

RESEARCH ADMISSION BROCHURE



INDIAN INSTITUTE OF TECHNOLOGY MADRAS
CHENNAI - 600 036

Updated on Sep. 20th, 2016

Important Dates

- | | | |
|--|-----|---------------------------------|
| • Registration of Application forms will be open on | ... | 25.09.2016 |
| • Last date for Registration of application through on-line | .. | 24.10.2016 |
| • Interview and or Test [on or before]* | .. | 18.11.2016 to 25.11.2016 |
| • Selected candidates list display in the Department Website | .. | 12.12.2016 |
| • Selected Candidates to join on | ... | 27.12.2016 |

** Intimation on interview and/or test indicating the date of interview will be given by the respective Departments through email.*

1. THE INSTITUTE

The Indian Institute of Technology Madras (IITM) is established as an autonomous institute of national importance in 1959 by the Government of India with an initial technical and financial support from Germany. IIT Madras with a number of well equipped laboratories, advanced research facilities, sophisticated services and computing & networking capabilities, is recognized to have done exceedingly well in the fields of higher technical education, research and industrial consultancy.

IIT Madras conducts academic programmes of B.Tech., Dual Degree (B.Tech. and M.Tech.), Integrated M.A, M.Tech., M.B.A, M.Sc., M.S. and Ph.D. in various disciplines. Located in about 225 hectares of natural flora and fauna, with 19 student's hostels and about 1000 faculty/staff quarters, IIT Madras is one of the greenest residential campuses in the country. Faculties of international repute, a brilliant student community, excellent technical and supporting staff and an effective administration have all contributed to the pre-eminent status of IITM.

2. ABOUT RESEARCH PROGRAMMES

The IITM is internationally renowned for the quality and diversity of its research, with over 550 academic staff and 4500 post-graduate students. Ample opportunities are provided for research-minded students to hone their research skills and participate actively in pioneering research studies through Ph.D and M.S (by research) programmes. The faculties of engineering, science, Humanities and Management departments, along with their scholars do active research in frontier areas, which often results in highly acclaimed publications in International and National Journals and patents. Most of the research work is also presented in International and National conferences. A large number of sponsored research projects are funded by agencies such as the Department of Science & Technology, Aeronautical Research & Development Board, Indian Space Research Organisation, Ministry of Non-Conventional Energy Sources and Defence

Research & Development Organisation, Naval Research Board, Department of Electronics, IGCAR, Atomic energy agencies and other Organisations for tackling the challenging research issues of national interest. Fellowships are also available from certain industries and organization. Our faculty also undertakes several application-oriented industrial consultancy projects with industries in India and abroad and collaborative research projects with foreign universities. Opportunities are available for interested students to participate in such sponsored research, industrial consultancy or collaborative research projects. The Engineering, Science, Humanities and Management Departments of our Institute are equipped with excellent laboratories, facilities with state-of-the-art equipment. Research is being carried out on many areas of topical interest worldwide. For example, research is carried out in areas such as Laser diagnostic applications, Non-destructive techniques, NMR spectroscopy, solid state physics and micro-electronic devices, Nano-materials technology, Bio-technology, Bio-medical research, Bio-chemistry, Wireless Local Loop technology, Alternative Energy sources and Emission Control, Composite materials, Finite Element modeling, Photo elasticity, Structural Analysis, Computational Fluid Dynamics, Ocean Engineering, Vibration & Acoustics, Rarefied Gas Dynamics, to name a few. The details of areas of research in the departments and research centres are given in this brochure. More detailed description of the research work undertaken in each department is available in the Institute website www.iitm.ac.in Strong expertise exists among the faculty on both theoretical and experimental methods of research.

Opportunities exist for candidates to do Joint Ph.D in Engineering & Sciences offered by IIT Madras & National University of Singapore, University of Melbourne, Swinburne University, Australia, National Tsing Hua University, Taiwan, University of Passau, Germany, University of Technology, Sydney, Australia, Curtin University, Australia, University of Duisburg, Germany, Queensland University of Technology, Australia, Deakin University, Australia, RWTH Aachen, Germany & University of Bordeaux, France. Joint Ph.D programme is also offered by IIT Madras, Sree Chitra Tirunal Institute for Medical Sciences & Technology, Trivandrum and Christian Medical College, Vellore in the area of Biomedical Devices and Technology.

Research works are carried out in the interdisciplinary areas among the Departments which may be pursued by the research scholars for the Ph.D degree. A list of interdisciplinary areas is given in section 8.18.

While the Office of the Dean, Academic Research administers the academic research activities, the Industrial Consultancy & Sponsored Research (IC & SR) wing of the Institute coordinates the sponsored research and consultancy activities.

Important Guidelines for Ph.D. & M.S. Application:

1.	Please read the instructions given in the admission brochure carefully before filling up the application form.
2.	<p>Online Application Form & Admission Brochure (including the admission schedule along with the important dates) is available on the Institute website at the following link https://research.iitm.ac.in/brochure/msphd_brochure.pdf.</p> <p>You are required to submit the application ONLINE. No Downloadable Forms will be available. After filling the form, you are advised to take a print of your application and keep the same for the record.</p>
3.	<p>The application fee is as follows:</p> <p>GN/OBC-NCL Male candidates : Rs.200/- GN/OBC-NCL Female candidates : Rs.100/- SC/ST and PwD candidates : Rs.100/-</p> <p>APPLICATION FEE IS NON-REFUNDABLE.</p>
4.	The <i>OBC (Non-Creamy Layer) certificate issued after 01.02.2016</i> (financial year for 2016-2017) in the prescribed format must be uploaded in the ONLINE application and submitted at the time of admission.
5.	You should check the admission website for important announcements and department website for result.
6.	<i>Candidates called for written test/interview should bring with them (i) Printed copy of the application submitted online along with Original and photo copies of relevant certificates.</i>

MINIMUM EDUCATIONAL QUALIFICATIONS FOR ADMISSION

Eligibility criteria for applying to Ph.D programme for Jan-May 2017 & Jul-Nov. 2017

Candidates seeking admission for Jan-May 2017:

For Regular (full time) Research Scholars:

Ph.D. in Engineering:

- a) Candidates with a Master's degree in Engineering/Technology with a good academic record or a Master's degree by Research in Engineering/Technology with a good academic record.
- b) Candidates with Master's degree in Sciences with a good academic record and of exceptional merit are eligible, for the relevant Engineering disciplines (as decided by admitting departments). Candidates must have a valid GATE score or UGC-JRF/NET/CSIR-JRF/NBHM/INSPIRE or equivalent qualification in the relevant area tenable for the year of registration.

In the case of candidates with Bachelor's degrees are in Engineering / Technology OR candidates with more than 5 years relevant experience after the Master's degree, the requirement of a test score may be waived by the Selection Committee.

- c) Candidates who have qualified for the award of Bachelor's degree in Engineering/Technology with exceptionally good academic record in an eligible discipline will be considered for **direct admission to Ph.D. Programme** in various Engineering and Science departments as a regular full time scholar subject to the following conditions:
 - a B.Tech. degree holder of Centrally Funded Technical Institute with a minimum CGPA of 8.0 for General, 7.5 for OBC-NCL and 7.0 for SC/ST/PwD on a 10.0 point scale or with a valid GATE score.
 - a Bachelor's degree holder in Engineering/Technology with a minimum CGPA of 8.0 for General, 7.5 for OBC-NCL and 7.0 for SC/ST/PwD or equivalent from any other University and having a valid GATE score.
 - a Bachelor's degree holder in Engineering/Technology from a reputed R & D organization and having a proven research record.

Candidates with B.E/B.Tech. for direct admission to Ph.D. programme will be joining a two-degree (M.S+Ph.D) programme.

Ph.D. in Sciences:

1. Master's degree in Sciences with a good academic record and having a valid GATE score or UGC-JRF/NET/CSIR-JRF/NBHM/INSPIRE or equivalent qualification tenable for the current year in the relevant area.
2. Master's degree in Engineering/Technology are eligible with a good academic record.
3. B.Tech degree holder of an IIT are eligible with a minimum of CGPA of 8.0 for General, 7.5 for OBC-NCL and 7.0 for SC/ST/PwD on a 10.0 point scale or with a valid GATE Score.
4. B.Tech / B.E degree of any recognized University in India with a minimum CGPA of 8.0 for General, 7.5 for OBC-NCL and 7.0 for SC/ST/PwD on a 10.0 point scale or equivalent, with valid GATE score.
5. Students who get more than 8.0 CGPA in M.Sc. in Science Departments of IIT Madras can be admitted directly to their Ph.D programme in Sciences with interview at departmental level.

Ph.D. in Humanities and Social Sciences:

a) (i) Master's degree / dual degree or equivalent in a relevant discipline AND Qualifying UGC - NET or JRF / CSIR-JRF / GATE Score or any national level examination tenable for the current year in the relevant area or international level post graduate admission examination such as GRE (Non-HTRA).

OR

(ii) Master's degree in Engineering/Technology with a good academic record.

b) At least 3 years of experience in research/industry in lieu of the above examination. (This clause is only for Non-HTRA candidates)

Ph.D in Management:

Masters degree or equivalent PG Diploma or Associateship in a relevant discipline, and a Bachelor's degree with a good academic record OR Five year integrated masters degree / dual degree or equivalent in a relevant discipline with a good academic record

AND

Qualifying in national level examinations such as CAT /XAT /MAT /ATMA /GATE /UGC or CSIR / NET / JRF or Lectureship or equivalent or international level post graduate admission examination such as GMAT / GRE or equivalent.

OR

At least **5 years** of managerial experience in lieu of the above examination. (This clause is only for Non-HTRA candidates)

Master's degree in Engineering / Technology with a good academic record or a Master's degree by Research in Engineering / Technology in a relevant discipline are exempted from qualifying in National level examinations.

For Institute staff members / Research Scholars under QIP / Research Scholars under External Registration / Research Scholars working on part-time basis:

For Research Scholars in the above categories, the minimum educational qualifications are the same as prescribed for Regular (full time) Research Scholars in 5.1.1 for admission to the Ph.D. Programme in the respective categories.

However, valid GATE score or CSIR/UGC NET/NBHM/CAT/AIMA/JRF or equivalent qualification as applicable for regular (full time) research scholars **may not be required** in these cases.

Further the residential requirement is treated as fulfilled for MS/PhD scholars admitted from among the employees of the organizations posted to IITM Research Park.

One year PG programme from Accredited Universalities is considered as one of the eligibility criteria for admission to Ph.D. at IIT Madras. Following are the conditions:

- 1) The Selection committee may consider the applicant as direct Ph.D., if the candidate found suitable and meet eligibility requirements.
- 2) Courses completed already in one year PG programme may be considered by the Doctoral Committee towards course requirement for Direct Ph.D.
- 3) The scholar will be eligible for HTRA, if they qualify GATE (equivalent to Direct Ph.D. scholars)

Candidates seeking admission for Jul-Nov 2017 :

Ph.D. in Engineering:

Candidates who are in their (i) 3rd semester of MTech/ME or (ii) 9th semester of BTech-MTech dual degree, with a good academic record.

Ph.D. in Sciences/Humanities & Social Sciences/Management:

Candidates who are in their (i) 3rd semester of MA/MSc / MBA, or (ii) 9th semester of Integrated BS-MS, with a good academic record.

Candidates in their 7th semester of B.E./B.Tech in a recognized Institute/University with good academic record can apply for direct admission to Ph.D. programme in various Engineering and Science departments.

Note: i) *Candidates applying with B.E/B.Tech. to Direct Ph.D. programme will be joining a two-degree (M.S+Ph.D) programme.*

ii) *For detailed eligibility criteria refer Clause 5.1.1 for Ph.D.*

Eligibility criteria for applying to M.S. programme for Jan-May 2017

For Regular (full time) Research Scholars:

M.S. in Engineering :

- a) Candidates with a Bachelor's degree in Engineering / Technology with valid GATE score or a Master's degree in appropriate Sciences/Management where eligible with a good academic record and a valid GATE score or CAT/AIMA or equivalent qualification tenable for the current year in the relevant areas.
- b) Candidates having Associate Membership of the following professional bodies will also be eligible for admission to the M.S. programme of their parent discipline provided they have a valid GATE score and have passed both part A and part B of the Membership examinations with a good academic record.

The Institution of Engineers (India) (Civil, Mechanical, Electrical and Electronics, Electronics and Communications), the Aeronautical society of India, the Indian Institute of Metals, the Indian Institute of Chemical Engineers, the Institute of Electronics and Telecommunication Engineering and other professional bodies approved by the Senate from time to time.

- c) Candidates having qualified in MFT (Major Field Test) will also be eligible for admission to the M.S. programme if the concerned department opt for it.
- d) IIT B.Tech candidates with a CGPA score of 8.0 or above on a scale of 10 [SC/ST: 7.5 CGPA] are eligible to apply for M.S. Programme.

M.S. in Entrepreneurship/Management

- A) Bachelors degree or equivalent in any professional discipline of minimum four years duration or Masters degree or equivalent in a relevant discipline, with a good academic record,

AND

- B) A good score or pass in:
 - a) national level post graduate admission qualifying examinations such as CAT/XAT/MAT/ ATMA/GATE or equivalent, or
 - b) International level post graduate admission qualifying examination such as GMAT/GRE or equivalent
 - c) at least 3 years of managerial experience in lieu of the qualifying test. (This clause is only for non-HTRA candidates)

- C) Candidates having qualified in MFT (Major Field Test) will also be eligible for admission to the M.S. programme if the concerned department opt for it.

The minimum eligibility requirement for admission will be graduates with a B.Tech/B.E. or any postgraduate degree (eg. M.A or M.Com will be eligible; not B.A. or B.Com graduate).

The existing admission criteria for regular HTRA and Non-HTRA admissions to be retained. For HTRA, the candidate will need to qualify in GATE/CAT/MAT/XAT and to any of the approved national qualifying exams eligible for scholarship at the time of accepting offer of admission or CGPA over or equal to 8.0 CGPA for graduates from centrally funded technical institutions (including IITM). Under the non-HTRA category, anyone with a B.Tech or postgraduate degree can apply.

In addition all candidates must submit a Proposal for a start-up, which will be evaluated by the Screening Committee first, before recommending select applications to the Admissions/Selection Committee for a one - to- one interview.

For Institute staff members/Research Scholars under External Registration / Research scholars working on part-time basis:

Bachelor's degree in Engineering/Technology or a Master's degree in appropriate Sciences/Management where eligible with a good academic record.

However, valid GATE score or CAT/AIMA or equivalent qualification as applicable for regular (full time) research scholars **may not be required** in these cases.

Upgradation possibility from M.S./M.Tech. to Ph.D.: On satisfactory progress/performance, scholar/student can upgrade to Ph.D. program. They can opt for a single or two degrees option (M.S. +Ph.D.) or (M.Tech + Ph.D.).

General:

A list of eligible discipline in which the minimum educational qualifications have to be obtained by the candidate is given in section 6.

Additional and stiffer criteria than the minimum educational qualifications given in 5.1(Ph.D) and 5.2 (M.S) may be set by the Department/Selection Committee from time to time for short listing candidates to be called for interview and or test.

The Department Selection Committee may find fit to consider meritorious candidates from disciplines other than listed in the Research Admission Brochure if there is a good match between the educational/ research background of the candidate and the proposed area of research.

Research works are carried out in the interdisciplinary areas among the Departments which may be pursued by the research scholars for the Ph.D degree. A list of interdisciplinary areas is given in section 8.18.

Short listing of the candidates to be called for interviews as per norms of the individual departments, announced in the [department website](#).

3. PH.D AND M.S ADMISSIONS

3.1 Financial Assistance:

Scholars admitted to Ph.D. and M.S. programmes under regular scheme (fulltime) are eligible for the following Half-time Teaching/Research Assistantship (HTRA) for which:

- (a) They should work for 8 hours per week in the Departments to earn this assistantship.
- (b) Renewal of assistantship every semester will be contingent on enrolment, satisfactory progress in research work and good performance during the preceding semester in the discharge of responsibility as teaching/ research assistant.

Ph.D.

a)	B.E/B.Tech/M.Sc. graduates or equivalent qualification with valid GATE/NET	Rs.25,000/- p.m. First 2 years	Rs.28,000/- p.m. Upto 3 years
b)	M.E/M.Tech/MBBS or equivalent qualification	Rs.25,000/- p.m. First 2 years	

M.S.

In Engineering / Management	Rs.12400/- p.m. upto 3 years
-----------------------------	------------------------------

Other scholarships like UGC-JRF, CSIR-JRF, ICMR, ICAR & AICTE etc. may also be available for those who had qualified for these schemes and get admission and the amount of fellowship will be as per the norms of the funding agency.

3.2 Admission without Assistantship:

A few candidates may also be considered for admission to the Ph.D./M.S. programme without assistantship also (Non-HTRA) under full time (regular) category.

The eligible qualifications are the same as for the Regular (fulltime) HTRA candidates.

Such candidates have to enclose a letter along with the Application Form stating that they may be considered for admission even without assistantship (Non-HTRA).

(Students selected from HTRA list can move to N-HTRA and revert back to HTRA later. Students selected from N-HTRA list cannot move to HTRA category)

3.3 Selection Procedure:

Eligible candidates possessing the minimum educational qualifications (as given in section 5, eligible degree as given in section 6) and satisfying additional and stiffer criteria set by the departments from time to time, will be called for an interview and/or test by the Selection Committees of the respective departments.

For candidates who have obtained PG degree 10 years earlier as on the last date prescribed for receipt of the completed application, a departmental test will be conducted.

The applications of foreign nationals may be considered without a personal interview / test (details vide section 8).

Based on the academic record and the performance of the candidates in the interview and/or test, the Departmental Selection Committee will recommend to the Chairman, Senate the names of candidates found suitable for admission to the Ph.D. programme.

3.4 Reservation of Seats

Reservations are applicable to SC/ST/OBC-NCL/Persons with Disability (PwD) candidates as per Govt. of India rules.

3.5 Fees and Deposits:

Fees for the Indian students/scholars to be admitted in the academic year 2016-17 (for Jan-May 2017)			
S.No	Items of Fees & Deposits	M.S.	Ph.D.
I. Institute Fees			
A. One time Fees:			
1.	Admission fee	150	150
2.	Grade card/Thesis fee	450	950
3.	Provisional certificate	100	100
4.	Medical Exam fee	100	100
5.	Student welfare fund	500	500
6.	Modernisation fee	500	500
7.	Alumni Life Membership Fee (NS)	1000	1000
8.	Publication fee (NS)	250	250
		-	-
	Total A	3050	3550
B. Semester Fees:			
1.	Tuition fee #	2500	2500
2.	Examination fee	300	300
3.	Registration-Enrolment fee	300	300
4.	Gymkhana	1000	1000
5.	Medical fee	500	500
6.	*Hostel Seat Rent	5000	5000
7.	*Fan, Elec. & Water Charges	750	750
8.	Student Wellness fee	100	100
9.	Medical Insurance Premium (subject to revision)	482	482
	Total B	10932	10932
C. Deposits (Refundable):			
	<i>Institute Deposit and Library Deposit</i> (each Rs 1000)	2000	2000
	Institute fees payable at the time of admission through DD drawn in favour of "Registrar, IIT Madras" payable at "Chennai"	<i>Hostellers</i> (A+B+C)	15982
		<i>Day scholars</i> [A+(B-*) +C+ II(3)]	15232
II. Hostel Fees & Mess Charges per semester			
1.	Hostel Admission fee	200	200
2.	Hostel Deposit (NS)- (refundable)	3000	3000
3.	Estt.'A' charges	5000	5000
4.	Estt 'B' charges	1500	1500
5.	Advance Dining charges	14000	14000
6.	SWD charges	50	50
	Hostel Fees payable through DD drawn in favour of "Chairman, Council of Wardens, IIT Madras" payable at "Chennai"	23750	23750

NS – Non-Statutory fees

* For Hostellers only.

SC/ST/PwD students/ scholars are exempted from payment of tuition fee.

+ (for one year)Subject to Change

Hostel rooms are allotted depending on availability on sharing basis. **If you wish to be a day scholar, you should register your name in the Office of the Dean Students and obtain day scholar certificate immediately after admission.**

3.6 TA for attending Interview for Ph.D programme:

Candidates called for Ph.D. interview under the regular (full time) category will be paid second class single to & fro rail fare from their place of residence to Chennai by the shortest route. A candidate is entitled for a single TA as above even as he/she may attend interview in more than one department in the same trip.

3.7 Completing the Qualifying Degree and production of Provisional Certificate:

Candidates joining Ph.D/M.S programme in July-December/January-June session have to submit their original mark/grade sheets along with provisional certificates at the time of admission. They should also produce their required degree certificate for having passed the qualifying examination within three months from the date of registration i.e. on or before 30th September for July admission / 31st March for January admission.

3.8 Documents to be submitted at the time of interview/Admission

At the time of Interview:

- (a) Printed copy of application mailed to the candidates after online registration.
- (b) Copies of all Mark sheets/grade cards, provisional / degree certificates beginning from first degree towards proof of qualification with Original certificates.
- a) Copy of Community Certificate in the case of SC/ST/OBC-NCL candidates issued by the respective State Government.
- b) Authorised Doctor's Certificate with disability descriptions in the case of Person with Disabled (PwD) candidates.
- c) Copy of GATE score or UGC - JRF/NET/CSIR/ DAE-JEST or other fellowship award.
- d) Project Co-ordinator's certificate in the prescribed format and a copy of project appointment letter from Dean IC & SR of IITM in the case of Project Associate if already appointed.

At the time of Admission:

- a. Offer of admission.
- b. Birth Certificate.
- c. First page of SSLC/SSC/Matriculation certificate along with application form.
- d. Original GATE Score Card/UGC-JRF/NET/CSIR-JRF/DAE-JEST or other fellowship award letter.
- e. Degree certificate/Provisional/Course completion certificate/Grade Cards/Mark sheets of all the semesters of degrees obtained
- f. SC/ST/OBC-NCL community certificate for the candidate belonging to SC/ST/OBC-NCL category. [OBC-NCL scholars to upload the latest valid Non-creamy layer community certificate in the prescribed format obtained after 01/02/2016].
- g. Relieving order/Resignation acceptance letter from the employer in the case of regular candidates (HTRA / NHTRA / PROJECT / CSIR / UGC), if employed except candidates selected under IITM Staff scheme.

In addition to the above....

For External candidates:

- Research Co-ordinator letter
 - Research Co-ordinator Degree certificate
 - NoC/Relief from the present employer
- } from the present employer

For Part-time candidates:

- NoC/Relief/Permission from the present employer

For Project candidates:

- Project Coordinator letter

4. CATEGORIES OF ADMISSION

4.1 Categories of admission in Ph.D programme:

- a) **Regular** full-time scholars with or without Institute fellowship or with project support.
Students selected from HTRA list can move to N-HTRA and revert back to HTRA later.
Students selected from N-HTRA list cannot move to HTRA category
- b) Eligibility requirement of **IIT Madras project staff** applying for Ph.D. will be treated equivalent to that of External registration candidates under **N-HTRA**.
- c) Research scholars sponsored under the **Quality Improvement Programme (QIP)**.
- d) Research scholars who are **staff members** of the Institute
- e) Research scholars under the **external registration** programme sponsored by and employed in industry/organisation having R & D facilities and recognised by DST or IIT Madras, national laboratories, reputed universities/colleges or employed in research/analysis jobs in public sector/private sector/government in the case of management area.

*(A research scholar under the external registration programme will normally carry out part or all of his / her research work in the industry/organization/national laboratories/universities **employing** the scholar under the supervision of a co-guide also employed in the same organization and a guide at IIT Madras.)*

*The candidate must have at least **two years** experience in the case of registration in Engineering/Sciences/Humanities & Social Sciences/ Management.*

- f) Research scholars on a **part-time** basis from a reputed University/Institution/ Organisation. They should have at least **two years** experience in a regular position for registration in Engineering, Sciences, Humanities & Social Sciences, and Management Departments.
(A research scholar working on a part time basis shall normally carry out the research work at IIT Madras under the supervision of a guide at IIT Madras. The feasibility of doing this with sufficient intensity will be an important consideration in admitting the scholar in this category).

g) Candidates applying for admission in the External/Part-time categories:

- ii) Should submit a relief certificate at the time of admission
- iii) Should submit one page write-up about the research topic.
- iv) Must belong to any one of the following category:
 - a) Industry/organization having R& D facilities and recognized by DST, Gol or IIT Madras
 - b) National Laboratories
 - c) Reputed Universities / Colleges
 - d) Public sector / Private sector / Government Departments engaged in research/analysis jobs of their executives in the case of management area.
- h) The minimum residential requirement for the Ph.D scholar under external registration and Ph.D. research scholars working on part-time basis not employed in the Institute is one semester.
- i) Scholars will be permitted to do course work without the residential requirement with the permission of their institution subject to fulfilling the course requirement.
 - i) Part time scholar residing within the commutable distance from IIT Madras may use this option.
 - ii) The scholar to complete the course and comprehensive requirement within the time limit.
 - iii) Leave not required for attending the courses.
- j) **M.Tech/Ph.D Dual Degree programme in Engineering Design Department:**

The selection of candidates is through MS admission process. Final selection for admission will be as per the criteria fixed by the department selection committee.

4.2 Categories of admission in M.S programme:

- a) **Regular** full time scholars with or without Institute fellowship or with project support.

(Person employed on a IIT Madras project can apply for admission to M.S. programme with a minimum project experience of six months without valid GATE score subject to qualifying in selection procedure (interview / written examination) of the concerned department. They will not be eligible for HTRA until they qualify in the GATE examination. The scholars may seek conversion from project to HTRA provided they qualify in GATE with the minimum cut-off prescribed for the selection of scholars admitted in his/her batches.)

- b) Research scholars who are **staff members** of the Institute.

- c) Research scholars under the **external registration** programme sponsored by and employed in industry/organisation having R & D facilities and recognized by DST or IIT Madras, national laboratories, reputed universities/colleges or employed in research/analysis jobs in public sector/private sector/government in the case of Management area.

(A research scholar under the external registration programme will normally carry out part or all of his/her research work in the industry/organization/national laboratories/ universities employing the scholar under the supervision of a co-guide employed in the same organization and a guide at IIT Madras. The candidate must have at least two years experience).

- d) Research scholars working on a **part-time** basis from a reputed University/ Institution/Organization. They should have **two years** experience.

(A research scholar working on a part-time basis shall normally carry out research work at IIT Madras under the supervision of a guide at IIT Madras. The feasibility of doing this with sufficient intensity will be an important consideration in admitting the scholar in this category).

- e) Candidates applying for admission in the External/Part-time categories:

1. Should submit a relief certificate at the time of admission
2. Should submit one page write-up about the research topic.
3. Must belong to any one of the following category:

- Industry/organization having R& D facilities and recognized by DST, Gol or IIT Madras
- National Laboratories
- Reputed Universities / Colleges
- Public sector / Private sector / Government Departments engaged in research/analysis jobs of their executives in the case of management area.

- f) The minimum residential requirement for the MS scholar under external registration and MS research scholars working on part-time basis not employed in the Institute is one semester.

5. MINIMUM EDUCATIONAL QUALIFICATIONS FOR ADMISSION

5.1 Minimum Educational Qualifications for Ph.D:

5.1.1 For Regular (full time) Research Scholars:

Ph.D. in Engineering:

- a) Candidates with a Master's degree in Engineering/Technology with a good academic record or a Master's degree by Research in Engineering/Technology with a good academic record.
- b) Candidates with Master's degree in Sciences with a good academic record and of exceptional merit are eligible, for the relevant Engineering disciplines(as decided by admitting departments). Candidates must have a valid GATE score or UGC-JRF/NET/CSIR-JRF/NBHM/INSPIRE or equivalent qualification in the relevant area tenable for the year of registration.

In the case of candidates with Bachelor's degrees are in Engineering / Technology OR candidates with more than 5 years relevant experience after the Master's degree, the requirement of a test score may be waived by the Selection Committee.

- c) Candidates who have qualified for the award of Bachelor's degree in Engineering/Technology with exceptionally good academic record in an eligible discipline will be considered for **direct admission to Ph.D. Programme** in various Engineering and Science departments as a regular full time scholar subject to the following conditions:

- a B.Tech. degree holder of Centrally Funded Technical Institute with a minimum CGPA of 8.0 for General, 7.5 for OBC-NCL and 7.0 for SC/ST/PwD on a 10.0 point scale or with a valid GATE score
- a Bachelor's degree holder in Engineering/Technology with a minimum CGPA of 8.0 for General, 7.5 for OBC-NCL and 7.0 for SC/ST/PwD or equivalent from any other University and having a valid GATE score.
- a Bachelor's degree holder in Engineering/Technology from a reputed R & D organization and having a proven research record.

Candidates with B.E/B.Tech. for direct admission to Ph.D. programme will be joining a two-degree (M.S+Ph.D) programme.

Ph.D. in Sciences:

6. Master's degree in Sciences with a good academic record and having a valid GATE score or UGC-JRF/NET/CSIR-JRF/NBHM/INSPIRE or equivalent qualification tenable for the current year in the relevant area.
7. Master's degree in Engineering/Technology are eligible with a good academic record.
8. B.Tech degree holder of an IIT are eligible with a minimum CGPA of 8.0 for General, 7.5 for OBC-NCL and 7.0 for SC/ST/PwD on a 10.0 point scale or with a valid GATE Score.
9. B.Tech / B.E degree of any recognized University in India with a minimum CGPA of 8.0 for General, 7.5 for OBC-NCL and 7.0 for SC/ST/PwD on a 10.0 point scale or equivalent with valid GATE score.
10. Students who get more than 8.0 CGPA in M.Sc. in Science Departments of IIT Madras can be admitted directly to their Ph.D programme in Sciences with interview at departmental level;

Ph.D. in Humanities and Social Sciences:

- a) (i) Master's degree / dual degree or equivalent in a relevant discipline AND Qualifying UGC - NET or JRF / CSIR-JRF / GATE Score or any national level examination tenable for the current year in the relevant area or international level post graduate admission examination such as GRE (Non-HTRA).OR
(ii) Master's degree in Engineering/Technology with a good academic record.

- b) At least 3 years of experience in research/industry in lieu of the above examination. (This clause is only for Non-HTRA candidates)

Ph.D in Management:

Masters degree or equivalent PG Diploma or Associateship in a relevant discipline, and a Bachelor's degree with a good academic record OR Five year integrated masters degree / dual degree or equivalent in a relevant discipline with a good academic record

AND

Qualifying in national level examinations such as CAT /XAT /MAT /ATMA /GATE /UGC or CSIR / NET / JRF or Lectureship or equivalent or international level post graduate admission examination such as GMAT / GRE or equivalent.

OR

At least 5 years of managerial experience in lieu of the above examination. (This clause is only for Non-HTRA candidates)

Master's degree in Engineering / Technology with a good academic record or a Master's degree by Research in Engineering / Technology in a relevant discipline are exempted from qualifying in National level examinations.

5.1.2 For Institute staff members / Research Scholars under QIP / Research Scholars under External Registration / Research Scholars working on part-time basis:

For Research Scholars in the above categories, the minimum educational qualifications are the same as prescribed for Regular (full time) Research Scholars in 5.1.1 for admission to the Ph.D. Programme in the respective categories.

However, valid GATE score or CSIR/UGC NET/NBHM/CAT/AIMA/JRF or equivalent qualification as applicable for regular (full time) research scholars **may not be required** in these cases.

Further the residential requirement is treated as fulfilled for MS/PhD scholars admitted from among the employees of the organizations posted to IITM Research Park.

One year PG programme from Accredited Universities is considered as one of the eligibility criteria for admission to Ph.D. at IIT Madras. Following are the conditions:

- 1) The Selection committee may consider the applicant as direct Ph.D., if the candidate found suitable and meet eligibility requirements.
- 2) Courses completed already in one year PG programme may be considered by the Doctoral Committee towards course requirement for Direct Ph.D.
- 3) The scholar will be eligible for HTRA, if they qualify GATE (equivalent to Direct Ph.D. scholars)

5.1.3 Offering admission into PhD programme for students in the 4th year of their B.Tech. programme

a) Applications will be sought from bright students who are in their 4th year in between October- and December and after completion of selection process, offer of admission to PhD programme for July session of next year to be finalized by December.

b) In case NCB makes students of 6th semester eligible to write GATE, GATE score may be used while considering admission process. In case of non-availability of such a provision, the candidate with a minimum CGPA of 8.0 for General, 7.5 for OBC-NCL and 7.0 for SC/ST/PwD and above, if found suitable, can be offered admission to PhD programme without HTRA. They can be encouraged to write GATE in their 8th semester to enable such candidate to become eligible for HTRA by qualifying in GATE.

c) Fellowship for the selected students will be for 5 years as applicable for direct Ph.D admissions.

Candidates from centrally Funded Technical Institutes having a minimum CGPA of 8.0 for General, 7.5 for OBC-NCL and 7.0 for SC/ST/PwD and above, if found suitable, can be offered admission to Ph.D programme with HTRA. The need to qualify GATE to avail HTRA is waived for such students.

5.2 Minimum Educational Qualifications for M.S:

5.2.1 For Regular (full time) Research Scholars:

M.S. in Engineering :

- a) Candidates with a Bachelor's degree in Engineering / Technology with valid GATE score or a Master's degree in appropriate Sciences/Management where eligible with a good academic record and a valid GATE score or CAT/AIMA or equivalent qualification tenable for the current year in the relevant areas.
- b) Candidates having Associate Membership of the following professional bodies will also be eligible for admission to the M.S. programme of their parent discipline provided they have a valid GATE score and have passed both part A and part B of the Membership examinations with a good academic record.

The Institution of Engineers (India) (Civil, Mechanical, Electrical and Electronics, Electronics and Communications), the Aeronautical society of India, the Indian Institute of Metals, the Indian Institute of Chemical Engineers, the Institute of Electronics and Telecommunication Engineering and other professional bodies approved by the Senate from time to time.
- c) Candidates having qualified in MFT (Major Field Test) will also be eligible for admission to the M.S. programme if the concerned department opt for it.
- d) IIT B.Tech candidates with a CGPA score of 8.0 or above on a scale of 10 [SC/ST: 7.5 CGPA] are eligible to apply for M.S. Programme.

5.2.2. M.S. in Entrepreneurship/Management

- A) Bachelors degree or equivalent in any professional discipline of minimum four years duration or Masters degree or equivalent in a relevant discipline, with a good academic record,
AND
- B) A good score or pass in:
 - d) national level post graduate admission qualifying examinations such as CAT/XAT/MAT/ ATMA/GATE or equivalent, or
 - e) International level post graduate admission qualifying examination such as GMAT/GRE or equivalent
 - f) at least 3 years of managerial experience in lieu of the qualifying test. (This clause is only for Non-HTRA candidates)
- C) Candidates having qualified in MFT (Major Field Test) will also be eligible for admission to the M.S. programme if the concerned department opt for it.

The minimum eligibility requirement for admission will be graduates with a B.Tech/B.E. or any postgraduate degree (eg. M.A or M.Com will be eligible; not B.A. or B.Com graduate).

The existing admission criteria for regular HTRA and non-HTRA admissions to be retained. For HTRA, the candidate will need to qualify in GATE/CAT/MAT/XAT and to any of the approved national qualifying exams eligible for scholarship at the time of accepting offer of admission or CGPA over or equal to 8.0 CGPA for graduates from centrally funded technical institutions (including IITM). Under the non-HTRA category, anyone with a BTech or postgraduate degree can apply.

In addition all candidates must submit a Proposal for a start-up, which will be evaluated by the Screening Committee first, before recommending select applications to the Admissions/Selection Committee for a one - to- one interview.

5.2.3. For Institute staff members/Research Scholars under External Registration / Research scholars working on part-time basis:

Bachelor's degree in Engineering/Technology or a Master's degree in appropriate Sciences/Management where eligible with a good academic record.

However, valid GATE score or CAT/AIMA or equivalent qualification as applicable for regular (full time) research scholars **may not be required** in these cases.

General:

A list of eligible discipline in which the minimum educational qualifications have to be obtained by the candidate is given in section 6.

Additional and stiffer criteria than the minimum educational qualifications given in 5.1(Ph.D) and 5.2 (M.S) may be set by the Department/Selection Committee from time to time for short listing candidates to be called for interview and or test.

The Department Selection Committee may find fit to consider meritorious candidates from disciplines other than listed in the Research Admission Brochure if there is a good match between the educational/ research background of the candidate and the proposed area of research.

Research works are carried out in the interdisciplinary areas among the Departments which may be pursued by the research scholars for the Ph.D degree. A list of interdisciplinary areas is given in section 8.18

6. ELIGIBLE DEGREES FOR ADMISSION TO Ph.D AND M.S PROGRAMMES

6.1 Eligible Degrees for Admission to Ph.D. programme

Sl.No.	Department	Eligible Degree for Ph.D
1.	Aerospace Engineering	<p>“Master’s degree or its equivalent in Aerospace / Civil / Applied Mechanics / Mechanical/Electrical/allied branches(such as Instrumentation, Energy Engg., Production, etc.) OR Master’s degree in Mathematics / Physics with an excellent academic record. OR Bachelor’s degree in Aerospace/Civil/Chemical/Computer Science/ Electrical/Mechanical/Metallurgical/Naval Architecture/ allied branches (such as Instrumentation, Energy Engg., Production, etc.) with fulfilment of additional conditions as specified under 5.1.1(c). The GATE score requirement is waived for candidates with at least two years experience in aerospace organisations and applying under the EXTERNAL category.”</p>
2.	Applied Mechanics	<p>Engineering Mechanics and Solid Mechanics areas: Master’s degree in Civil/Aerospace/Mechanical/Naval Architecture Engineering with an aptitude for research in Solid Mechanics.</p> <p>Fluid Mechanics area: Master’s degree in Engineering Mechanics/Civil Engineering/Mechanical Engineering/Aerospace Engineering/Chemical Engineering.</p> <p>Biomedical Engineering area: Master’s degree in Civil/Mechanical/ Electrical/Biomedical Engineering/ Computer Science.</p>
3.	Biotechnology	<p>a. Master’s degree in any area of Engineering. Candidates with Master’s in biotechnology, chemical engineering, computer science and electrical engineering are particularly encouraged to apply.</p> <p>b. Master’s degree in any area of Science. Candidates with Master’s in any branch of life sciences, chemistry, mathematics and physics are particularly encouraged to apply.</p> <p>c. Master’s degree in Pharmaceutical Sciences</p> <p>d. Master’s degree in Agricultural Sciences</p> <p>e. Master’s degree in Veterinary Sciences</p>
4.	Chemical Engineering	<p>Master’s degree in Chemical Engineering or any other discipline of Engg. or Technology or equivalent.</p> <p>Science/Mathematics postgraduates to be considered should have exceptional merit and/or Research / Industrial experience in the appropriate field.</p> <p>BTech/BE in Chemical Engineering, allied disciplines (eg. petroleum, petrochemical, pharmaceutical, environmental, polymer, biochemical, biotechnology, electrochemical, instrumentation) and other disciplines of engineering/technology with exceptional merit can also be considered for direct PhD admissions.</p>
5.	Chemistry	<p>Master’s degree in Sciences (in areas such as chemistry, applied chemistry, biochemistry, chemical physics, physics, material sciences, mathematics, pharmacy, or similar such area) with a good academic record and having a valid GATE score or UGC/CSIR-NET-JRF</p> <p><i>[DST-INSPIRE Fellowship is treated as eligible criteria for admission to PhD programme in all the departments wherever applicable.]</i></p> <p>Master’s degree in Engineering/Technology (in areas such as electrical engineering, computer sciences, chemical engineering, materials engineering, biotechnology or similar such area) with a good academic record.</p>

6. Civil Engineering
- Master's degree in Civil Engineering or Ocean Engineering (including integrated M.Tech / M.E. degree) with First Class or equivalent grade for specialisation in Civil Engineering.
In addition, the following non-Civil Engineering degrees qualification are also eligible for different specializations:
- Building Technology and Construction Management:** Master's degree in Industrial Engineering / Industrial Management / MBA after obtaining a basic degree in Civil Engineering with first class. First class Bachelor's and Master's degree in Architecture, Town and Country Planning.
- Geotechnical Engineering:** Master's degree in Engineering Mechanics/Master's degree in Mining Engineering with 2 years relevant experience.
- Environmental and Water Resources Engineering: M.Tech or M.S. or equivalent degree in Engineering Mechanics/Aerospace Engineering / Agricultural Engineering / Environmental Engineering
or
M.Tech or M.S. or equivalent degree in Environmental Science & Engineering /Chemical Engineering/Biotechnology/Applied Geology.
- Environmental and Water Resources Engineering: M.Tech or M.S. or equivalent degree in Engineering Mechanics/Aerospace Engineering / Agricultural Engineering / Environmental Engineering
or
M.Tech or M.S. or equivalent degree in Environmental Science & Engineering /Chemical Engineering/Biotechnology/Applied Geology.
- Structural Engineering: Master's degree in Engineering Mechanics / Aerospace Engineering / Naval Architecture / Mechanical/Architectural/Ocean Engineering/Master's degree in Computer Science & Engineering with basic degree in Civil Engineering.
- Transportation Engineering: Master's degree in Architecture/ Master's degree in Town and Country Planning/Regional Planning/City Planning/Urban Engineering or 2 years full time Postgraduate Diploma in Town and Country Planning with specialization in Traffic and Transportation Planning of the School of Planning and Architecture, New Delhi / MBA after obtaining a basic degree in Civil Engineering with first class.
7. Computer Science and Engineering
- Master's degree in Engineering/Technology. Preference will be given to those with M.Tech/M.S degree in Computer Science & Engineering.
8. Electrical Engineering
- Master's degree in Electrical Engineering (Electrical and Electronics Engineering)/ Electronics Engineering (Electronics and Communication Engineering) / Instrumentation Engineering or Master's degree in Physics followed by a Master's degree in Engineering in an area of relevance to the area of research. Candidates not having Master's degree in Electrical/Electronics Engineering should qualify in a written test to be eligible for interview.
9. Engineering Design
- Master's degree in Aerospace, Automobile, Biomedical, Civil, Computer Science, Electrical, Electronics, Engineering Physics, Instrumentation, Mechanical, Metallurgical, Naval Architecture, Production / Manufacturing Engineering, or Master's degree in Design (M.Des.) or M.Tech (Industrial Mathematics.)
10. Humanities & Social
- Master's degree or equivalent with a minimum of 55% aggregate marks or 6.0 CGPA on a 10-point scale in Humanities and Social Sciences and allied disciplines.
11. Management Studies
- Masters degree or equivalent PG Diploma or Associateship in a relevant discipline, and a Bachelor's degree with a good academic record OR Five year integrated masters degree / dual degree or equivalent in a relevant discipline with a good academic record
AND
Qualifying in national level examinations such as CAT /XAT /MAT /ATMA /GATE /UGC or CSIR / NET / JRF or Lectureship or equivalent or international level post graduate admission examination such as GMAT / GRE or equivalent.

OR

At least 5 years of managerial experience in lieu of the above examination.
(This clause is only for Non-HTRA candidates)

Master's degree in Engineering / Technology with a good academic record or a Master's degree by Research in Engineering / Technology in a relevant discipline are exempted from qualifying in National level examinations.

12. Mathematics
Master's Degree in Mathematics/Statistics/Physics/Computer Science with GATE/UGC/CSIR/NBHM or M.Tech (Industrial Mathematics & Scientific Computing) or any M.Tech degree with Master's degree in Mathematics/Physics/Statistics/ Computer Science.
13. Mechanical Engineering
Master's degree in Mechanical Engineering, Aerospace Engineering, Automobile Engineering, Automotive Engine Tech, Bio-Medical Engineering, Chemical Engineering, Computer Science, Electrical Engineering, Electronics, Energy Engineering, Industrial Engineering, Instrumentation, Maintenance Management, Metallurgical Engineering, Production/ Manufacturing Engineering/Agricultural Engineering and in related areas depending on the research topics.
14. Metallurgical & Materials Engineering
Master's degree or equivalent in Metallurgical Engineering or other appropriate branch of Engineering/Technology. Science postgraduates to be considered should have exceptional merit and research or industrial experience in the appropriate field.
15. Ocean Engineering
Master's degree in Engineering/Technology and preference to those with Master's degree in Ocean Engineering.
M.Sc degree in Physics, Mathematics, Oceanography, Geology and / or Geophysics and Statistics and having valid GATE score.
- For Petroleum Engineering
Master's degree in Engineering / Technology in any area relevant to research in Petroleum Engineering."
M.Sc degree in Physics, Mathematics, Oceanography, Geology and / or Geophysics and Statistics and having valid GATE score.
16. Physics
M.Sc/M.Sc (Tech) in Physics, Applied Physics, Materials Science/M.Tech (Solid State Technology)/M.Tech (Materials Science) or equivalent.

Students who get CGPA of 8.0 and above in M.Sc degree from IIT Madras are also eligible for admission to Ph.D programme in Sciences

Note:

DST-INSPIRE Fellowship is treated as eligible criteria for admission to PhD programme in all the departments wherever applicable.

6.2 Eligible Degrees for Admission to M.S programme

Sl.No.	Department	Eligible Degree
1.	Aerospace Engineering	<p>Bachelor's degree in Aerospace/Civil/Chemical/Computer Science/Electrical/Mechanical/Metallurgical/Naval Architecture/allied branches (such as Instrumentation, Energy Engg., Production, etc.)</p> <p>OR</p> <p>Master's degree in Physics/Mathematics/Chemistry and aptitude for research.</p> <p>OR</p> <p>Any engineering graduate with at least two years relevant experience in Aerospace Industry/Research Organisation and applying under EXTERNAL category.</p>
2.	Applied Mechanics	<p>Engineering Mechanics and Solid Mechanics areas: Bachelor's degree in Civil/Aerospace/ Mechanical/Naval Architecture Engineering.</p> <p>Fluid Mechanics area: Bachelor's degree in Civil / Mechanical / Aerospace / Chemical Engineering.</p> <p>Biomedical Engineering area: Bachelor's degree in Engineering or Master's degree in Science with Mathematics as optional subject and aptitude for research. MBBS candidates with Mathematics in +2 and having 2 years research/teaching experience may also apply for M.S sponsored programme in the area of Biomedical Engineering.</p>
3.	Biotechnology	<p>Bachelors Degree in Engineering or Pharmacy or M.B.B.S or B.D.S</p> <p>Selection Process: The candidate should have a valid GATE score or qualified for JRF through CSIR or ICMR exams or all India PG admission test or equivalent in order to be called for the interview.</p> <p>The final selection process will be based on performance in the Departmental written test and interview.</p>
4.	Chemical Engineering	<p>Bachelor's degree in Chemical Engineering, allied disciplines such as polymer, petroleum, petrochemical, pharmaceutical, environmental, biochemical, biotechnology, electrochemical, instrumentation etc and other disciplines of engineering/technology</p> <p>M.Sc. (Mathematics /Physics/Chemistry/Env. Science/Biochemistry/Biology etc.) with aptitude for research.</p>
5.	Civil Engineering	<p>Bachelor's degree in Civil Engineering from any recognised University for all specialisations in Civil Engineering.</p> <p>In addition, the following non-Civil Engineering Degree Qualifications are also eligible for different specialisations but M.Sc. degree holders in Science with two years experience admitted to the M.S. programme should take additional Engineering Courses to acquire enough engineering background.</p> <p>Building Technology and Construction Management: Bachelor's degree in Architecture or First Class M.Sc degree in Physics/ Applied Science/Material Science with 2 years experience in Civil Engineering area.</p> <p>Geotechnical Engineering: M.Sc. degree in Mathematics/ Physics/Chemistry/Applied Geology with 2 years experience in Civil Engineering area. Bachelor's degree in Mining Engineering with one year relevant experience.</p> <p>Environmental and Water Resources Engineering: Bachelor's degree in Agricultural Engineering or Master's degree in Applied Mathematics/Applied Geology/ Geophysics with 2 years experience in Civil Engineering area.</p> <p>or</p> <p>Bachelor's degree in Environmental Engineering/ Chemical Engineering/Biotechnology or Master's degree in Environmental Science/Microbiology/Bio-Chemistry with 2 years experience in Civil Engineering.</p> <p>Structural Engineering: Bachelor's degree in Aerospace Engineering/Naval Architecture/Mechanical/ Architectural Engineering or First Class M.Sc. degree in Applied Mathematics/ Chemistry/Materials Science/ Physics with 2 years experience in Civil Engineering area.</p> <p>Transportation Engineering: Bachelor's degree in Architecture or First Class B.E/B.Tech (Mechanical) working in Transportation Field</p>

- | | | |
|-----|---------------------------------------|--|
| 6. | Computer Science and Engineering | Bachelor's degree or equivalent in any branch of Engineering / Technology or Master's Degree in Mathematics/ Statistics/ Physics/Computer Science/MCA with Mathematics/ Physics/ Statistics basic degree |
| 7. | Electrical Engineering | Bachelor's degree in Electrical Engineering (Electrical and Electronics Engineering)/ Electronics Engineering (Electronics and Communication Engineering) / Instrumentation Engineering or Master's degree in Physics. Candidates not having Bachelor's degree in Electrical/Electronics Engineering should qualify in a written test to be eligible for interview. |
| 8. | Engineering Design | Bachelor's degree in Aerospace, Automobile, Biomedical, Civil, Computer Science, Electrical, Electronics, Engineering Physics, Instrumentation, Mechanical, Metallurgical, Naval Architecture, Production / Manufacturing Engineering, or Bachelor's degree in Design (B.Des.) or Master's degree in Physics. |
| 9. | Management Studies | <p>Qualifying Test : National-level entrance/eligibility test such as CAT/XAT/MAT/ATMA/GATE/ UGC or CSIR NET JRF or Lectureship or equivalent</p> <p>International level post graduate admission qualifying examination such as GMAT/GRE or equivalent</p> <p>Candidates having qualified in MFT (Major Field Test) will also be eligible for admission to the M.S. programme</p> <p>Minimum Educational Qualifications : B.E./B.Tech or equivalent with First class or 60% marks in aggregate or Four-year professional degree (like AMIE) or equivalent programmes in a relevant discipline with First class or 60% marks in aggregate.</p> <p style="text-align: center;">or</p> <p>A Master's degree in any discipline with 55% marks in aggregate from a recognized Institution or University.</p> <p>Minimum Work Experience :</p> <ol style="list-style-type: none"> 1. NIL for those fulfilling the above conditions for Qualifying Test and Minimum Educational Qualifications. 2. THREE years' managerial experience for those who fulfill the Minimum Educational Qualifications condition but have not taken or are ineligible to take the Qualifying Test. Such applicants will be administered by a Departmental test to evaluate their eligibility. These candidates are not eligible for HTRA. |
| 10. | Mechanical Engineering | Bachelor's degree in Mechanical Engineering, Aerospace Engineering, Agricultural Engineering, Architectural Engineering, Automobile Engineering, Chemical Engineering, Computer Science, Electrical Engineering, Electronics, Energy Engineering, Industrial Engineering, Instrumentation, Metallurgical Engineering, Mining Engineering, Naval Architecture, Marine Engineering, Production/ Manufacturing Engineering and in related areas depending on the research topics. |
| 11. | Metallurgical & Materials Engineering | Bachelor's degree or equivalent in Metallurgical Engineering or other appropriate branch of Engineering/ Technology or Master's degree in Physics/Chemistry/Materials Science or allied fields with GATE with 'XE'. Master's Degree in Mathematics with GATE with Metallurgy. |
| 12. | Ocean Engineering | Bachelor's degree or its equivalent in Civil/Mechanical/ Aerospace/Naval Architecture or Master's degree in Oceanography/Applied Mathematics/Physics. |
| | For Petroleum Engineering | <p>Bachelor's degree in Civil / Mechanical / Chemical / Naval Architecture / Ocean / Aerospace / Metallurgical / Materials / Electrical and Electronics / Marine / Mining / Aerospace or its equivalent.</p> <p>Master's degree in Oceanography / Earth Sciences / Applied Physics / Applied Mathematics / Geology / Geophysics / Remote Sensing or its equivalent.</p> |

INTERNATIONAL STUDENTS – ADMISSION (M.S/Ph.D)

Foreign nationals can only register as regular full-time scholars. Foreign nationals with degree from Indian Universities will be treated on par with Indian nationals for admission purposes. Foreign nationals with foreign degrees must meet the minimum educational requirements as given in **R.2.1** equivalent to a Indian Master's degree in the relevant disciplines. In addition, they should have a valid GRE/ GMAT / GATE /CAT/XAT/MAT/ATMA/UGC or CSIR /NET /JRF or an equivalent examination in the relevant discipline and should have cleared TOEFL score. International students are expected to have a working knowledge of English.

Fees:

Sl.No.	Institute fees	Ph.D.	M.S.
1.	One time fee (at the time of admission)	US \$ 100	US \$ 100
2a	Semester fees: a) Tuition Fees (for SAARC Countries US \$ 1000)	US \$ 2000	US \$ 2000
2b	Other fees	US \$ 65	US \$ 65
4	Hostel Fees	Rs. 23750	Rs. 23750
5	Institute/Library caution Deposit	Rs. 2000	Rs. 2000

8. RESEARCH AREAS

8.1 Aerospace Engineering Department :

Aerodynamics: Subsonic, Transonic, Supersonic, Hypersonic, Rarefied Gas flows (Theoretical and Experimental), Boundary Layers and Stability of Flows, Turbulent Flows, Shock Tubes and Related Problems, Development of Algorithms and Code for Numerical Methods in Gas Dynamics and Computational Fluid Dynamics, Vortex Dynamics, Supersonic Mixing and Combustion, Optical Flow Diagnostics.

Aircraft Structures: Finite Element Methods, Numerical Methods, Photo Elasticity, Moire and Holographic Methods of Structural Analysis. Composite Structures, Fatigue and Fracture Mechanics, Contact Mechanics, Vibrations and Impact Mechanics.

Aerospace Propulsion: Rocket Propulsion and Solid Propellant Combustion, Airbreathing Propulsion and Combustion, Cascade Flows, Multiphase Flow Simulation, Combustion Instability, Optical Flow/Combustion Diagnostics.

Dynamics and Control : Nonlinear Dynamics in Aerospace Applications, Computational Methods in Nonlinear Dynamics, Nonlinear Control Theory and Applications, Flight Simulations and Controller Development, Design Development of Autonomous Flying Vehicles.

8.2 Applied Mechanics Department :

Plates and Shells, Finite and Boundary Element Techniques, Experimental Stress Analysis including Holography, Image processing techniques, Digital Photo Mechanics, Fatigue of Materials, Fracture Mechanics, Reliability of Structures, High Temperature Design, Composite Structures, Plasticity, Smart Materials and Structures, Constitutive Modelling, Granular Materials, Biomaterials, Fluid Mechanics, Aerodynamics, Stability, Transition, Turbulence, Turbulence Modelling, Turbulent Convection, Computational Fluid Dynamics (CFD), Bluff body and Industrial Aerodynamics, Fluid Structure interaction, Cardiovascular System studies, Image and Signal Processing, Speech Signal Processing, Ultrasound and Laser instrumentation in Medicine, Biomechanics, Rehabilitation Engineering, Evoked Response and Functional Electrical Stimulation.

8.3 Biotechnology Department :

Cellular, Molecular and Structural Biology relating to Signal transduction, Lipid Trafficking, Stem cell proliferation etc., Protein crystallography and structure prediction; Drug design and QSAR. Bioorganic Chemistry; Biotransformations; Enzymes in Organic synthesis; Biosensors; Environmental Biotechnology Bioremediation; Green Chemistry;

Biochemical Engineering, Bioreactor Modelling; Reactive Oxygen species in Bioreactors; Recombinant Systems Cloning of Therapeutic Proteins and Large scale Production; Industrial Microbial Processes; Plant tissue and Animal cell Culture; Downstream Processing; Protein Refolding.

Bioinformatics and Computational Biology; Biomedical Engineering Biomechanics; Biomaterials; Computational Neuroscience; Molecular Genetics of Plant Development.

8.4 Chemical Engineering Department:

Chemical reaction engineering and thermodynamics, transport processes, process design and control, environmental engineering, polymer science and technology, semi-conductor materials processing, and particle technology.

Fundamental studies: Electrocatalyst, photocatalyst and heterogeneous catalyst, Light driven chemical reactions, Antibiotics and bacterial resistance. Mathematical modeling of physico-chemical phenomena. Applied statistical mechanics, thermodynamic property estimation, phase equilibria. Flow visualisation using lasers, Microwave assisted thawing. Drying, multicomponent boiling and condensation. Simultaneous heat and mass transfer processes.

Modeling of processes and equipments: Hydrodynamic and kinetic studies of turbulent bed contactors, trickle beds, slurry reactors, fast and inverse bed fluidized beds. CFD analysis of process equipments. Advanced separation processes such as reactive and azeotropic distillation, membrane processes. Modeling of rotary kilns, crushing and grinding equipments, fluid energy mills of Microelectronic fabrication techniques.

Development, characterization and processing of materials: Characterization of materials by light and electron microscopy. Development of polymer blends and composites, polymer based nano-composites. Rheology of polymers and colloids; damping and vibration isolation using polymers. Enzyme design and engineering, protein engineering and production of recombinant proteins.

Process design and control, systems engineering: Advanced control design such as adaptive control, intelligent control, non-linear control, fault diagnosis and fault tolerant control. Synthesis and optimization of process systems; statistical data processing. Simulation and optimization of crushing and grinding circuits.

Environmental engineering and waste reduction: Liquid and solid waste treatment, air pollution monitoring and control, toxic and hazardous waste management, environmental risk assessment, colour removal from waste water. Recycling of mixed plastic waste.

8.5 Chemistry Department:

Analytical Chemistry, Bioinorganic Chemistry, Chemistry of Main Group Elements, Inorganic Heterocycles, Materials Science, Synthetic and Structural Solid State Chemistry, Nanomaterials, Cage and Cluster Chemistry, Synthetic Organometallic Chemistry, Metalloboranes and Metallocarboranes, Supramolecular Chemistry
Organic Synthesis, Natural Product Synthesis, Organometallics, Asymmetric Catalysis, Synthetic and Structural Carbohydrate Chemistry, Bioorganic Chemistry, Enzymes in Organic Synthesis, Medicinal Chemistry, Physical Organic Chemistry, Organic Photochemistry

Homogeneous and Heterogeneous Catalysis, Surface Chemistry, Theoretical and Experimental Electrochemistry, Photochemistry, Polymer Chemistry and Applications, Gas-phase Kinetics, Monolayers and Clusters, Green Chemistry, Host-Guest Chemistry, Reaction Mechanisms, Excited State Photophysics, Energy Systems, Superconductors, Nanoclusters and Nanophases, Colloid and Interface Science Chemical Physics, Quantum and Theoretical Chemistry, Chemical Reaction Dynamics, Theoretical and Experimental Spectroscopy, Magnetic Resonance Spectroscopy and Imaging (especially NMR based), Fluorescence Spectroscopy, Nuclear Spectroscopy, Statistical Mechanics, Molecular Dynamics.

8.6 Civil Engineering Department :

Building Technology & Construction Management Division: Technology of Construction Materials, High Performance Concrete, Repair and Rehabilitation of Constructed Facilities, Accelerated and unreinforced / reinforced Masonry, Disaster-Resistant Construction. Functional Performance of Buildings, Energy Efficiency of Buildings, Noise Control in Buildings, Acoustical Modelling, Environmental Noise Control. Construction Project Management, Project Scheduling and Control, Resource Management, Quality Management, Contracts, Productivity, Constructability, Schedule Compression, Risk Modelling in Projects, PPP for Infrastructure Development, Computer Applications in Construction, Geographic Information Systems.

Geotechnical Engineering Division: Strength and Deformation Behaviour of Soils, Expansive Soils, Soil Dynamics and Earthquake Engineering, Pile Foundations, Soil Stabilization, Stone Columns, Reinforced Earth, Geosynthetics, Environmental Geotechnics and Waste Disposal, Computer Methods in Geotechnical Engineering, Soil Structure Interaction, Reliability Methods.

Environmental and Water Resources Engineering Division: Water Resources Systems Analysis, Design and Management for Water Supply, Irrigation, Drainage, Hydropower, Flood Control, Droughts. Surface and Ground Water Hydrology, Stochastic Hydrology, Physical and Numerical Modelling. Use of Finite Difference, Finite Element and Boundary Element Methods. Instrumentation and Monitoring of Hydraulic Systems, Computer Simulation and Optimization of Hydrosystems. Evolutionary Computing Applications, CAD, Decision Support and Expert Systems in Water Resources Engineering. Environmental Hydraulics, Water Quality Modelling, Industrial Waste Water Treatment, Hazardous Waste Management, Environmental Systems Analysis, Environmental Micro-Biology, Bioremediation, Air quality and Solid Waste Management, Environmental Biotechnology, Water and Wastewater Treatment.

Structural Engineering Division: Experimental and Theoretical Study of Reinforced Concrete, Prestressed Concrete and Metal Structures, Plates & Shells, Thin Walled Members, Advanced Fibre Composite Members, Structural Dynamics and Impact Behaviour, Structural Stability, Structural Reliability, Smart Structures, Earthquake Resistant Design and Retrofit of Reinforced Concrete Structures, Bridges, Tall Structures, Structures for Power Plants, Finite Element Analysis of Linear and Non-Linear Structural Systems, Structural Optimization, Computer Aided Structural Analysis and Design, Expert Systems and Artificial Intelligence Applications in Structural Engineering.

Transportation Engineering Division: Inter-City and Regional Transportation, Urban Transportation Planning, Travel Demand Analysis, Traffic Management, Operations and Safety; Public Transportation Planning, Operations and Management; Planning of Pedestrian and Bicycle Facilities, Intelligent Transportation Systems (ITS), Applications of GIS, Simulation Tools, Advanced Techniques and Decision Support System, Optimization, Transportation Economics; Constitutive Modelling of Asphalt, Modified Asphalt and Asphalt Mixtures; New and Innovating Materials in Pavement Construction; Analysis of Layered Structures, Design of Flexible and Rigid Pavements; Geo-synthetics in Pavements and Pavement Overlays; Pavement Management Systems; Rural Roads Planning, Design, Performance Evaluation and Maintenance Management; Low Cost Road Construction, Socio-economic Benefits Evaluation of Rural Road Projects.

8.7 Computer Science and Engineering Department :

Automata theory and Formal languages, Analysis of algorithms, Graph theory, Unconventional Methods of Computing, Cryptography.

Software Engineering, Object Oriented Systems, Parallel and Distributed systems, Mobile Computing, Programming languages, Performance evaluation.

Software for VLSI design, Computer architecture, Computer graphics and Visualization.

Computer Communication and networks, Network Protocols and security, Real-time systems, Wireless Sensor Networks.

Data bases, Knowledge based systems, Data mining, Artificial intelligence, Machine learning, Indian language systems, Speech and vision systems, Artificial neural networks.

8.8 Electrical Engineering Department :

Communication Systems: Multi-access Wireless Communication Networks, Modulation and Coding, Digital Signal Processing, Audio and Video Signal Compression, Image Processing and Computer Vision, Speech Processing, Computer Networks, Optical Communication, Optical Networks, Optical Sensors and Components, Optical metrology Computational Electromagnetics.

Control: Control Theory - Linear and Nonlinear, Robotics, Vision, Sensing, Digital Control of Systems, Simulation of Systems, Control Systems Design, Servomechanisms and Micromachines, Electronic and Control Instrumentation.

Electrical Drives and Power Electronics: Power Electronic Converters, Vector Control/Direct control /Torque Control of Motors, Simulation of PE systems, DSP Applications, Permanent Magnet Machines and Special Machines.

Instrumentation: Power Systems Instrumentation - Partial discharge measurements - Modeling and Simulation-Transducers-Signal conditioning-Optical methods for Bio-Medical Instrumentation - Virtual Instrumentation. Signal Processing applications in Instrumentation - Telemetry.

Microelectronics: Modeling, Simulation, Fabrication and Characterization of Silicon-on-Insulator (SOI) based Devices, Power MOSFETS, HEMTS, Compound semiconductor Devices, Polysilicon and Amorphous Silicon Thin Film Transistors: ultra-thin and high-k gate dielectric and small geometry devices. MEMS based sensors and actuators, BioSensors, photonics.

Power Systems and High Voltage: Power System Optimization and Economics, Energy Management Systems, Power system automation, Flexible AC Transmission Systems (FACTS), Restructured Power System Operation, Power Quality.

High Voltage Engineering, Insulation Coordination, Treeing and Tracking Phenomena in insulation material, Condition Monitoring of Power Apparatus Using Multi-Fusion Sensors, Production of Nanoparticles, Sterilization of Liquid Foods.

VLSI Design: Analog and RF circuit design, Digital Systems including Architectures for Image Processing and Vision, CAD for Digital and Analog Circuits, Reconfigurable Computing.

8.9 Engineering Design:

Automotive Engineering : Vehicle Dynamics, Tyre Mechanics, Mathematical Modelling of Dynamic Systems, Control, Fault, Diagnosis, Automotive Systems, Intelligent Transportation Systems.

Biomedical Design :Medical Imaging, Biomechanical Modeling, Soft Tissue Mechanics, Bio-Fluid Mechanics, Prosthetic and Scaffold Design, Biomedical Devices and Control Microwave Applications, Tissue Ablation and Hyperthermia Physics, Radiometry, Ergonomics, Rehabilitation Engineering.

Materials and Design : Geometric and Solid Modeling, Computational Geometry, Shape Search, Shape Optimization, Image Based Reconstruction, Solid Free Form Fabrication, Design Theory, Reliability Fatigue and Fracture, Finite Element Analysis, digital Image Correlation, Material Characterization, Structural Health Monitoring, Design with Smart Materials, Sustainable Manufacturing.

Robotics and Mechatronics : Parallel Manipulators, Underwater Robots, Path Planning, System Dynamics and Control, Optomechatronics, Sensing.

8.10 Humanities & Social Sciences Department:

Economics: Development Economics, Energy and Environmental Economics; Applied Econometrics; Industrial Economics; Micro-finance; Health Economics; International Trade; Economics of Innovation and Technological Change; Financial Economics and Banking; Economics of Education/Labour Markets; Urban Water Management.

Education and Technology Studies: Theories of Learning; Information and Communication Technologies (ICTs) in Higher Education; Science and Engineering Education; Engineering Ethics; Assessment and Evaluation in Higher Education; Quality Assurance.

Development Studies: Gender Studies, Labour Studies; Studies on Migration; Poverty, Social Exclusion and Marginalisation; Governance and Decentralisation; New Social Movements / Political Mobilisations.

History: Modern Indian History, History of Science, Technology and Medicine (since 1700s), Law and Society; Plantation History (Historical Aspects of Science, Technology and Medicine and Circulation of Knowledge concerning the crops).

Linguistics: Language in Education; Sociolinguistics; Applied Linguistics; Syntax/Morphology.

Literature and Media Studies: American Literature; Cultural Studies; Disability Studies; English Literature; ELT, Eco-criticism (American/British); Film and Media Studies; Fashion Studies; Indian Drama; Popular Culture; Life writing.

Philosophy: Phenomenology; Hermeneutics; Philosophies of Heidegger and Wittgenstein; Indian Philosophy; Philosophy of Mind; Consciousness; Analytical Philosophy; Philosophy of Language; Political Philosophy; Ethics; Bioethics.

Politics & International Relations / Political Science: International Relations Theory; International Political Economy; Taiwan Studies; Chinese Studies; Democracy Theory and Practice.

Public Policy: Health Policy and Planning; Science and Technology Policy.

Sociology/Anthropology: Political Sociology of Corruption; Sociology of Religion; Islam; Sociology of Work and Gender; Anthropology of body; Anthropology of Technology; Gender Studies; Sociology of Science.

Urban Studies: Urban Housing; Land and Peri-urban land; Peri-urban dynamics; Urban Renewal; Poverty; Urban Livelihoods; Urban Infrastructure; East Asian Urbanism.

8.11 Department of Management Studies :

Research areas: Consumer Behaviour, Positive Organizational Behaviour: Workplace Emotions, Ancient Indian Wisdom in Management, Creativity & Innovation, Cross-Cultural Research, Cognition in organizations, Corporate Sustainability: Responsible Business.

- Comparative Management Systems, Global leadership: Mindset, Potential, Practices, Work and Wellness Training & Development, Workplace teams; Career Management, Experiential Marketing, Advertising; Data Science and Analytics,
- Technology transfer, Innovation and Entrepreneurship, Experimentation and reinforcement learning, Competitiveness and business excellence, Public Systems; Supply chain and Logistics: Green concerns, healthcare and food sectors,

- Game Theoretic Models, Scheduling in manufacturing and service operations, Integrated Production, Logistics and Inventory Optimization in Supply Chain Management, Behavioural Decision Theory; Corporate Finance: Financial decision making, Venture capital and private equity, Small and medium enterprises , Infrastructure finance, Public sector finance; Real Options, Developmental Finance, Financial Markets - Capital market, Bond market, commodity market, derivatives, market microstructure, Behavioural Finance, Financial Modelling & Forecasting, Banking and risk management; E-commerce.

8.12 Mathematics Department:

- Commutative Algebra, Algebraic Geometry, Algebraic Topology, Cryptography, Number Theory, Algebraic K-Theory, Homological Algebra, Geometric Group Theory, Low Dimensional Topology.
- Functional Analysis, Operator Theory, Operator Algebras, Operator Equations, Generalized inverses of matrices and operators, positive operators, Nonnegative matrices, Fixed Point Theory, linear and nonlinear optimization, standard and semi definite linear complementarity problems, Non-linear Analysis, Harmonic Analysis, Wavelets, Fractal Signal and Image Compression, CAGD using fractal function, Theory of Fractal Interpolation, Approximation by Fractal functions, Time Frequency Analysis, Special Functions, Complex Analysis, Fuzzy set Theory and Applications, Summability Theory, Systems and Control Theory, Game Theory, Partial Differential Equations, Inverse problems.
- Differential Equations, Mathematical Modeling, Numerical Analysis, Numerical Linear Algebra, Theoretical and Computational Fluid Dynamics, Transportation Theory of Heat and Mass and Water Waves, mathematical study of ferromagnetic systems.
- Applied Probability and Stochastic Processes, Queuing Theory, Inventory Control, Reliability, Computer Modeling and Simulation.
- Mathematical Logic, Graph Theory, Graph Algorithms, Approximation Algorithms, Theory Of Computation, Theory of Codes, Communication and Coding Theory Combinatorial Optimization, Combinatorics of words, Complexity Theory, Theory of Programming.

(i) Design Engineering:

Machine Elements: design development, analysis and performance improvements; New materials and design: composites, nano composites, bio materials, surface engineering, contact mechanics, tribology, tyre mechanics, biomechanics, fatigue and failure analysis: computational and experimental fracture mechanics, fatigue crack closure - environment interaction studies, alternate/small specimen test methods, small crack propagation under biaxial/multi-axial loading, multi crack interaction studies, fatigue damage in composites, failure mechanics of biomaterials. Non linear finite element analysis, design process, design optimization, finite element applications including coupled problems, Non destructive evaluation, structural health monitoring, Materials constitutive modeling and Characterisation, Measurements of Material Properties and Behaviour, NVH, machinery signal processing, Condition monitoring of structures/machines, machinery diagnosis, combustion/flame noise, Acoustics and Noise Control.

(ii) Manufacturing Engineering :

Manufacturing Processes, Conventional and Unconventional Processes, CAD/CAM, Robotics, CNC Machining, Metrology, Surface Engineering, Computer Integrated Manufacturing, Manufacturing Methods in Precision Engineering; Microsystems technology: Micro-sensors and actuators, Embedded systems, Vehicle controls; Robotics: Series and parallel configuration, Networked robots, Under water, space and medical applications; Fluid power technology: Electro-hydraulic servo-valves, Hybrid hydraulics, System Simulation and Modeling; Precision manufacturing; Design, Development, Modeling and Simulation of Unconventional, Micro and Nano Machining Systems.

(iii) Thermal Engineering:

Heat Transfer in Nano-fluids, Heat Transfer in Multi-Phase Flows, Heat Exchangers, transition to turbulence, Heat and Mass Transfer in Fuel Cells, Biomass combustion, Fluidized Bed Combustion, Advanced Coal Power Plants, Solar Power Systems, Optimization of Solar ICs Systems, Concentrating Solar Power, Thermal Photovoltaic systems The Heat Transfer in Phase Change Material Based Composite Heat Sinks, Experimental and Numerical Methods in Porous Media, Bio-thermo fluids, numerical modeling of heat transfer in biological systems, Conjugate heat transfer in low and high speed flows, Optimization of heat transfer systems, Inverse heat transfer, Satellite Meteorology, Numerical weather prediction, Radiance Assimilation in Mesoscale Weather Models; Pico, micro and mini hydropower ; Economic choice and use of pumps; Two phase flow in pumps and turbines; Cavitation in pumps, turbines and flow devices ; Pumps using solar power; Control of hydrodynamic cavitation, and Design and development of micropumps; Flow Structure Interaction in High Speed Turbo machinery Seals,; Turbine rotor stator interaction, Performance improvement of centrifugal compressor by tip modification, subsonic cascade studies, Investigations on counter rotating turbines, volute casing and mixed flow compressors, active and passive control of turbomachinery flows, Gas turbine blade cooling; IC Engine Combustion and Emissions; Alternative fuels; Multi-component Fuels; Phenomenology and CFD of IC Engines and Gas Turbine Processes, Engine Flow and Combustion Diagnostics;

engine management, Advanced IC Engine Technologies; Vapour compression refrigerators operating with new generation HFO, refrigerants and refrigerant mixtures, mixed refrigerant cascade, refrigerators, Simulation and optimization of mixed refrigerant processes, liquefaction of natural gas/bio gas, magnetic and acoustic refrigeration systems, high effectiveness compact heat exchangers used in refrigerators, air conditioners, and liquefiers, vapour absorption refrigerators operating with ionic fluids. desalination systems, solar cooling systems, IAQ (indoor air quality), jet refrigeration systems, heat pipes, heat pumps, micro-miniature and small cryogenic refrigerators, Simulation and optimization of air separation cycles, solid state hydrogen storage, sorption heating and cooling systems, Desiccant / evaporative cooling, air-conditioning and Ventilation , CFD for air distribution; Acoustics of Supersonic Jets, Active and Passive Control of High speed flows, Combustion noise, Emissions, Combustion of solid, liquid and gaseous fuel, Propulsion, CFD of high speed reacting flows, Microfluidics, Bio-MEMS, Micro-scale flows.

8.14 Metallurgical & Materials Engineering Department:

(i) Materials: Nanostructured materials, Ceramics, Composites, Biomaterials, Medical Materials, Magnetic materials, Optoelectronic materials, Hydrogen storage materials, Fuel cells, energy materials, Chemical sensors, Carbon nanotubes, Smart materials, Shape memory alloys, Metallic foams, Advanced steels (AHSS, DP, Q&P, ODS, etc.), Al, Mg and Ti alloys, Superalloys, Intermetallics, Bulk metallic glasses, High entropy alloys, Polymers and colloids, Printed electronics, Ultra high temperature ceramics, interfaces, Transmission electron Microscopy, Atom probe tomography.

(ii) Processing: Metal casting and solidification, Metal forming, Materials joining, Materials synthesis, Physical and Structural metallurgy, Phase transformations, Mechanical metallurgy, Chemical metallurgy, Powder metallurgy, Surface engineering, Coating, Thermal spraying, Corrosion, Electro chemistry, Non-equilibrium processing, Fatigue and Fracture mechanics, High temperature deformation behaviour of materials and Creep, Nanoindentation, Superplasticity and Superplastic forming, Severe plastic deformation, Thermomechanical processing using Gleeble, Additive manufacturing, spark plasma sintering, grain boundary engineering, Micro and macro texture development.

(iii) Modeling: Integrated computational materials engineering (ICME), Thermodynamics of metallurgical systems and processes, Computational thermodynamics using CALPHAD approach, Simulation and modelling of materials processing, Modeling of mechanical behavior through crystal plasticity, Phase field modeling of microstructure, Molecular Dynamics, Cellular Automaton, Ab-Initio/electronic structure/first principle calculations, Object oriented finite element analysis, Artificial neural networks, Modeling of transport phenomena.

8.15 Ocean Engineering Department :

Petroleum Engineering ,Ocean Hydrodynamics, Ship hydrodynamics, Dynamics of Floating systems, Ocean Structures, Coastal processes, Marine Geotechnical Engineering, Materials for marine Environment, Ocean Energy.

8.16 Physics Department :

Applied Optics, Quantum Optics, Photonics and nonlinear optics, Atomic and Molecular Physics, Complex fluids, Dynamical systems, Statistical physics and field theory, Low temperature physics and superconductivity, Magnetism and Magnetic materials, Hydrogen Storage Materials, Microwaves and Dielectrics, Semiconductor Physics, Photovoltaics, Solid State Ionics and molecular electronics, Thin film phenomena, X-ray diffraction and Amorphous systems, Spintronix and Diluted Magnetic Semiconductors, Condensed Matter Physics/Magnetism in Oxides/Magnetic Materials, Electronic structure of solids/Computational material science, Nonlinear Dynamics, Quantum Chaos, Quantum Information, Metal-oxide Thin films, Nanostructured thin films and heterostructures by PLD.

Centres:

8.17 Sophisticated Analytical Instrument Facility (SAIF) :

Nanomaterials, Clusters, Self Assembled Monolayers, Chemistry of Ions, Surface Chemistry, and Chemistry of ice surfaces. Bioactive ceramics, Surface science aspects of biomaterials host interface, nano composites, Crystal Twinning, Molecular structure of natural products and biomolecules. Photophysical Chemistry, Fluorescence Spectroscopy.

8.18 Interdisciplinary Research Areas:

- (1) Combustion
- (2) Atmospheric Sciences and Technology, including climate science and climate change
- (3) Nano/bio materials and devices
- (4) Sustainability
 - (a) All energy technologies including new and renewable
 - (b) Transportation technologies including guidance and control
 - (c) Heritage structures
- (5) Technology and policy
 - (a) Education and ICT
 - (b) Ethics
 - (c) Technology management
 - (d) Equity
- (6) Computational sciences applied to
 - (a) Materials
 - (b) System biology
 - (c) Quantum computing
 - (d) Analytics, simulation and optimization
- (7) Environmental science and engineering in the following (and not restricted to) areas
 - (a) Air quality and pollution
 - (b) Water quality and pollution
 - (c) Nuclear waste management
 - (d) Carbon dioxide sequestration
- (8) MEMS, NEMS, Lab on a chip, microfluidics and applications
- (9) Bio- engineering – applications and devices
- (10) Advanced sensors

For national security and personal health

9. AMENITIES IN THE CAMPUS

9.1 Accommodation:

IIT Madras is a residential institute and provides on-campus accommodation to all students, faculty and staff. For the students, there are 20 Hostels. Accommodation in the Hostels is provided by the Chairman, Council of Wardens. The hostel rooms are furnished with a cot, a chair and a writing table. Students are expected to bring their own bedding. Establishment fees cover the rent for hostel accommodation. (vide section 3.5 for fees and deposits)

Students residing in the hostels are provided with exclusive dining facility. This covers, breakfast, lunch, evening coffee/tea and dinner. The menu for these is decided by an elected student body.

Each hostel has

- (i) A small library for the exclusive use of the students of that hostel. The hostel library is normally stacked with books for general reading and story books. The hostel library is maintained by the student body of the hostel.
- (ii) A common room for recreation. The common room is provided with a Television, News papers and selected magazines (decided by the student body)
- (iii) Limited sports facility such as table tennis, volley ball / ball-badminton courts etc.,

A Guest House provides accommodation for visitors to the Institute faculty, staff and students.

9.2 Transport:

Campus wide transport is provided by battery operated mini-buses.

9.3 Shopping:

The campus has two shopping centres catering to the needs of the students, faculty and staff. The shopping centre in the hostel zone hosts a xerox shop, a stationery shop, patisserie shop, gift articles shop and a telecom centre. The shopping centre in the residential zone hosts grocery shops, vegetable / fruit stalls, stationery shop and a bookshop.

9.4 Sports Facility:

The Institute has play fields for football, hockey, cricket, volleyball, tennis and a skating ring. A modern Gymnasium, indoor courts for shuttle and volleyball and a beautiful swimming pool are the pride of Institute sports facility.

9.5 Medical Facility:

A full-fledged hospital with 20 beds takes care of the medical needs of the students, faculty and staff. All students of Institute are registered with the hospital and are also covered by a Medical Insurance scheme. Apart from general practitioners, services of leading specialists (on part-time basis) are provided by the hospital.

9.6 Banks:

Two banks, namely State Bank of India and Canara Bank operate branches within the campus. ATM's of SBI and ICICI are housed near the hostels.

9.7 Other Amenities:

A post office and a BSNL telecom centre are also available on campus.

There are four restaurants, two in the Institute zone and two in the hostel zone, catering to the needs of all iitians.

[To be submitted at the time of the Interview]

DATA SHEET FOR Ph.D / M.S ADMISSION

(TO BE FILLED BY CANDIDATES)

Ph.D
M.S

(Please put a tick (☑) mark)

1. Name

(If the boxes provided are not sufficient, Shorten your name)

2. Category Applied for

HTRA	Non-HTRA	External	Project	Staff	Sponsored	CSIR	Part-Time
------	----------	----------	---------	-------	-----------	------	-----------

3. Department

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

4. Age as of last date of the receipt of Application form in IITM

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

5. Date of Birth

6. Email ID : _____

7. B.Tech./B.E/B.Sc.(Engg)/M.A./ M.Com./ M.Sc./AMIE. Etc.,

(a) University
(Shorten the name if boxes are not sufficient)

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

(b) Year of passing

--	--	--	--	--

(c) Aggregate Marks
(Provide one Box also for point)

--	--	--	--	--	--	--	--	--	--

(d) GATE Score
(Provide one Box also for point)

--	--	--	--	--	--	--	--	--	--

(e) UGC-JRF-Lectureship/CSIR Fellowship holder (state validity date)

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

8. Category SC / ST/ GN / PwD

SC ST GN PwD

9. M.Tech/M.Sc.(Engg.)/M.E/M.Sc./M.S./M.A./M.Com./M.B.A

(a) University
(Shorten the name if boxes are not sufficient)

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

(b) Year of passing

--	--	--	--	--

(c) Aggregate Marks
(Provide one Box also for point)

--	--	--	--	--	--	--	--	--	--

(d) If result awaited fill up the boxes as R A

--	--	--	--	--

10. Experience in years as of April /Oct.

--	--	--	--	--

11. No. of Publications

--	--	--	--	--

To be filled in by office :

Reg. No:

Ph.D

M.S

[To be submitted at the time of Interview]

**Admission to Ph.D/M.S programme under
External / Part – time Registration Scheme at IIT Madras**

Proforma for Relief Certificate

Shri/Smt/Kumari
*employed as is granted
leave for 20 weeks (140 days) commencing from to
and is relieved of his/her duties with effect from to
..... to enable him/her to pursue M.S/Ph.D. Research programme
under External / Part – time Registration Scheme in July / Jan..... semester at
the Indian Institute of Technology Madras, Chennai - 600036 as per their offer of
admission letter No..... dated*

Date :

Signature of the Officer with name
and address of the Organisation

Office Seal

Form-1

Certificate from the Employing Organisation

For external registration of their employees in Ph.D / M.S programme of IIT Madras

The application of working as
..... in since is herewith
recommended and forwarded for admission under External Registration Scheme of the
Indian Institute of Technology Madras for Ph.D/M.S Research programme in the
Department of

1. This organization has adequate facilities for carrying out the research indicated by the applicant and if he/she is selected, these will be made available to him/her during regular working hours till the completion of the programme.
2. The applicant will be deputed/given leave for duration of his/her residence period at IIT Madras. The applicant is working with in the commutable distance from IIT madras and he/she will be given permission to attend the required class for completing course work. *(strike out what ever not applicable)*
3. Facilities will be made available to the Co-guide to supervise the work of the applicant and to attend the meetings at IIT Madras when necessary.
4. Till the completion of his/her research programme, the applicant will not ordinarily be transferred to another unit or place which may impede his/her work under the scheme. If such a transfer is necessary, IIT Madras will be informed within a month of such transfer. We understand that continuing of registration will depend on IIT's decision in this regard, taking into account all relevant factors.
5. We note that the facilities of the Institute will be made available to him/her for carrying out the work and that there will be no separate charge (other than tuition fees payable by the candidate) for the use of laboratory, library and other facilities.
6. No part of the work carried out in fulfillment of the Research programme will be utilized commercially or for applying for a Patent without the approval of Indian Institute of Technology Madras and other than on terms mutually agreed to by IIT Madras and this organization.

Date:

Signature of the Officer :

Seal of the organization/
Institution

Name and Designation :

Postal address of the Organisation :

[To be submitted at the time of Interview]

Form-2

Certificate from the reputed University / Institution/ Organization sponsoring their employees For Ph.D / M.S programme of IIT Madras-Part-time scheme

The application of working as
..... in since is herewith
recommended and forwarded for admission under External Registration Scheme of the
Indian Institute of Technology Madras for Ph.D/M.S Research programme in the
Department of

1. The applicant has 2 year / 5 year(in the case of management area) experience in the organization.
2. We note that facilities of the IITM will be made available to him/ her for carrying out the research work under the supervision of a guide and he/ she has to pay full fees every semester for the use of laboratory, library and other facilities of the Institute.
3. This organization facility will also be made available to him/ her in the case of selection.
4. The applicant will be deputed/given leave for duration of his/her residence period at IIT Madras. The applicant is working with in the commutable distance from IIT madras and he/she will be given permission to attend the required class for completing course work.
(strike out what ever not applicable)
5. Till the completion of his/her research programme, the applicant will not ordinarily be transferred to another unit or place which may impede his/her work under the scheme. If such a transfer is necessary, IIT Madras will be informed within a month of such transfer. We understand that continuing of registration will depend on IITM's decision in this regard, taking into account all relevant factors.
6. No part of the work carried out fulfillment of the Research programme will be utilized commercially or for applying for a Patent without the approval of Indian Institute of Technology Madras and other than on terms mutually agreed to by IIT Madras and this organization.

Date:

Signature of the Officer :

Seal of the organization/
Institution

Name and Designation :

Postal address of the Organisation

[To be submitted at the time of Interview]

Particulars of Co-guide for external Registration Scheme

In addition to being in a position to ensure technical and logistic support to the scholar in his/her research work in the organization, the Co-guide must have a minimum academic qualification of a Master's degree in Engineering/Management or Ph.D. in Science and adequate professional experience in the relevant field. The Co-guide should not himself be a scholar working for any higher degree of any university. He will be an invitee to the Doctoral Committee/General Test Committee meetings at IIT Madras.

(1) Name of proposed Co-guide :
(in block letters)

(2) Academic qualifications of Co-guide :

(3) Membership of Professional Societies of Co-guide :

(4) Designation of Co-guide :

Certificate of Co-guide

This is to state that in the event of Mr/Ms. _____ of this organization being selected for Ph.D / M.S programme in the Department of _____ under the External Registration Scheme of IIT Madras, I agree to be his/her Co-guide and shall extend all possible facilities to enable him to carry out his research programme towards the submission of thesis.

Date:

Signature of Co-guide

Admission to Ph.D / M.S programme under Project Scheme at IIT Madras
Certificate from the Project Co-ordinator

I have noted the conditions stated below concerning the registration of project staff for Ph.D / M.S programme.

This is to certify that Sri/Smt/Kum _____ is working in the project title _____ since _____ as _____ . The candidate is eligible to continue in the project for a minimum period of one more year from the date of his/her joining the research programme (Ph.D / M.S) even though his/her appointment is upto _____ as per his/her appointment order. The actual duration of the project is upto _____ .

Conditions:

1. For a person employed on a project to be eligible for Ph.D/M.S registration, there should be a minimum residual period of one year's service in the project from the date of registration.
2. Person employed on a project can apply for admission to M.S. programme with a minimum project experience of six months without valid GATE score subject to qualifying in selection procedure (interview / written examination) of the concerned department. They will not be eligible for HTRA until they qualify in the GATE examination. The scholars may seek conversion from project to HTRA provided they qualify in GATE with the minimum cut-off prescribed for the selection of scholars admitted in his/her batches.
3. Eligibility requirement of project staff applying for Ph.D. will be treated equivalent to that of External registration candidates under N-HTRA.

Date: _____ Signature and name of the Project Coordinator

Department of _____

Countersigned:

Date: _____ Head of the Department of _____