Draft Approach Paper for M.Tech Curriculum Review

Issues

The following issues pertaining to curriculum were identified by wide consultations through a M.Tech. Curriculum Worskhop and detailed discussions in the PG Curriculum Review Committee:

1. Preparedness of input leading to difficulty in setting an appropriate level of courses.
2. Difference in pedagogy of UG and PG courses; enhancement of self study content
3. Reduced level of research content in the curriculum; expectation from a project
4. Project monitoring and evaluation
5. TA work streamlining
6. Credit structure
7. Attrition in the M.Tech Programmes

Problems:

1. *Preparedness of input*: There are two types of M.Tech. programmes: one which constitutes further specialization of the undergraduate education, and the other which is multidisciplinary, and thus is loosely related to the undergraduate education or requires input from a wide variety of disciplines. In the first case, often it is argued that the level of education at the UG level is poor and hence, some 'UG' level courses have to be included again in the PG curriculum. This leads to lowering of the level of PG courses which is not desirable. On the other hand, in the second type of programmes where the background is not built up at the UG level for the PG programme, courses that build the background have to be included before advanced level courses can be taken up.

2. *Reduced level of research content*: Over the years, the quality of M.Tech. projects has gone down. Projects have become time-bound rather than goal-bound. The project are often not resulting in any tangible outcome in the form of a paper or a patent. It is expected that a project should lead to a significant research, a product or a process. One reason often advanced is that the number of students has increased leading to this state of affairs.

3. *Project monitoring and evaluation*: There is often a complaint from faculty that the students are not regular and are not taking the project work seriously. Further, most projects are not hardware based. There are also many problems with evaluation of project, such as the role of supervisor vis-à-vis the evaluation committee and the type of evaluation- graded or non-graded.

4. *Difference in pedagogy*: PG students are more mature as compared to UG students, and it is expected that they should be able to do a significant amount of self inquiry and self study. However, the curriculum has to provide enough opportunity and direction for this to happen. This would require a somewhat different approach to the design of courses for the PG level. The PG students should be trained in report/paper writing even before they write their project report.

5. *TA work streamlining*: All M.Tech. students have to put up to 8 hours/week of TA work in lieu of the assistantship they are given. This is thus a very large technical manpower that is available to the faculty; however, due to inadequate planning and organization at the faculty/department/institute level, this manpower is underutilized. Also in the first and the second semester, the course load, often, leaves little time for TA work.

6. *Credit Structure*: Credit structure should provide ample flexibility to accommodate variations in various programmes.

7. *Attrition in M.Tech. Programmes:*It has been observed that a number of students leave the

programmes in the first semester, giving rise to several vacancies. This problem has become more serious since the PSUs have started using GATE scores for their recruitments.

Proposals:

1. *Preparedness of input*: Each programme should consider a desirable level of preparedness of input students and should set the level of courses in that programme. There should be no courses for which are at the level of the degree programme which the students are supposed to have done. Each course may prescribe a set of online courses (e.g., NPTEL) or other online material which the admitted students are supposed to know. This should be specified at the website of the course/programme. If the course has input from multiple streams, there may be a one/two courses, as bridge courses, which the students could do as electives in the first semester to bring their knowledge in the relevant subject up to the desired level. However, these course should be specially designed for this purpose and should be run independently for this purpose only, and not merged / combined with one of the existing UG courses. Further, in each course in the first/second semester, a background reading material should be specified, so that the students who have weaker background in the specific subject could read on their own during the intervening vacations and during the semester. The important thing is that the courses in the M.Tech. should be at a higher level, so that good students have enough of challenge and are kept sufficiently engaged.
2. *Reduced level of research content*: An M.Tech. at IIT Delhi should have significant research content. The project component (at present 30%) which is expected to be entirely research, design and development based, needs to be strengthened and probably increased. Further, the project should have a tangible outcome in the form of a paper or a patent (or some other form of IPR / non-IPR outcomes). For this to happen the students have to have enough time to prepare, plan and execute the project. Some of the measures that can be taken are: (a) the project duration (2-3 semesters) and credits (18-24) can be increased. (b) A requirement of a tangible outcome can be stipulated.
3. *Project monitoring and evaluation*: Once a project is allotted to the students, its progress and regularity of the student have to be monitored. It may be a good idea to have a project logbook (physical or electronic) where the progress of work as well as meetings with the supervisor and the advice given by the supervisor are recorded. This logbook should be part of the project evaluation process. Project also has to be evaluated periodically. We may continue with the current practice of two evaluations per semester. For an A grade the project must have a tangible outcome, e.g., in the form of a research paper / patent, tangible deliverables as part of sponsored projects such as Defence projects where IPR is not possible, import substitution projects, field installations and testing, etc., as specified by the respective Faculty Board/PAC/PEC and publicized in advance. The Faculty Board/PAC/PEC would also need to deliberate and devise specific criteria and a separate mechanism for the award of A grade. The project evaluation committee would evaluate and propose a grade for the project, not exceeding A(-) grade. Award of A grade as per the criteria as above could be done by the same committee or a separate committee as decided by the Faculty Board/PAC/PEC.
4. *Difference in pedagogy*: Design of courses must take into account the fact that the students are mature and have already done first/second degree. It is expected and should be considered in the course design that these students can do self study. The time schedule for PG courses and course credits should also account for the work expected from the students. They should also be required to write more term papers/assignments. In fact the report writing skills should be honed during the courses rather than leaving it for the project. It should be mandatory for the student to check these submissions through anti-plagiarism software. The format for preparation of these should also be specified.
5. *TA work streamlining*: We have large number of students as technical manpower being

supported by the Institute Assistantship; however, due to lack of planning these are not being utilized properly. On the other hand the faculty members have to carry out a number of routine jobs as part of their teaching/research/administrative commitments. We should make a comprehensive effort to utilize the manpower for reducing the burden on faculty. We should identify the kind of jobs that can be offloaded to the TAs. This can be done at the Institute level as well as at the academic unit level.

6. *Credit structure*: The total credits for an M.Tech. programme would remain 60 with following break-up:

Programme Core:	min 36 (including project: min 18 max 24)
Programme Electives:	min 9
Open Electives:	min 6
Total:	60

The Programme electives would be chosen out of a list of courses specified by the Department / Centre / School. The open electives would be chosen by the student from across the institute, and these could also be from the list of programme electives. Major project would be part of the core, and could be 18, 21 or 24 credits. It could be spread over 2-3 semesters and summer, with the break-up of credits between semesters as specified by the academic unit. In case of 18 credits, it could be 6+12 or 3+3+12 while in the case of 21, it could be 3+6+12 or 9+12 and in the case of 24, it could be 6+6+12 or 3+9+12. Provision should also be available for off-campus Major projects during the third and fourth semesters. In the last semester, since there is only project to be registered, the Major project must be of 12 credits (the minimum credits in a semester). The summer semester after first year could also be made a registered semester with some credits associated with it for the project.

7. *Attrition from M.Tech. Programmes:* Since most attrition takes place in the first semester, the willing programmes may opt to admit students in the second semester. However, the admission criteria, including the shortlisting criteria for all categories, should be the same as those during the first semester admission. Further, the courses in the first and second semesters should preferably be such that they can be taken in any order, such that there is no need for running any course specially for students admitted in the II semester.