offline end semester examination. The students can do the MOOC according to their convenience, but

shall complete it by third semester. The list of MOOC courses will be provided by the concerned BoS if at least 70% of the course content match with the area/stream of study. The course shall not be considered if its content has more than 50% of overlap with a core/elective course in the concerned discipline or with an open elective.

MOOC Course to be successfully completed before the commencement of fourth semester (starting from semester 1). A credit of 2 will be awarded to all students whoever successfully completes the MOOC course as per the evaluation pattern of the respective agency conducting the MOOC.

(viii) MINIPROJECT

Total marks: 100, only CIA

Mini project can help to strengthen the understanding of student's fundamentals through application of theoretical concepts and to boost their skills and widen the horizon of their thinking. The ultimate aim of an engineering student is to resolve a problem by applying theoretical knowledge. Doing more projects increases problemsolving skills. The introduction of mini projects ensures preparedness of students to undertake dissertation. Students should identify a topic of interest in consultation with PG Programme Coordinator that should lead to their dissertation/research project. Demonstrate the novelty of the project through the results and outputs. The progress of the mini project is evaluated based on three reviews, two interim reviews and a final review. A report is required at the end of the semester.

Interim evaluation: 40 (20 marks for each review), final evaluation by a Committee (will be evaluating the level of completion and demonstration of functionality/specifications, clarity of presentation, oral examination, work knowledge and involvement): 35, Report (the committee will be evaluating for the technical content, adequacy of references, templates followed and permitted plagiarism level is not more than 25%): 15, Supervisor/Guide: 10

(ix) RESEARCH PROJECT/DISSERTATION

Research Project: Students choosing track 2 shall carry out the research project in their parent Institution only under the guidance of a supervisor assigned by the DLAC.

Dissertation: All categories of students in track 1 are to carry out the dissertation in the Institute they are studying or can work either in any CSIR/Industrial R&D organization/any other reputed Institute which have facilities for dissertation work in the area proposed. **Dissertation outside the Institute**: For doing dissertation outside the Institution, the following conditions are to be met:

- They have completed successfully the course work prescribed in the approved curriculum up to the second semester.
- > The student has to get prior approval from the DLAC and CLAC.
- Facilities required for doing the dissertation shall be available in the Organization/Industry (A certificate stating the facilities available in the proposed organization and the time period for which the facilities shall be made available to the student, issued by a competent authority from the Organization/Industry shall be submitted by the student along with the application).
- They should have an external as well as an internal supervisor. The internal supervisor should belong to the parent institution and the external supervisor should be Scientists or Engineers from the Institution/Industry/ R&D organization with which the student is associated for doing the dissertation work. The external supervisor shall be with a minimum post graduate degree in the related area.
- The student has to furnish his /her monthly progress as well as attendance report signed by the external guide and submit the same to the concerned Internal guide.
- The external guide is to be preferably present during all the stages of evaluation of the dissertation.

Note1- Students availing this facility should continue as regular students of the parent institute itself.

Note 2-The course work in the 3rd semester is to be completed as per the curriculum requirements (i) MOOC can be completed as per the norms mentioned earlier (ii) Audit course are to be carried out either in their parent Institution or by self-learning. However, for self-learning students, all assessments shall be carried out in their parent Institution as in the case of regular students.

Internship leading to Dissertation: The M. Tech students who after completion of 6 to 8 weeks internship at some reputed organization are allowed to continue their work as dissertation for the third and fourth semester after getting approval from the DLAC. Such students shall make a brief presentation regarding the work they

propose to carry out before the DLAC for a detailed scrutiny and to resolve its suitability for accepting it as an M.Tech dissertation. These students will be continuing as regular students of the Institute in third semester for carrying out all academic requirements as per the curriculum/regulation. However, they will be permitted to complete their dissertation in the Industry/Organization (where they have successfully completed their internship) during fourth semester.

Dissertation as part of Employment: Students may be permitted to discontinue the programme and take up a job provided they have completed all the courses till second semester (FE status students are not permitted) prescribed in the approved curriculum. The dissertation work can be done during a later period either in the organization where they work if it has R & D facility, or in the Institute. Such students should submit application with details (copy of employment offer, plan of completion of their project etc.) to the Dean (PG) through HoD. The application shall be vetted by CLAC before granting the approval. When the students are planning to do the dissertation work in the organization with R & D facility where they are employed, they shall submit a separate application having following details:

- Name of R&D Organization/Industry
- Name and designation of an external supervisor from the proposed Organization/Industry (Scientists or Engineers with a minimum post graduate degree in the related area) and his/her profile with consent
- Name and designation of a faculty member of the Institute as internal supervisor with his/her consent
- Letter from the competent authority from the Organization/Industry granting permission to do the dissertation
- Details of the proposed work
- > Work plan of completion of project

DLAC will scrutinize the proposal and forward to CLAC for approval.

When students are doing dissertation work along with the job in the organization (with R & D facility) where they are employed, the dissertation work shall be completed in four semesters normally (two semesters of dissertation work along with the job may be considered as equivalent to one semester of dissertation work at the Institute). Extensions may be granted based on requests from the student and recommendation of the supervisors such that he/she will complete the M. Tech programme within four years from the date of admission as per the regulation. Method of assessment and grading of the dissertation will be the same as in the case of

regular students. The course work in the 3rd semester for such students are to be completed as per the curriculum requirements (i) MOOC can be completed as per the norms mentioned earlier (ii) Audit course are to be carried out either in their parent Institution or by self learning. However, for self learning students, all assessments shall be carried out in their parent Institution as in the case of regular students.

Mark Distribution:

Phase 1: Total marks: 100, only CIA

Phase 2: Total marks: 200, CIA = 100 and ESE = 100 marks

(x) TEACHING ASSISTANCESHIP (TA)

All M.Tech students irrespective of their category of admission, shall undertake TA duties for a minimum duration as per the curriculum. Being a TA, the student will get an excellent opportunity to improve their expertise in the technical content of the course, enhance communication skills, obtain a hands-on experience in handling the experiments in the laboratory and improve peer interactions.

The possible TA responsibilities include the following: facilitate a discussion section or tutorial for a theory/ course, facilitate to assist the students for a laboratory course, serve as a mentor for students, and act as the course web-master. TAs may be required to attend the instructor's lecture regularly. A TA shall not be employed as a substitute instructor, where the effect is to relieve the instructor of his or her teaching responsibilities (specifically prohibited by University Policy).

For the tutorial session:

- (i) Meet the teacher and understand your responsibilities well in advance, attend the lectures of the course for which you are a tutor, work out the solutions for all the tutorial problems yourself, approach the teacher if you find any discrepancy or if you need help in solving the tutorial problems, use reference text books, be innovative and express everything in English only.
- (ii) Try to lead the students to the correct solutions by providing appropriate hints rather than solving the entire problem yourself, encourage questions from the students, lead the group to a discussion based on their questions, plan to ask them some questions be friendly and open with the students, simultaneously being firm with them.
- (iii) Keep track of the progress of each student in your group, give a periodic feedback to the student about his/her progress, issue warnings if the student is

consistently under-performing, report to the faculty if you find that a particular student is consistently underperforming, pay special attention to slow-learners and be open to the feedback and comments from the students and faculty.

(iv) After the tutorial session vou mav be reauired to arade the tutorials/assignments/tests. Make sure that you work out the solutions to the questions yourself, and compare it with the answer key, think and work out possible alternate solutions to the same question, understand the marking scheme from the teacher. 3. Consult the teacher if are and make sure that you are not partial to some student/students while grading. Follow basic ethics.

Handling a laboratory Session:

- (i) Meet the faculty in- charge a few days in advance of the actual lab class and get the details of the experiment, get clarifications from him/her regarding all aspects of the experiment and the expectations, prepare by reading about the theoretical background of the experiment, know the physical concepts involved in the experiment, go to the laboratory and check out the condition of the equipment/instrumentation, perform the laboratory experiment at least once one or two days before the actual laboratory class, familiarize with safety/ security aspects of the experiment / equipment/laboratory, prepare an instruction sheet for the experiment in consultation with the faculty, and keep sufficient copies ready for distribution to students for their reference.
- (ii) Verify condition of the equipment/set up about 30 minutes before the students arrive in the class and be ready with the hand outs, make brief introductory remarks about the experiment, its importance, its relevance to the theory they have studied in the class, ask the students suitable questions to know there level of preparation for the experiment, discuss how to interpret results, ask them comment on the results.
- (iii) Correct/evaluate/grade the submitted reports after receiving suitable instructions from the faculty in charge, continue to interact with students if they have any clarifications regarding any aspect of the laboratory session, including of course grading, Carefully observe instrument and human safety in laboratory class, Preparing simple questions for short oral quizzing during explanation of experiments enables active participation of students, facilitate attention, provides feedback and formative assessment.

POINTS TO REMEMBER

- 1. Arrange an awareness programme to all M.Tech students on day 1 regarding the curriculum and the regulation.
- 2. Make them aware about two tracks and its distinct features.
- 3. The departments should prepare the list of MOOC courses suitable to their programmes and encourage the students to complete at the earliest.
- 4. Make a tie up with industries by the middle of semester for Industry Electives. While choosing the Industry and the Industry electives, it should be ensured that the programme is relevant and updated in that discipline. The Industry expert handling the elective shall be a postgraduate degree holder. The evaluation procedure shall also be clearly explained to them.
- 5. If nearby Industries are not available, encourage all departments to offer courses for other disciplines that enrich interdisciplinary research.
- 6. Each department offering M.Tech programme should be careful in selecting the miniproject in semester 2. The miniproject should lead to dissertation/research project.
- 7. The departments should invite the Industries/research organizations during first semester and inform them about the mandatory 6-8 weeks internship that the students should undergo after their second semester. The possibility of doing their dissertation at the Industry shall also be explored. They should also be made aware about the evaluation procedure of the Internships. They may also be informed that it is possible to continue internship provided if it leads to their dissertation. Proposals may be collected from them for allotting to students according to their fields of interest.
- Make sure that all internal assessments and the end semester examinations to be conducted by the respective Institutions are carried out as per the assessment procedure listed in the curriculum. Any dilution from the prescribed procedure shall be viewed seriously.
- Teaching assistance shall be assigned to all students as per the curriculum. However, a TA shall not be employed as a substitute instructor, where the effect is to relieve the instructor of his or her teaching responsibilities (strictly prohibited by University Policy).
- 10. The possible TA responsibilities include the following: facilitate a discussion section or tutorial for a theory/ course, facilitate to assist the students for a laboratory course, serve as a mentor for students, and act as the course web-master