AP-92
Senate/Agenda/2013-14/1st/23.09.2013

The Master of Technology (M .Tech.) Programme at IIT Kanpur

Recommendations of the Fifth Academic Programme Review Committee

May 2013

Executive Summary

- **Credit system and registration:** The Academic Programme Review Committee proposes a completely credit-based system. In this system, the course credits will be computed based on the student-time required per week for the course using the following formula:
  $C = L + T + P + SS$, where C is the number of credits, L is the number of lecture hours, T is the number of tutorial hours, P is the number of laboratory hours, and SS is the number of self-study hours given by the following formula with A representing the additional number of hours needed for assignments and projects, as decided at the time of approval of the course.
  $SS = 2L + T + A$
  There is no discussion hour in any course. The overall credit formula then becomes $C=3L+2T+P+A$. The normal load of a typical student is 36 credits per semester. A student may register for 27-45 credits in a semester. Four thesis units per semester is prescribed as the normal academic load for students doing no course work. Each thesis unit corresponds to nine credits. M.Tech. students must register in summer for at most 18 credits. The credit system is discussed in detail in Section 2.1.

- **Grading scales:** Added a new grade A* with same equivalent points as A grade to recognize excellence on transcripts. The grading scales are discussed in detail in Section 2.3.

- **Thesis grade:** Each thesis unit should be graded satisfactory (S) or unsatisfactory (X). See Section 2.5 and Appendix I for further details.

- **Two new programmes:** In addition to the regular M.Tech. programme as it presently exists, two new programmes leading to an M.Tech. Degree are being proposed: (a) **Extended M.Tech. Programme,** and (b) **A 3-year M Tech Programme** for bright students with a B. Sc. Degree. Details are in Section 1.1.

- **Graduation requirements:** The minimum graduation requirement for a regular M.Tech. degree is 54 course credits (in addition to the Communication Skills course) and 81 thesis credits. For the extended M.Tech. pogramme, these numbers are 72 course credits and 99 thesis credits. For the students who join the 3-year M.Tech. programme with a B.Sc. Degree, the minimum requirements are 144 course credits and 99 thesis credits. The student must have a minimum of B grade in 50% of the mandatory course credits (roughly three courses for the regular M.Tech. programme) and a minimum of D grade in the remaining course credits. . These numbers for students in the other two programmes are 36 credits and 72 credits respectively. See Section 2.7 for more details.

- **Communication skills: C**ommunication skills may be acquired by a student through either a web-based course, a course module taught by a professional, or a seminar course. This is a 2-5 credit, Pass/Fail course. See Section 2.2 and Appendix II for further details.

- **Interdisciplinary research:** While the academic programmes in the respective departments should continue, it is recommended to have flexibility in setting up academic programmes that run across more than one department. See Section 3 for a discussion on this topic.

- **APEC rules:** A student goes on probation if s/he fails to accumulate 'B' or higher grade in

at least 30% of the cumulative course credits up to that point. The programme of the student is terminated if s/he is on probation and fails to accumulate at least 20% of the cumulative credits up to that point with 'B' grade or better. The semesters that the student may be on leave are excluded from the computation. Once the student acquires a minimum of B grade in 50% of the mandatory course credits, s/he is not subject to APEC rules for course credits. The APEC rules regarding grades in thesis credits remain the same as at present. These are described in Section 2.10.

- **Dual M.Tech-Ph.D. Degree:** Students may upgrade their programme to a M.Tech.-Ph.D. dual degree programme. They may apply for this change anytime after spending two semesters in the programme. The details are in Section 2.8.

- **Examinations:** One mid-semester and one end-semester examination.

- **Modular courses:** A modular course may be offered for half a semester with only one examination at the end aligned with the mid-semester examination schedule. Modular courses open up the option of offering an elective course only during one half of a semester. This will bring enormous flexibility in the system.

- **Admissions**: The committee recommends a review of the admission process and the role of GATE score. Also. in view of the two new M.Tech. programmes being proposed, the admission process needs to defined for the same. Details are in Section 1.2.1.

1. Introduction

It is nearly 50 years since the Indian Institute of Technology Kanpur (IITK) was established. This is the first time that the Institute is conducting a review of its M.Tech. programme.

1.1 The Programme

At present, the Institute runs a M.Tech. programme whose duration is roughly four semesters and a Summer. Several possible programmes that lead to an M. Tech. degree were discussed and are listed below. The role of GATE for admission to these programmes is discussed under the section admisions.

i) **The regular M.Tech. Programme as it exists at present (recommended by ARC):** The committee recommends that this programme be continued with modifications as listed later in the document.

ii) **M.Tech. Programme primarily based on course work (not recommended by ARC):** It is noted that at present the thesis forms a significant percentage of the credits that are required to earn a M.Tech. degree. It was suggested to explore the possibility of offering a parallel track of the M.Tech. programme where the student does a mini project (in place of a thesis) and earns the required credits via additional course work. However, it was strongly felt that the M.Tech programme should really focus on research. Nevertheless, there is a need to attract more professionals from the Industry and candidates who have prior experience in research. This leads to the next option listed below.

iii) **A programme similar to M.S. by Research (not recommended by ARC):** The committee discussed the M.S. by research programme as it exists in other Institutes. It was pointed out that the input to this programme is from the same pool of students who apply for the regular M.Tech. programme. Usually the students who join the programme are the ones who do not make it to the regular M.Tech. programme. So, in some sense the students admitted to this programme are academically weaker (than those admitted to M Tech programme) but take fewer courses and are expected to do more research. Therefore, the M.S. by Research programme via reduced course work appears to be an ill conceived idea.

iv) **Extended M.Tech. Programme (recommended by ARC):** If the admissions committee is unable to find enough candidates suitable for the regular M.Tech. Programme, then the committee may select students for the extended M.Tech. programme. The ARC notes that prior experience in research is also a valuable resource and such candidates can do a good thesis if given an opportunity, even if they do not qualify/are not eligible for the regular .M.Tech. programme. However, such candidates might need to be prepared with extra course work. It is recommended that there should be new guidelines for admission of all such candidates. Also, their programme will be relatively longer to earn (additional) course credits.

v) **A 3-year M.Tech. Programme for bright students with a B.Sc. Degree (recommended by ARC)**: There is a large pool of good students who have a B.Sc. Degree. Currently, the M.Tech. programme is mostly open to students with a B.Tech. We can possibly admit students with a B.Sc. to a 3-Year M.Tech. Programme. This concept already exists in

some form: For example, IIT Roorkee takes students in some areas (geosciencs) for a M.Tech. Programme. We are already taking students with 2 Year M.Sc. in some of our M.Tech. programmes. First year students in this programme should, perhaps, pay for themselves. Second year onwards they can be paid a stipend/fellowship/assistantship if they satisfy certain requirements such as GATE/CPI. Each department can decide whether it would like to run such a programme and can design the relevant course template. Possibly, the first year courses might include courses taken by undergraduate students that are offered anyway. This will minimize the extra load on teaching resources.

The success of the programme hinges on the right combination of (a) bright and motivated students, (b) a vibrant and challenging academic environment, (c) a rich and flexible curriculum, (d) state-of-the-art research infrastructure, and (e) inspiring mentors.

1.2 Students

Success of a programme primarily hinges on attracting and nurturing the candidates. The rigors of an M.Tech. programme demand that the student has the following attributes: intelligence, creativity and intense curiosity. It is important that the Institute attracts students with these attributes in large numbers for admission to the programme.

1.2.1 *Admissions*: The programme should be widely advertised. The admission process should be transparent and flexible. There is a need to widen the scope of admissions. The present admission policy of the institute is to assign 70% weightage to the GATE score. This is not helping us in getting the best students for the graduate programme. The departments should, therefore, decide on alternative admission procedures (which may still retain some role for GATE scores) and seek approval of SPGC/Senate. The requirement of GATE may be retained for the Institute Assistantship, if needed. However, admission criterion may be independent of GATE. Admissions to the two proposed new programmes (the Extended M.Tech. Programme and the 3-year M.Tech. programme for students with a B.Sc. Degree) will have to be evolved by the departments and approved by SPGC/Senate.

1.2.2 *Financial Support:* The current mechanism needs to be expanded to provide for various levels of financial support. This can include a) full fellowship, b) full assistantships as presently the case, c) partial assistantship, and d) partial/full fee-waiver. Industry sponsored/self supported students may also be considered.

1.2.3 *Student demography:* To be a truly international institute, there should be an effort to attract international students to our programme. One may need to look at various models of providing financial support to deserving candidates through global open advertisements.

1.3 Academic Environment

An ideal programme requires that the candidates go through learning in and outside their class-rooms/laboratories. This requires the following:

•State-of-the-art library (physical as well as digital)

•Comfortable and hassle-free living facilities which are also sensitive to married scholars

•Efficient internet access

•An open learning environment including regular seminars, discussions, workshops, and talks by eminent speakers/professionals that generate intense curiosity

•Academic responsibility through tutoring and teaching assistantships

•Opportunities to participate in cutting edge industrial and fundamental research projects

•Encourage widening of horizon through inter-disciplinary research

•Personality development through participation in sports/cultural/social/entrepreneurial activities

Promoting Excellence: The Institute must evolve and support mechanisms to promote excellence amongst M.Tech. scholars via incentives in the form of citations/awards/fee-waivers/travel support.

1.4 Curriculum

The curriculum should have the right combination of depth and breadth in order to provide the student with sound fundamental training. It should allow flexibility for the student to get exposed to current frontiers of research through advanced courses. The student should have the opportunity and freedom to be exposed to international experience. This may be possible via attending conferences, workshops, collaborative research, transfer of credits. Expert seminars and short courses via web/video conferencing should be actively looked into. There is a need to evolve interdisciplinary courseware to encourage borderless thinking. It would also be useful to sensitize the students to issues related to academic ethics and laboratory safety.

1.5 Research Infrastructure

This can be broadly classified under three headings: a) personal work area, b) computing resources and support, and c) laboratory equipment and support.

Personal work area: In order to contemplate, analyze and document, each student must have access to a personal work area with basic office support, i.e., furniture, storage space, desk top computer. Spaces should also be created to encourage interaction between research scholars. While it may not be possible to provide individual space to each student in the Master's programme, it is recommended that they must have access to either a personal work area or at least a common office/lounge.

Computing resources and support: In order to carry out high-end research, students will need computing resources. While some of these can be catered to locally, some intense applications will require access to high performance computing platforms and supporting software. There is also a need to provide help desks for students who may need help with use of computing resources. This help can be provided either by hiring specialized man power or help desks manned by trained students. Of course, the latter will have to be done on a rotation basis with proper financial compensation.

Laboratory equipment and support: As the frontiers of research are expanding rapidly, there is a need to upgrade and provide contemporary experimental facilities to our students. It is also

important that attention is paid to avoid/minimize downtime of these facilities. For smooth and efficient conduct of experiments all facilities should be manned by trained personnel.

2. Proposed Curriculum

In the following, the recommendations of the fifth academic programme review committee for M.Tech. curriculum are discussed in detail.

2.1. Credit System and Registration

The fifth academic programme review committee proposes a fully credit-based M.Tech. curriculum. Every academic activity will be evaluated in terms of credits. Academic load is directly converted to credits, as opposed to going through a non-linear mapping. Credits (C) explicitly reflect contact and self-study (SS) hours. The formula for computing credit is given by C = L + T + P + SS. Here, SS = 2L + T + A, where A indicates additional work. M.Tech. courses use the same credit formula as UG courses.

1. Some M.Tech. courses may have two versions, one for M.Tech. registrants and another for UG registrants. The former will have higher additional work component than the latter. Both courses, however, will have common lecture components.
2. The normal academic load for M.Tech. students is 36 credits per semester.
3. An M.Tech. student may register for 27-45 credits in a regular semester.
4. Four thesis units per semester is prescribed as the normal academic load for students doing no course work. Each thesis unit corresponds to nine credits of work. Each thesis unit receives a satisfactory (S) or unsatisfactory (X) grade.
5. M.Tech. students must register in summer. However, this should not lead to increased tuition fees for the students. They may register for at most 18 credits during summer. These credits may be earned through courses, thesis, or a mix of two.

The credit system is described in more detail in Appendix I.

2.2 Communication Skills

The committee feels that there is a need to expose all the students to a course focused on Communication Skills. This will be a Pass/Fail course with credits in the range of 2-5 and is in addition to the credits for other course work (outlined in section 2.7.1). The committee proposes the following three models, one of which may be adopted by each department.

Web based: This course has been successfully running for the UG students. It is suggested that a similar course can be run for the M.Tech. students as well. It can be offered to the students in the summer session, so that it does not interfere with their regular course-work in the first year. Details are in Appendix II.

Course module taught by a professional: Professionals from outside the Institute may be invited to teach this course. This course can take care of skills related to (non-technical) presentations, verbal communications, writing (like synopsis/abstraction etc.). Some of the salient features of this course can be, how to write and structure the content of reports, how to structure an organized thesis, etc. This could also be assisted by a *Language lab*, which would be run by professional(s) and needy students can seek its help as and when required. There are also

resources within the Campus to run a *Writing Help Desk*. This may be explored. The number of students is so large that the logistics requirement for these being mandatory is prohibitive.

Seminar courses: It was opined that any course on communication skills that drains on too much faculty resource might not succeed. Perhaps a worthwhile model is that each department offers seminar course with several sub-groups. Each sub-group can have 20-30 registered students and be headed by a faculty member. This should be Pass/Fail course where an S/X grade is awarded. The students would take turns to deliver a seminar every week and the mentoring is done by the faculty member.

2.3 Grading Scales

The fifth academic programme review committee recommends the introduction of an A* grade carrying the same level of points as an A grade. However, the A* grade is intended to recognize and encourage outstanding performance in a class. This grade should be used sparingly.

The description of the various letter grades is:

Grade	Weight	Description
A*	10	Outstanding
A	10	Excellent
B	8	Good
C	6	Fair
D	4	Pass
E	2	Fail/Exposure
F	0	Fail

2.4 Examinations

As in the UG programme, it is proposed to hold one mid-semester and one end-semester examination.

2.5 Thesis Grade

The committee also discussed if the S and X grades can be replaced by letter grades so that the gradation of the work can be finer and more accurate than S or X. However, it was felt that justifying a particular letter grade for a thesis unit may not be easy. It was also felt that multiple thesis units already offer a simple explanation of the grade in a semester e.g., SSSX can clearly tell the student that he/she has accomplished three-quarter of the work expected from him/her. It is recommended that the present practice of awarding S and X grades towards the thesis credits be continued.

2.6 Modular courses

A modular course can be offered for half a semester with only one examination at the end aligned with the mid/end semester examination schedule. Modular courses open up the option of offering an

elective course only during one half of a semester. This will bring enormous flexibility in the system. A student registering for a modular course earns half the credits (rounded to the next highest integer) than that of a regular course that runs for a full semester.

2.7 Graduation Requirements

Course-work forms an important component of education in the M.Tech. programme. It prepares the student for the research work, lays a strong foundation and also exposes him/her to the various points of views offered by the Instructors teaching the courses. An ideal M.Tech. programme provides adequate opportunity to the student to undertake creative and careful research.

2.7.1 Credits via course work:

Regular M.Tech. Programme: The minimum credit requirement for a regular M.Tech. programme is 54 credits of course work (in addition to the Communication Skills Course). Some students may need exposure to under graduate courses to get better prepared for their research. This is especially true for students who may have been trained in one discipline but would now like to pursue research in another discipline. It is proposed that the student may take up to a maximum of 22 credits (roughly equivalent to 2 courses) at the undergraduate level.

The extended M.Tech. programme: The students in this programme will take more courses compared to the ones in the regular M.Tech. Programme. The minimum credit requirement for students in this version of M.Tech. program is 72 credits of course work (in addition to the Communication Skills Course). The student may take up to a maximum of 33 credits (roughly equivalent to 3 courses) at the undergraduate level.

3 Yr. M.Tech. Programme for students with a B. Sc. Degree: This being a new programme, each department should propose a template. A general guideline is that these students can take four courses each semester for the first four semesters and devote the last two to research. This works to 144 credits of course work (in addition to the Communication Skills Course). Of these, a minimum of 54 credits should be from the undergraduate programme and a minimum of 54 credits from the graduate programme (roughly 6 courses each).

The current graduation requirement of a minimum CPI of 7.0 discourages students from taking additional courses beyond the minimum credits required. Sometimes students might be working in areas that require them to do additional course work. However, the fear of not doing well and landing up with poor grades dissuades the students from registering for more/additional courses.

It is recommended that a student can graduate if s/he acquires a minimum of B grade in at least 50% of the mandatory course credits and a minimum of D grade in the remaining course credits. This works out to a minimum of B grade in at least 27 of the course credits (roughly equivalent to 3 courses) for the regular M.Tech. programme, 36 credits for the extended M.Tech. programme, and 72 credits for the 3-year M.Tech. programme for students with a B.Sc. degree. The CPI will, of course, be computed on the basis of all the courses that the student registers for. It is hoped that with this model, students will be encouraged to register for additional courses if their research requires them to do so.

2.7.2 Thesis Credits:

The minimum credit requirement is 81 credits of thesis work for the regular M. Tech. Programme. The students in the other two programmes will spend an additional Summer. Therefore, the minimum requirement for them is 99 thesis credits. The committee noted that for the students who register for thesis credits in Summer, the Summer term should be delinked from the Summer Term for students who register for courses during Summer. The duration of Summer term may be the same. However, flexibility needs to be provided to the students regarding the start of the term for students who are registering only for thesis credits during the Summer.

2.8 Change of programme to the dual degree M.Tech-Ph.D. programme

All students in the M.Tech. programme who have completed at least two semesters and have a CPI equal to or greater than 7.0 will have the option to upgrade their programme to the dual degree M.Tech.-Ph.D. programme. The details of the dual degree programme will have to be worked out for each department and approved by SPGC/Senate.

2.9 Exit Option

Unlike in the doctoral programme, there is no exit option for the M.Tech. programme.

2.10 APEC Rules:

A student goes on probation if s/he fails to accumulate 'B' or higher grade in at least 30% of the cumulative course credits up to that point. The programme of the student is terminated if s/he is on probation and fails to accumulate at least 20% of the cumulative credits up to that point with 'B' grade or better. The semesters that the student may be on leave are excluded from the computation. Once the student acquires a minimum of B grade in 50% of the mandatory course credits, s/he is not subject to APEC rules for course credits. The APEC rules regarding grades in thesis credits remain same as at present.

2.11 Related Issues

2.11.1 Teaching/Research Assistantship

Participation of graduate students in teaching must be encouraged. Teaching helps in learning as well. Each department should evolve guidelines for the teaching assignment so that the process is effective and fair.

2.11.2 Promoting Excellence

The committee brainstormed on various means that can promote excellence amongst graduate students:

- Fellowships (as opposed to assistantships) can be awarded to some of the exceptional students. The criterion for the same can be laid out by the departments. Each department can recommend 2-3 students.

- We must attract large number of international students to promote diversity in the campus. Certain scholarships/fee-waivers can be set up for this purpose.

- Annual internal conference to be held at IIT Kanpur across departments. It should be part of the academic calendar. Good papers/posters should be recognized. The conference should have a session on new proposals. These would be written by students and presented at the conference. The good ones may be internally funded or they may be taken up for further submission to outside agencies.

- Additional travel funds for attending conferences for students

- Institution of more awards of excellence for M.Tech. students

- Encourage students to attend Summer/Winter Schools. Schools of certain minimum duration can also be considered for earning credits.

3. Interdisciplinary Research

The research programmes should not be constrained by departmental boundaries. There is a need for clear distinction between an academic department and an academic programme. While the academic programmes in the respective academic departments must continue, one needs to set up liberal programmes that run across more than one department.

We need a flexible framework in which programmes can be created relatively easily and closed also as easily after serving the purpose, with only a limited risk for having created an ineffective programme for short duration

An interdisciplinary programme (IDP) may consist of faculty members across departments who sign up for being associated with the programme in terms of offering the related courses and guiding students. Their joining the programme will require the consent of the Head of the Department they belong to. The administrative structure of the programme will include a PPGC (Programme Post Graduate Committee). The proposal to start an IDP must detail the teaching and research plan for the next five years. The IDP becomes functional only if there is a critical mass of faculty resource from various departments. As far as possible, the duplication of courses must be avoided. The efficient utilization of teaching resources must be kept in mind while proposing a course template. The IDP is given a go ahead only for a certain time (let us say, 5 years). It will have to be renewed for intake of new students before this expiry date. In case the renewal is not approved, the IDP continues only to graduate the students that are already in the programme.

The IDP should evolve its own admission process in line with the guidelines of the Institute. Further, it should also be possible for a student of other departments to move to an IDP.

Appendix I: Credit Based System

M.Tech. Credit Subcommittee Report

The UG credit system has already been proposed. With reference to the M.Tech. programme, there are four main issues:

1. Credit calculation for M.Tech. courses
2. Credit allocation toward thesis work in M.Tech.
3. Credit requirements for the M.Tech. programme
4. Summer credits for M.Tech. students

1. **Credit calculation for M.Tech. courses:**

The committee debated whether credits for M.Tech. courses should be calculated any differently than the UG courses. Since a M.Tech. student typically registers for four courses, the normal academic load would be 36 credits if the credit calculation is kept the same. While this turns out to be much lower than a typical UG student's academic load, the committee agreed that a M.Tech. student is expected to cultivate higher maturity and carry out self-study outside the routine course curriculum. As a result, a typical M.tech. student is justified to have lower academic load compared to a UG student. However, the committee recommends that certain M.Tech. courses can be assigned a higher "A" component, if the instructor feels so at the time of proposing the course. Also, a course can be given two different numbers with different "A" components. Essentially, this pair of courses would have a common lecture component, but the registrants of the two courses will be graded separately. The one with the higher "A" component can be open to graduate registrants only and the registered M.Tech. students will have to put more effort in appropriate forms as decided by the instructor to obtain those additional "A" credits. Overall, the committee concludes that the credit calculation formula remains unchanged for a M.Tech. course and the normal semester load for a M.Tech. student is 36 credits, while the minimum is 27 and maximum is 45 (i.e., 25% below and above the normal).

2. **Credit allocation toward thesis work in M.Tech. programme:**

The committee discussed how the thesis credits should be calculated. The committee first debated whether the current definition of thesis units should continue. It was felt that allowing a student to register for multiple thesis units has the advantage of offering a simple explanation of the grade in a semester e.g., SSSX can clearly tell the student that he/she has accomplished three-quarter of the work expected from him/her. Such an advantage cannot be enjoyed if a student registers for just one lumped thesis unit and receives an S or X grade at the end of the semester. The committee also discussed if the S and X grades can be replaced by letter grades so that the gradation of the work can be finer and more accurate than S or X. However, it was felt that justifying a particular letter grade for a thesis unit may not be easy. At the end the committee concluded to continue with the current scheme of four thesis units per semester as the normal academic load.

Next, the committee debated how credits should be calculated per thesis unit. Number of options were considered. They are listed below.

A. Do away with credits for thesis units. The committee first agreed that the thesis credits won't contribute to the CPI of a M.Tech. student. As a result, it is possible, in theory, to completely decouple credits from thesis units. However, there are practical issues with this model. For example, it is not clear how the academic load of a student would be calculated if he/she registers for a few courses and a few thesis units in a semester.

B. Use the credit formula from UG ARC and assign appropriate values to the "P" and "A" components. However, it was felt that no thesis work can be fully categorized into "P" or "A". In fact, in almost all cases the "A" component is expected to dominate and will vary greatly across departments. Unless a large proportion is allocated to "A", such a credit calculation cannot reflect the actual nature of thesis work. However, the credit formula of UG ARC has a limit on the "A" component and the limit is fairly low. The committee felt that extending this cap to encapsulate thesis credit calculation can lead to confusions.

C. Assign a lumped credit value to each thesis unit. The committee acknowledged the simplicity of this model and agreed that one thesis unit should be nine credits. This leads to a normal academic load of 36 credits in a semester for a student registering for only thesis units. This number was arrived at by taking into account the fact that the normal academic load of a M.Tech. student registering for four courses in a semester would be at least 36 credits. Therefore, the academic load remains more or less uniform throughout the program and does not change much once a student moves on to do his/her thesis work.

3. **Thesis Credit requirements for M.Tech. programme:**

MTech/MDes: Minimum 63 credits of thesis work

4. **Summer credits for M.Tech. students:**

All M.Tech. students are expected to conduct research in the Summer Session. However, at present there is no mechanism to monitor/evaluate their progress. It is recommended that a M.Tech. student must register in the Summer. The registration may be for a maximum of 18 credits during the summer session. This is equivalent to two thesis units. These credits can be obtained by taking courses or by registering for thesis units or a mix of these two.

Appendix II: Course on Composition (Communication Skills)

This course is based on a lot of on-line exercises. It consists of one lecture per week which is to initiate the students into the subject matter to be covered during the week. In addition there is to be a two hour lab every week where exercises are to be administered on a computer. An instructor and several tutors will be required to run the lab. After the practice session, students are to be given assignments on the subject matter covered in the laboratory. Evaluation is to be based on an online half-hour test at the end of each module. As suggested in the ARC report, the course is supported by a parallel help desk where students can go and seek assistance.

(i) It is suggested that senior PhD students from all the departments be involved in running the lab as they also stand to benefit from this.

(ii) It may not be possible to run the course for the entire batch in one semester due to logistic reasons. So the senate may consider offering the course in the third and the fourth semester.

Course structure:

Module 1 - Introduction to words: word derivation; context senstivity in word meaning; synonyms and antonyms; homonyms; homophones; pronunciation of same spelling words according to the context; vocabulary building techniques; using a thesaurus for choosing a proper word; euphemistic words and collocations; using idiomatic expressions (3 lab sessions)

Module 2 - Introduction to sentences: constructing grammatically correct sentences; use of appropriate articles, tenses, parallelism, agreement and modifiers; correcting incorrect sentences; use of active, passive, direct and indirect speech; improving a sentence with an alternate word or an alternate structure; simplifying and building complex sentences (3 lab sessions)

Module 3 - Mind mapping and idea organisation: reading skills and techniques; reading comprehension; deciphering an idea – may include giving title to a written paragraph; identifying thematically incoherent sentences in a paragraph; rewriting a paragraph in one's own words (paraphrasing); organising and presenting ideas in a logical sequence; understanding structure of arguments; common flaws in argumentation; coherence of composition; correcting jumbled paragraphs (3 lab sessions)

Module 4 - Paragraph writing: Guided composition; writing within a word/sentence limit; Editing with alternate words/phrases; situational writing; developing appropriate arguments in composing a paragraph (3 lab sessions)

Module 5 - Story/ Essay/Thematic/Narrative/Scientific writing (2 lab sessions) Total number of labs

= 14

Appendix III: The committee members

Dr. Sanjay Mittal, AE, Chairperson
Dr. Peeyush Mehta*, IME
Dr. CS Upadhyay, AE
Dr. K. Subramaniam, BSBE
Dr. V. Chandrasekhar*, CHM
Dr. Goutam Deo, CHE
Dr. M.S. Kalra, ME
Dr. Rajiv Shekhar*, MME
Dr. Partha Chakraborty, CE
Dr. A.K. Chaturvedi, EE
Dr. Mainak Chaudhuri, CSE
Dr. Debasis Kundu, MTH
Dr. Manoj Harbola, PHY
Dr. Suchitra Mathur, HSS

*In view of these members being on leave from the Institute, they nominated the following members:

Dr. Raghu Nandan Sengupta, IME
Dr. Anish Upadhyay, MSE
Dr. K. Srihari, CHM

Dr. PK Saini, AR(AA), Secretary