Academic Requirements for the M Tech (ICT) Program
(Effective from 2017-18 batch)

Master of Technology (Information and Communication Technology) M Tech (ICT) duration – two (2) year postgraduate program will be governed by these rules, subject to amendments, from time to time, as per the needs and requirements. These rules deal only with the post-admission academic activities of the program. Eligibility for admission, admission procedures etc., for the program are outside the purview of this document.

The Dean (Academic Programs)/Registrar may, from time to time, issue such instructions or directions as may be necessary to give effect to and carry out the provisions of these rules. Director, as Chairman of the Academic Council, may relax/exempt some provision(s) of the rules in exceptional situations and all such cases shall be reported to the Academic Council in the immediate next meeting.

Important terms/expressions used in the document have been defined in the GLOSSARY at the end of this document.
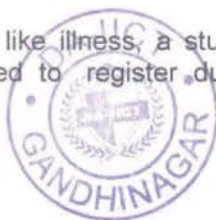
1. REGISTRATION

1.1 Categories of Registration:

a) A student has to register in the resident registration category only. For sponsored M Tech (ICT) student external registration will be allowed depending on the conditions of MoU with the sponsoring organization. Only resident registration will count towards the residence requirement for a degree. A foreign student on student visa will not be allowed to register as an external student.

b) To qualify for resident registration, the student must register for a duly approved course programme and pay the prescribed tuition and other fees, including any outstanding dues.

c) To qualify for external registration, a student must register for a duly approved research programme, and pay the prescribed registration fees, with the provision that the PG Committee may permit/require registration for coursework also. However, this qualification is subject to the proviso that a regular M Tech student may not avail of external registration for the purpose of obtaining an 'S' grade for thesis work, as detailed in Section 2.3 (e).

1.2 New entrants to the program, who are awaiting the results of the qualifying examination may be allowed 'provisional' registration. Latest by the date given in the Academic Calendar (usually about 8 weeks from the date of registration) such candidates will be required to submit, for verification, the Certificates of having passed the qualifying examination. Original certificates will be returned to the students and a self-attested copy will be kept for records.

1.3 Late Registration:

a) If for any compelling reason like illness, a student is unable to register on the day of registration, he/she will be allowed to register during the late registration period as

specified in the Academic Calendar (which is about one week from the date of registration). Any student registering late will be required to pay the specified late registration fee.

b. In exceptional cases, the Dean (Academic Programs) on the recommendation of the Post Graduate Committee (PGC) may consider registration beyond the date of late registration. In such a case, the student will be allowed to register for thesis credits only

1.4 Academic Advising:

a) A student will be advised in the selection of courses by the faculty adviser appointed by Dean (Academic Programs) in consultation with the PGC.

b) A student may be permitted to repeat or substitute courses in which he/she has obtained 'DD', 'DE' or 'F grades. Permission to repeat/substitute a course will be governed by the guidelines laid down in section 2.3.

1.5 Semester Load Requirements:

The load of a student is 17/18 credits per semester in the first year and 12/13 credits per semester in the second year. The total credits requirement for the Degree is 60 credits, so the average load per semester is 15 credits. Depending on the merits of the case, the PGC may permit a student to register for a maximum of 18 credits or a minimum of 12 credits.

1.6 Adding/Dropping of Courses and Withdrawal from a Semester

a) Adding and dropping of courses is permitted, during the Add/Drop period, only if the student's request is endorsed by the instructor of the course and the Convener PGC. The last dates of applying for adding and dropping of courses are specified in the Academic Calendar.

b) A student who wishes to withdraw prior to registration for a semester must obtain a formal approval from the Dean (Academic Programs) before the prescribed last date for late registration for the concerned semester. Withdrawal after registration for a semester is permitted only on medical grounds or for other exceptional reasons and formal approval for such withdrawal must be obtained from the Dean (Academic Programs) before the date of commencement of the end-semester examination for the concerned semester. Withdrawal from a semester, either prior to registration or after registration, is permitted for only one semester during the entire program. If a student does not register for a regular semester or does not withdraw with permission from the Dean (Academic Programs) as indicated above, his/her name is liable to be struck off from the rolls of the Institute.

c) A student who registers for a semester after having withdrawn in previous semester(s) can register for the available courses as prescribed in the curriculum for that particular semester subject to pre-requisites, if any.

d) The transcript of a student who has 'withdrawn' status would show the appropriate status for the concerned semester(s). The transcript of a student who is suspended for an academic or disciplinary reason would also show 'withdrawn' status.

e) The maximum period for completion of M Tech (ICT) program is given in the appropriate subsection of Section 2 includes any semester in which the student has 'withdrawn' status.

2. ACADEMIC REQUIREMENTS

2.1 M Tech (ICT) Program:

The total credits required in the program will be at least 60. The actual credits will be as specified in the approved curriculum applicable to the concerned batch The maximum permissible duration for the completion of the programs is 3 years, except that the maximum permissible duration for the (sponsored category) is 4 years.

2.2 Audit Courses:

The students are permitted to audit courses. They will be given a 'P' grade, which will be entered in their grade card if they satisfy the requirements placed by the course instructor. If they do not meet the requirements, then they will not get any grade and no entry will be made in the grade-card/transcript for that course.

2.3 Grades, Semester and Cumulative Performance Index:

A student is awarded a letter grade in each course he/she is registered for, indicating his/her overall performance in that course. These letter grades are assigned points on a 10-point scale as described in the table below:

Letter Grade	Grade Points	Explanation
AA	10	
AB	9	
BB	8	
BC	7	
CC	6	
CD	5	
DD	4	
DE	3	
F	0	Fail
I	-	Incomplete
P*	-	Pass

*For Pass/Fail and Audit Courses only.

a) If a student does not complete all the requirements for a course for a genuine reason, the instructor may award grade 'I' (Incomplete). An 'I' grade must be converted by the instructor to a regular letter grade by the last date for such conversion specified in the Academic Calendar, failing which it is automatically converted to an 'F' grade.

b) A student getting an 'F' grade in a core course must repeat it. An elective course must be either repeated or substituted as suggested by PGC.

c) A student getting a 'DD' or 'DE' grade in an elective course may substitute it by another course, provided his/her CPI is less than the prescribed minimum for getting the Degree and the student is allowed to continue in the program.

d) In case a course is repeated or substituted, the old grade will also appear on the transcript although it will not be taken into account while computing the CPI.

e) The grade 'S' or 'X' will be awarded for research/project credits as follows:

At the end of the semester, the thesis/project supervisor(s) will assess the student's progress towards the research work during the semester and will award the grade 'S' if the work is satisfactory and 'X' for unsatisfactory work.

f. If a student is on leave for a part of the semester or submits his/her thesis in the middle of a semester, the PGC may reduce his/her research credits appropriately.

2.4 Sponsored Category (M Tech):

A student may be admitted as a sponsored student to the M Tech program provided DA-IICT signs an agreement with the sponsoring agency for the same. The Table below indicates the aspects of the student's Degree program which would be specified by the agreement. The sponsored category student will be allowed only for Thesis mode of study. All other requirements would be as indicated in the Academic Requirements for M Tech (ICT) Program.

Requirement	Sponsored M Tech
Course Work	38 credits at DA-IICT.
Research	22 credits. Part or all the research may be carried out at the sponsoring agency as indicated in the agreement.
Guidance	Guide from DA-IICT. Co-Guide from sponsoring agency.
Infrastructure (Research & Course)	DA-IICT and sponsoring agency respectively for the part in which student stays at DA-IICT and at the sponsoring agency.
Financial Support (TA/RA)	Not Applicable unless indicated in the agreement
Intellectual Property Rights	DA-IICT jointly with sponsoring agency as specified in the agreement.

3. ACADEMIC PERFORMANCE REQUIREMENT

3.1 Semester Performance Index (SPI) and Cumulative Performance Index (CPI):

The SPI is an indicator of the academic performance of a student in all the courses he/she has registered during a given semester. It is computed by taking the weighted average of the grades obtained in that semester. The CPI indicates the cumulative academic performance in all the courses taken including those taken in the current semester. CPI is computed by taking the cumulative weighted average of the grades earned till that semester. The SPI and CPI is calculated up to two decimal places. Courses with 'S' and 'X' will not be taken into account in the above computations.

3.2 Minimum CPI requirements for graduation in the program:

Program	CPI for Graduation
M Tech (ICT)	6.0

3.3 Academic Probation and Dismissal:

A student whose CPI falls below the minimum required for graduation at the end of any semester will be placed on Academic Probation for the next semester with written intimation. A student will also be placed on Academic Probation if he/she obtains an 'X' in a research course. For every student placed on Academic Probation for a semester, the PGC will prescribe a specified course load in the concerned semester and may also prescribe a minimum SPI the student must attain in the semester. The PGC will keep a watch on the progress of every student placed on probation and if the performance of a student is poor so that he/she is not likely to benefit from continuing in the program any further, will recommend to the Director that he/she should leave the Institute. If a student's continuation in the program is terminated, the appropriate authority will issue the letter of termination.

4. Teaching Assistantships:

A Thesis Mode student may expect financial support by stipend in the form of Teaching Assistantship. Based on need and merits, eligible Project Mode students may also be considered for Teaching Assistanships with stipend. Weightage would be given to the performance of student in his/her TAship while deciding for the continuation of the TAship or amount of the stipend. The eligibility criteria and amount of stipend will be decided by Competent Authority of the Institute.

5. MIGRATION RULES

5.1   Eligibility: Students in the M Tech program are eligible to migrate to the Ph D program provided they fulfil the following criteria:
- Student should have entered the program with a B Tech/BE Degree or equivalent.
- Student should have completed a minimum of two semesters of the M Tech program with at least 18 credits.
- Student should have a minimum CPI of 7.0/10.

5.2   Admission Process: A student who wishes to migrate must submit an application to the Dean (Academic Programs) according to the format specified for admission to the Ph D program in the concerned academic year. This must include a research statement and letters of recommendation from three faculty members who were the instructors in courses taken by the student. The application would be considered as per the procedure laid down for Ph D admissions. However, no application fee or admission fee would be applicable.

5.3   Ph D Requirements: The migrated student would be subject to all the requirements as specified for Ph D students with a B Tech/BE Degree or equivalent. However, semesters registered (with resident/external registration) and credits earned as an M Tech student would be carried over to the Ph D program. The prescribed duration for completion of the Degree and for passing the comprehensive examination would be regarded as commencing from the time of admission to M Tech program.

5.4   Eligibility for M Tech Degree: A Ph D student who fails to pass the Ph D comprehensive examination within the specified duration, whether admitted directly or via internal migration, is eligible to receive the M Tech Degree under the following conditions:

- The student fulfils the eligibility criteria for M Tech program.
- The student fulfils the criteria for continuation in the M Tech program.
- The student submits an M Tech thesis or project which fulfils the requirements for such within a maximum of two semesters. This duration would commence from the semester immediately following the semester in which the student failed in the Ph D

comprehensive examination Furthermore the student would not be eligible for any financial support during this period.

5.5 **Completion of Requirements for M Tech Program.** A student who migrates to the M Tech (ICT) program from the Ph D program must complete all requirements for the M Tech (.C T) degree within two years (four semesters) from the time of migration. However credits earned as a Ph D student would be carried over to the M Tech (ICT) program.

6   GLOSSARY

Academic Probation: Academic Probation indicates that a student's academic performance is not up to the expected level. Over and above the academic consequences described in section 3.3, a student who has been placed on probation may be subjected to other restrictions related to financial support, award of medals and prizes, etc. at any time.

Cumulative Performance Index (CPI) CPI indicates the cumulative academic performance in all the courses taken including those taken in the current semester. CPI is computed by taking the cumulative weighted average of the grades earned till that semester.

Grade Points: Product of the credits and points of a letter grade awarded to the course.

Postgraduate Committee (PGC): Committee of the Institute responsible for Policy Guidelines and Implementation Strategies covering the Postgraduate Programs.

Semester: Approximately 16 weeks duration each, the first one (Autumn Semester) extending from July to November and the second (Winter Semester) from December/ January to April.

Semester Credits: The sum of credits of courses registered by the student in a semester.

Semester Grade Points: The sum of the products of credits and points for each course registered by a student in a semester.

Semester Performance Index (SPI): SPI is an indicator of the academic performance of a student in all the courses he/she has registered during a given semester. It is computed by taking the weighted average of the grades obtained in that semester.

DA-IICT, Gandhinagar
Created as of August 2017.

M Tech (ICT) Program

COURSE STRUCTURE 2017 onwards

The program has been specially designed to meet the increasing needs of professionals who would be able to respond to the convergence between computers and communication Systems. The program aims to provide exposure to students who wish to build a professional career in ICT, working at the cutting edge of technology, research and development. On successful completion of the program, the students will be able to acquire essential technical and practical knowledge for solving real-world problems in the ICT domain using modern technologies and tools, and will have ability to demonstrate excellent analytical, logical and problem solving skills that would bridge the digital divide between urban and rural developments. The student will also have ability to acquire social and ethical attributes that enable them in applying their skills for societal needs with effective communication both orally and in writing.

The curriculum is organized with core courses, elective courses and thesis/project work. Program Core courses are foundational and compulsory, which will build core competence for getting into ICT domain knowledge areas. Once the student acquires knowledge in foundational courses, he/she will have choice for selecting Group Core courses which are interdisciplinary in nature and will provide breadth in ICT research exploration. Subsequently, the student will have adequate choice of electives in order to dwell deeper into areas of his/her research interest. Finally, student will have option to pursue one full year (two semesters) of research work in the form of thesis or a semester long internship/project work, depending on his/her category (Thesis or Project mode) in the program..

The structure of the curriculum is broadly classified into 4 categories. The first category, referred to as *Foundation (Program Core)*, is a set of compulsory courses required to be taken by every student in the program. The next one is domain knowledge in ICT, termed as *Group Core*. The third category is *Electives* in ICT. The fourth one is either a *Thesis* spread over in third and fourth semesters or a *Project* in fourth semester.

Program Core

Program core courses are designed to make the students acquire the necessary mathematical background and basic foundations in ICT, which will enable them to cope with Group core courses, electives and to pursue research in interdisciplinary areas in the subsequent semesters. As the input to the program is primarily from CSE or ECE disciplines, the curriculum aims to train students with Program core courses in First semester for building their basic foundation in ICT, which are common to all students.

Group Core courses

Group core courses are technical courses in the areas of CSE, ECE and interdisciplinary areas. The Group core courses would enable students in broadening their knowledge of ICT disciplines and then would motivate them to specialize in specific disciplines through elective courses. A student requires to take a minimum of 3-4 Group core courses based on his/her options in Thesis mode or Project mode. Following are the Group courses offered by faculty from the respective research groups.

- **Machine Intelligence and Analytics.** Pattern Recognition and Machine Learning; Image Processing; Computer Vision; Information retrieval; Approaches to Semantic Web; Data Analytics; Artificial Intelligence; Neural Networks; Language Processing.
- **Intelligent Systems and Security:** Network architecture and protocol design; Network and System Security; Internet-Of-Things; Wireless Sensor Networks; Human Computer Interaction; Control System.
- **Parallel & Distributed Computing:** Distributed Systems; Cloud Computing; Parallel and Distributed Algorithms; Graph Algorithms
- **Software Engineering:** Advanced Software Engineering; Software Project Management; Formal Specification and Verification.
- **Signal and Image Processing:** Speech Communication; Computer Vision; Image Processing; Detection and Estimation Theory; Biomedical Signal Processing; Adaptive Filter Theory; Deep Learning.
- **Communication Systems:** Advanced Wireless Communications; Satellite Communications; RF/Microwave Applications; Smart Antennas and Radar Systems; Information Theory and Coding; Wireless System Design; Statistical Signal Processing; LTE, 4G/5G and MIMO Channels.
- **VLSI and Embedded Systems:** Embedded Systems; VLSI Subsystem Design; Low Power VLSI Design; Advanced Solid State Devices; Nano-electronics.

Electives

Electives courses are adopted from the disciplines of Computer Science, Electronics, Communication and Signal Processing, and interdisciplinary areas of ICT. Students will have a wide variety of choices amongst the currently existing technical and science electives. A representative list of elective courses is as follows:

Logic for Computer Science; Web Data Management; Introduction to Coding Theory and Applications; Elements of Synthetic Biology; Combinatorial Algorithms; Introduction to Data Science; Artificial Neural Networks; Fuzzy Logic and Applications; Topics in Deep Learning; Advanced Digital Communications; Real Time Embedded Systems.

Thesis Mode

Student entry in *Thesis* mode will be decided based on student choice and counseling by faculty at the end of First semester. Student in thesis mode is expected to carry out research work in the form of thesis in third and fourth semester. The student will carry out research under the supervision of a faculty member at DA-IICT in an area of mutual interest.

Project Mode

Like Thesis mode, student entry in *Project mode* will be decided based on student choice and counseling by faculty at the end of first semester. The student is required to take a semester long MTech project (MTP)in the fourth semester, during which he/she is required to demonstrate his/her ability to learn current areas of research and/or industrial interest. A student will have the option to do his/her MTP as on-campus or off-campus mode, where the *on-campus* mode allows the student to explore his/her research interest under the supervision of a faculty and the *off-campus mode* allows the student in getting exposure to industry and/or other R&D organizations/universities.

Semester-wise course sequence
(L-Lecture, T-Tutorial, P-Practical, C-Credit)

Thesis Mode		Project Mode	
Semester I	**L-T-P-C**	**Semester I**	**L-T-P-C**
Mathematical Methods for ICT	3-0-0—3	Mathematical Methods for ICT	3-0-0—3
Probability and Statistics	3-0-0—3	Probability and Statistics	3-0-0—3
Computer Systems	3-0-2—4	Computer Systems	3-0-2—4
Basics of Communications Systems	3-0-0—3	Basics of Communications Systems	3-0-0—3
Introduction to Digital Design	2-0-2—3	Introduction to Digital Design	2-0-2—3
ICT Foundation Lab	0-0-4—2	ICT Foundation Lab	0-0-4—2
Semester credits	**14-0-8—18**	**Semester credits**	**14-0-8—18**

Semester II	L-T-P-C	Semester II	L-T-P-C
Communication Skills & Technical Writing	3-0-0—3	Communication Skills & Technical Writing	3-0-0—3
Group Core – 1	3-0-2—4	Group Core – 1	3-0-2—4
Group Core – 2	3-0-2—4	Group Core – 2	3-0-2—4
Group Core – 3	3-0-0—3	Group Core – 3	3-0-0—3
Elective – 1	3-0-0/2—3/4	Elective – 1	3-0-0/2—3/4
Semester credits	**15-0-4/6—17/18**	**Semester credits**	**15-0-4/6—17/18**

Semester III	L-T-P-C	Semester III	L-T-P-C
Elective – 2	3-0-0/2—3/4	Group Core – 4	3-0-0—3
Research Unit –1, 2, 3	0-0-18—9	Elective – 2	3-0-0/2—3/4
		Elective – 3	3-0-0—3
		Elective – 4	3-0-0—3
Semester credits	**3-0-18/20—12/13**	**Semester credits**	**12-0-0/2—12/13**

Semester IV	L-T-P-C	Semester IV	L-T-P-C
Research Unit – 4, 5, 6, 7	0-0-26—13	Project	0-0-26—13
Semester credits	**0-0-26—13**	**Semester credits**	**0-0-26—13**

The curriculum mandates 60 credits.

A Thesis Mode student is required to earn 38 credits from coursework and 22 credits from thesis work. Out of the 38 required coursework credits, 21 credits are allocated to compulsory courses (Program core in the first semester) and 11 credits are allocated to three Group core courses, and 6-8 credits are allocated to two electives.

A Project Mode student is required to earn 47 credits from course work and 13 credits from project work. Out of the 47 required coursework credits, 21 credits are allocated to compulsory courses (Program core in the first semester) and 14 credits are allocated to four Group core courses, and 12-14 credits are allocated to four electives.

Graduation Requirement

Total Credits ≥ 60

Thesis Mode:	Project Mode:
Course Credits ≥ 38	Course Credits ≥ 47
Research/Thesis Credits: 22	Project Credits: 13

CPI (Cumulative Performance Index) ≥ 6.0

Executive Registrar
DA-IICT, Gandhinagar