INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

Information Brochure

M.Tech. / M.Tech.+Ph.D. (Dual Degree)

Admissions 2013-14

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I. Important Guidelines for M.Tech. Application

1	Please read the instructions given in the brochure carefully before filling up the application form.
2	Online Application Form & Information Brochure is available on the Institute website http://www.iitb.ac.in/newacadhome/mtech.jsp from 18th March 2013 to 2nd April 2013. Candidates are required to submit their application ONLINE. After filling the form, candidates are advised to take a printout and keep the same for the record.
3	The application fee is ₹ 300/- for GN/OBC-NC and ₹.150/- for SC/ST. The fee is to be paid by Debit Card/ Credit Card/ SBI Internet Banking/ Online Payment System/Demand Draft drawn on any Nationalized Bank (preferably State Bank of India / Canara Bank) in favour of "Registrar, IIT Bombay", payable at Mumbai branch. You must write your Name, Department, Application number or GATE registration number and Email address on reverse side of the Demand Draft. If you are paying through Demand Draft, you MUST send the Demand Draft along with the completed copy of the application. If you have paid the application fee through Debit Card/ Credit Card/ SBI Internet Banking/ Online Payment System you do not have to submit the hard copy of the application. Applications without online payment details/Demand Draft will not be considered. APPLICATION FEE IS NON-REFUNDABLE.
4	Please refer to the Institute website http://www.iitb.ac.in/newacadhome/mtech.jsp for filling ONLINE application form.
5	If the name of your qualifying discipline does not match exactly with the qualifying discipline listed in the brochure, you may select the code for the discipline closest to your qualifying degree discipline. In case you do not find a close match, you may select ZE (in case of B.E./B.Tech. degree) or ZS (in case of M.Sc. degree). Admission offered in these cases will be subject to the verification of the curriculum by the concerned Academic Unit of IIT Bombay.
6	You can apply for more than one programme and can select up to 10 preferences. If a discipline has multiple specialization, each specialization is counted as one option.
7	OBC candidates may note that the limit of annual income is ₹ 4.5 lakhs for determining the creamy layer among Other Backward Classes (OBCs) candidates. The OBC-NC certificate issued after 01.04.2012 (financial year for 2012-13) by the Competent Authority in the prescribed format must be uploaded in the ONLINE application form and submitted at the time of admission.In
8.	Requirement of First Class/60% for PG admission at IIT Bombay As given under A.7.3. "GENERAL ELIGIBILITY FOR M.TECH/M.TECH.+Ph.D.(DUAL DEGREE) PROGRAMMES IN ALL DEPARTMENTS/ CENTRES/ SCHOOLS/ ID GROUPS/ CROSS-DEPARTMENTS".
9	Please note that you can submit only ONE application.

10	You MUST upload the following while submitting the M.Tech. Application. • Scanned version of photograph • Scanned version of signature • Marksheet of the last semester/ Consolidated marksheet of the qualifying degree. • (Exam pending/result awaited candidates have to upload their latest/previous semester marksheet). • Caste Certificate (OBC-NC/SC/ST), if applicable. An affidavit for having applied in case the certificate is not yet received. • PD Certificate, if applicable • Statement of Purpose, if applicable
11	Candidates applying for Chemical Engineering (CH), Biomedical Engineering (BM), Electrical Engineering (EE1, EE2, EE3, EE4, EE5) MUST provide the following information along with the application form : • Title of the final year project. • Four courses studied, which you think, are relevant to the M.Tech. Programme. • Short-term courses attended.
12	In case of payment by Demand Draft, the copy of the completed application along with the demand draft (of the required amount) is to be sent in an envelope superscribing on the top 'Application for M.Tech. Programme', to the following address: Deputy Registrar (Academic), IIT Bombay, Powai, Mumbai–4000 76 and must reach this office by 2nd April,2013.
13	You should check the Institute website http://www.iitb.ac.in/newacadhome/mtech.jsp or results/ important announcements.
14	You should check emails sent to the email address provided in your application, for all important communications and announcements.
15	Candidates called for written test/interview should bring with them (i) Photo ID Card (ii) Hard copy of the application submitted online (iii)/Final year thesis / dissertation / report / publication / copy of certificates / Marksheets.
16	Candidates having degree from foreign universities are required to submit equivalence certificate from Association of Indian Universities (AIU), New Delhi for qualifying Exam and proof of having First class or 60% (55% for SC/ST) or equivalent in qualifying examination.
17	Seats are reserved for Other Backward class-Non-Creamy layer(OBC-NC)/Scheduled Caste (SC)/ Scheduled Tribe (ST) /Person with Disability (PD) category, as per Government of India rules.

Candidates need to apply ONLINE only. No Downloadable Forms will be available.

II. IMPORTANT DATES

No	Particulars	Dates	
01.	Advertisement (in all leading Newspapers and on IIT website)	March 10, 2013	
	Mode of Application form : Online		
02.	Availability of application forms	March 18, 2013	
03.	Last date for submission of completed application forms	April 02, 2013	
04.	Last Date to convey the minimum Qualifying GATE score/ Qualifying Discipline GATE score to be "eligible" for applying at IIT Bombay (only the candidates above this GATE score will be eligible to apply) by concerned academic units to the Academic Office.	March 05, 2013	
05.	Last Date to convey the minimum qualifying score for cut-off for Written Test/Interview to GN candidates by concerned academic units to the Academic Office.	April 09, 2013	
06.	Direct Admission Offer		
	AE & IE&OR (1st round only) CH,CS,EE, SC, ME (for ME2 & ME3 only) & MMM on the basis of GATE score only for TA category (No Written Test and/ or Interview for GN,SC,ST, OBC-NC & PD candidates)	Result Announcement	Last date for payment of fees
	1st offer	April 10, 2013	April 16, 2013
	2nd offer (except AE,IO)	April 19, 2013	April 25, 2013
	3rd offer (except AE,IO)	April 29, 2013	May 6, 2013
	4th offer for CH,EE,ME,SC (if required)	May 31, 2013	June 7, 2013
07.	Written Test and/or Interview		
To display the list for candidates called for TA / TAP / FA / RA / RAP / PS / IS / SW for Written Test and or/Interview schedule/details		April 16,2013	

08. Dates for the Written Test and or Interview for all categories(i.e TA/TAP/FA/RA/RAP/PS/IS/SW)

Department	Teaching Assistantship (TA)/ Teaching Assistantship Through Project (TAP)/Fellowship Awardee (FA)	Research Assistantship (RA)/ Research Assistantship Through Project (RAP)	Project Staff (PS)/Institute Staff (IS)/Sponsored (SW)
Aerospace Engineering (AE1, AE2, AE3, AE4)	May 13th, 2013 (Written Test and/or Interview)	-	May 13th, 2013 (Written Test and/or Interview)
Bioscience & BioEngineering (BM)	May 14th & 15th, 2013 (Written Test and/or Interview)	-	May 14th & 15th, 2013 (Written Test and/or Interview)
Chemical Engineering (CH)	-	-	May 14th & 15th, 2013 (Written Test and/or Interview)

Civil Engineering CE1, CE2, CE3, CE4, CE5, CE6	May 16th & 17th, 2013 (Written Test and/or Interview)	-	May 16th & 17th, 2013 (Written Test and/or Interview)
Candidates shortlisted for written test/interview for specialization – CE1,CE2 and CE4 should report to Civil Engineering Department at 8.30 a.m. on May 16th, 2013 & May 17th, 2013 and for remaining disciplines CE3,CE5 and CE6 there will be only Interview. Those who are not able to attend written test/interview on May 16th -17th 2013 as a special case (only on account of qualifying degree related university examinations), they can appear on May 19th, 2013 (Sunday) 8.30 am onwards.			
Computer Science & Engineering (CS)	--	May 20, 2013 (Written Test and/or Interview)	May 20, 2013 (Written Test and/or Interview)
Earth Sciences (GS, PG)	May 17th & 18th, 2013 (Interview)	-	May 17th & 18th, 2013 (Interview)
Electrical Engineering (EE1, EE2, EE3, EE4, EE5)	--	June 6th, 7th & 8th, 2013 (Written Test and/or Interview)	June 6th, 7th & 8th, 2013 (Written Test and/or Interview)
Energy Systems Engineering (EN)	May 14th & 15th, 2013 (Written Test and/or Interview)	-	May 14th & 15th, 2013 (Written Test and/or Interview)
Environmental Science & Engineering (EV)	May 18th & 19th, 2013 (interview only)	--	May 18th & 19th, 2013 (interview only)
Geoinformatics & Natural Resources Engineering (GNR)	May 18th & 19th, 2013 (Written Test and/ Or interview only)	--	May 18th & 19th, 2013 (Written Test and/ Or interview only)
Industrial Engineering & Operations Research (IO)	May 16th, 17th & 18th, 2013 (Written Test and/or Interview)	July 8th, 2013 (Written Test and/or Interview)	May 16th, 17th & 18th, 2013 (Written Test and/or Interview)
Mechanical Engineering (ME1, ME2, ME3, ME4)	May 5th, 2013 (Written Test for ME1* & ME4*) Fellowship Interview for Admitted candidates in ME4 on July 5th, 2013 ME2 & ME3 Through Direct Admissions Only (as per Sr. No.7).	May 5th, 2013 (Written Test for ME1*). July 5th, 2013 (written test/ interview, for ME2 & ME3 only). No RA Position for ME4.	May 5th, 2013 (Written Test for ME1*) . July 5th, 2013 (written test/ interview, for ME2 & ME3 only). No PS/IS/SW/TAP/PA Position for ME4.
	* Written test syllabus for ME1 & ME4 available on www.me.iitb.ac.in.		
Metallurgical Engineering and Materials Science (MM1, MM2, MM3, MM4)	May 17th & 18th, 2013 (Written test and/or interview)	-	May 17th & 18th, 2013 (Written test and/or interview)

Materials, Manufacturing and Modeling (MMM)	--	--	---
Systems & Control Engineering	--	--	May 2nd, 2013 (Written Test and/or Interview)
Technology & Development (TD)	May 13th, 2013 (Written Test) May 14th & 15th, 2013 (Interview)	--	May 13th, 2013 (Written Test) May 14th & 15th, 2013 (Interview)

09.	Date for receipt of recommendations from Heads of Dept/ School/ Centre/ID groups	May 22, 2013

10. Declaration of Result for Test/Interview and last date for payment of fees

Offers	Result Announcement	Last date for payment of fees
1st offer	May 28, 2013	June 3, 2013
2nd offer(if required)	June 6, 2013	June 12, 2013
3rd offer(if required)	June 17, 2013	June 23, 2013
Final offer (if required)	June 25, 2013	July 1, 2013

11 Spot admissions (for Vacant Seats, if any, if required) for TA category only	
Mechanical Engineering (TA/RA)*** & ME4** ** Fellowship interviews for the ME4 stream will be held on July 5th, Spot admissions for vacant seats, if any, will also be decided by the same interview committee. IF there are too many applicants for spot admissions, only the top 25% of the candidates present, based on the written test on May 5th, will be interviewed. *** Please refer the website for more details.	July 05, 2013
Bioscience & Bioengineering, Civil Engineering, Electrical Engineering, Earth Sciences.	July 08, 2013
Energy Systems Engineering, Environmental Science & Engineering, Geoinformatics & Natural Resources Engineering, Industrial Engineering & Operations Research, Metallurgical Engineering and Materials Science, Systems & Control Engineering, .	July 09, 2013
Aerospace Engineering, Chemical Engineering, Computer Science & Engineering, Technology & Development.	July 10, 2013
12 Registration and Orientation Programme	July 12, 2013 to July 17, 2013
13 Instructions begins	July 18, 2013

CH,EE,CS,ME2 & ME3,MMM, SC	These academic units offer Direct Admissions on the basis of GATE score ONLY (No written test and/or interview) (For admission to TA/TAP category)
AE, IE&OR	These academic units offer admission through Direct Admissions on the basis of GATE score & through Written Test and/or Interview (For admission to TA/TAP category)

The Written Test and/or Interview for M.Tech.+Ph.D. (Dual Degree) Programme will be communicated by Academic Office separately on IIT website: http://www.iitb.ac.in/newacadhome/mtech.jsp.

Results will be declared on IIT website: http://www.iitb.ac.in/newacadhome/mtech.jsp. The dates given above are tentative. Any changes in the dates will be indicated on the same website.

A) GENERAL

A.1) THE INSTITUTE

The Indian Institute of Technology Bombay (IIT Bombay) is one of the higher Institutes of Technology in the country set up with the objectives of making available facilities for higher education, research and training in various fields of Science and Technology. It was established in 1958.

The Institute is located at Powai in a campus extending over 220 hectares amidst picturesque surroundings with Vihar and Powai lakes on either side.

At present, Undergraduate, Postgraduate and Doctoral programmes are offered by Aerospace Engineering, Chemical Engineering, Civil Engineering, Computer Science and Engineering, Earth Sciences, Energy Science & Engineering, Electrical Engineering, Mechanical Engineering and Metallurgical Engineering and Materials Science Departments and by Interdisciplinary groups in Industrial Engineering and Operations Research and Systems and Control Engineering.

The Industrial Design Centre of the Institute offers a 2-year M.Des. Programme in Industrial Design, Visual Communication, Animation, Interaction Design, Mobility and Vehicle Design and a Ph.D. Programme in Design. M.Sc. and Ph.D. programmes in Applied Geology and Applied Geophysics, Chemistry, Mathematics, Physics, M.Sc. Programme in Applied Statistics and Informatics are offered by the respective Departments. The Department of Physics also offers a 4-year B.Tech. Programme in Engineering Physics. The Humanities and Social Sciences Department offers doctoral programmes and a 2-year M.Phil programme. The Centre of Studies in Resources Engineering (CSRE) offers a 2-year M.Tech. Programme in Geoinformatics & Natural Resources Engineering and doctoral programmes. The Departments of Physics, Energy Science and Engineering, Centre for Environmental Science and Engineering are also offering M.Sc. - Ph.D Dual degree programmes and their admissions are through JAM. The Institute offers M.Tech. in Technology and Development offered by CTARA and also offers a doctoral programme, Ph.D in Nano Technology - offered by CRNTS. The Institute offers Cross-Departmental M.Tech programme in Materials, Manufacturing & Modelling (MMM) offered by Mechanical Engineering, Met. Engineering & Mat. Sci. & Mathematics. The Institute has also started PG Dual Degree Programmes (M.Tech. + Ph.D.) in various disciplines.

The Shailesh J. Mehta, School of Management offers a 2-year Master of Management programme and also a doctoral programme.

The Department of Biosciences and Bioengineering offers M.Sc. in Biotechnology, Ph.D. and M.Tech. programmes in Biomedical Engineering and M.Sc.- Ph.D. Dual Degree Programme in Biotechnology.

The Institute on an average admits 1131 candidates for the Undergraduate programmes and 1476 candidates for different Postgraduate and Doctoral programmes every year. Students from Bangladesh, Egypt, Ethiopia, Fiji, Iran, Iraq, Jordan, Mauritius, Malaysia, Nepal, Palestine, Sri Lanka, Vietnam and Yemen are also undergoing training in various programmes. In addition to these academic programmes, the Continuing Education Programme (CEP) organizes short, intensive courses in specialized topics both for practicing engineers as well as for teachers from engineering colleges; and also conducts seminar and conferences on current scientific and technological developments. Further, teachers from various engineering colleges also join Institute for the postgraduate and doctoral programmes. under Quality Improvement programme (QIP).

A.2) RESEARCH FACILITIES

All the departments, centres, schools and interdisciplinary groups of the Institute have well equipped research laboratories and workshop facilities. In addition, there are a number of central facilities, which include Computer Centre, Central Library and Central Workshop. The Central Library has a very large collection of books, back volumes of periodicals, standard specifications and other literature. The Library now has more than 3 lakhs books and volumes and subscribes to over 1500 current journals in Science, Engineering, Humanities and Social Sciences. The Computer Centre of IIT Bombay provides

high- end networked computing facilities.

The Institute has many research collaborations with leading universities in USA, Europe, Japan, and other East Asian countries. As part of these collaborations, the post graduate students get opportunities to carry out joint research projects with faculty and students from these universities. Approximately 7 to 10 M.Tech. projects are taken up every year in collaboration with German Academic Exchange Service (DAAD) wherein students work on their projects in reputed German Universities like Aachen, Berlin, Darmstadt, Karlsruhe, Stuttgart and Dresden.

The location of IIT Bombay in close proximity to several leading R&D Centers and major industrial establishments offers excellent opportunities to interact with them and plan some research programmes in collaboration with them. The Industrial Research and Consultancy Centre (IRCC) coordinates collaborative projects with industry and other research organizations such as BARC, TIFR and CSIR. The Institute is actively collaborating with several organizations of other countries on a bilateral basis.

A.3) STUDENTS AMENITIES

The Institute is fully residential and has 14 hostels for students. Each hostel is an independent entity with its own mess facilities, recreation areas, etc. However students may be permitted to have their own arrangements for accommodation outside campus. Some flatlets are available for married research scholars.

Extra-curricular activities are provided by the Students' Gymkhana. These activities include Sports, Cultural programmes and Social Service. Various clubs of the Gymkhana encourage individual talents of students in hobbies such as painting, modeling, music, photography, aeromodelling and fabrication of electronic devices. A swimming pool is an additional facility. A well-planned Student Activities Centre (SAC) routinely organizes several vibrant extra curricular events.

A.4) M.TECH. PROGRAMME

The Institute offers Master of Technology programmes in various disciplines. The aim of the programme is to train the students in deeper theoretical knowledge which will enable them to tackle practical complex problems of design and development in industrial fields, as well as pursue further academic achievements through research. Enough flexibility is provided in the structure of the programme in respect of lecture courses, laboratory and project work to help the students to achieve the above-mentioned aim. The departments are equipped with sufficient facilities for this purpose.

The Institute offers a full-time programme of 2-year and a part-time programme of 3-year duration. The part-time programme is available to the students admitted under the categories of Sponsored (SW), Research Assistant (RA), Research Assistantship through Project (RAP), Project Staff (PS) and Institute Staff (IS). PS and IS categories are only for persons employed at IIT Bombay. The working hours for the full-time and part-time programmes are the same and include the normal working hours of 8.30 a.m. to 5.00 p.m. and evening slots.

A.5) ADMISSIONS

Some of the departments and interdisciplinary groups, offer direct admission to a limited number of candidates solely based on higher GATE score. Candidates, who are offered direct admission, have to confirm the admission by paying the fees on the dates mentioned under Important Dates as per schedule of this brochure. However, such candidates have an option of not accepting the direct admission offer in given specialization, but to appear for written test / interview in a discipline of his/her higher preferences.

Seats remaining vacant after Direct Admissions will be filled through written test and/or interview/spot admissions.

Other Backward Class Non-Creamy Layer(OBC-NCL)/Scheduled Caste (SC)/ Scheduled Tribe (ST) and Person with Disability (PD) Categories :

Seats are reserved for Other Backward Class Non-Creamy Layer(OBC-NCL)/Scheduled Caste (SC), Scheduled Tribe (ST) and Person with Disability (PD) categories as per Government of India rules.

Scheduled Caste and Scheduled Tribe candidates are offered direct admission solely based on their GATE Score and their preferences.

Admission for IIT B.Tech. degree holders

Candidate having an IIT B.Tech. Degree and having a CGPA/CPI of 8.00 and above are exempted from the requirement of GATE qualification. They are admitted to M.Tech. Programme through normal procedure for selection of candidates for TA/RA positions through written test and/or interview

A.5.1 APPLICATION CATEGORIES AND FINANCIAL SUPPORT

The Institute admits M.Tech. candidates under the following categories:

i Institute Teaching Assistantship-TA /Institute Teaching Assistantship through Project (TAP) / Fellowship Award (FA)

ii Institute Research Assistants (RA)/ Institute Research Assistantship through Project (RAP)

iii Project Staff (PS) (for Project staff of IIT Bombay)

iv Institute Faculty / Staff (IS) (for faculty/staff of IIT Bombay)

v Sponsored candidates(SW)

Admissions to all categories are subject to availability of seats. The continuation of the financial support and the registration for the selected programme will be subject to satisfactory performance of the duties assigned by the Academic Unit as well as satisfactory academic performance and fulfillment of the other academic and non-academic requirements, as per rules.

A.5.1.1 INSTITUTE TEACHING ASSISTANTSHIP (TA)

A.5.1.1.1 Candidates to this category are selected subject to (i) a valid GATE score and (ii) Performance in Test / Interview.

A.5.1.1.2 As per MHRD directives, a student holding Teaching Assistantship (TA) shall not accept or hold any appointment paid or otherwise or receive any emoluments, salary, stipend from any source during the tenure of the award (TA).

A.5.1.1.3 The students joining the programme under this category will be considered for Teaching Assistantships of ₹ 8,000/- per month , based on the following norms:

i. Students getting assistantship will be required to assist / work for courses, laboratory, or any other related academic / administrative work to the extent of 8 hours per week as assigned by the concerned Academic Unit.

ii. The assistantship will be available for a maximum period of 24 months and students with TA have to complete the M.Tech. programme in 2 years.

Iii. Assistantship will be paid on the basis of monthly attendance.

A.5.1.1.4 Employees on the rolls (with or without pay) of any organization are <u>not eligible</u> for admission under this category.

A.5.1.2 TEACHING ASSISTANTSHIP THROUGH PROJECT (TAP)

A.5.1.2.1 Candidates to this category are selected subject to (i) a valid GATE score and (ii) Performance in Test / Interview.

A.5.1.2.2 The students joining the programme under this category will be considered for Assistantships based on the following norms:

i. The TAP holders are required to work in a sponsored R&D project being carried out at the Institute.

ii. They will also do their M. Tech. dissertation work under same faculty group in same area as the sponsored project.

iii. They have to complete M.Tech. programme in 2 years.

A.5.1.2.3 Only some disciplines/specializations have TAP seats. The candidates do not have to indicate their preferences for TAP separately.

A.5.1.2.4 Employees on the rolls (with or without pay) of any organization are not eligible for admission under this category.

A.5.1.3 FELLOWSHIP AWARD (FA)

A.5.1.3.1 Candidates to this category are selected subject to (i) a valid GATE score and (ii) Performance in Test / Interview.

A.5.1.3.2 Fellowships are available from agencies such as Aeronautics Research & Development Board (ARDB), Dept. of Science and Technology (DST), Forbes Marshall, Pune, Textile Machinery Manufacturers' Association (TMMA), Atomic Energy Regulatory Board (AERB), International Energy Initiative, Department of Atomic Energy (DAE), Larsen & Toubro, Maharashtra Pollution Control Board etc.

A.5.1.3.3 Only some disciplines/specializations have FA seats. The candidates do not have to indicate their preferences for FA separately.

A.5.1.3.4 Employees on the rolls (with or without pay) of any organization are not eligible for admission under this category.

A.5.1.4 INSTITUTE RESEARCH ASSISTANTSHIP (RA)

A.5.1.4.1 Candidates to this category are selected subject to (i) a valid GATE score and (ii) Performance in Test / Interview.

A.5.1.4.2 The students joining the programme under this category will be considered for Research Assistantships (RA) of ₹ 9,000/- per month , based on the following norms:

i. Research Assistants have to look after the Undergraduate laboratories and also assist in Teaching or Research or other work academic / administrative work to the extent of 20 hours a week as assigned by the Academic Unit.

ii. They have to complete the programme in 3 years.

A.5.1.4.3 Only some disciplines/specializations have RA seats. The candidates do not have to indicate their preferences for RA separately.

A.5.1.4.4 Employees on the rolls (with or without pay) of any organization are not eligible for admission under this category.

A.5.1.5 RESEARCH ASSISTANTSHIP THROUGH PROJECT (RAP)

A.5.1.5.1 Candidates to this category are selected subject to (i) a valid GATE score and (ii) Performance in Test / Interview.

A.5.1.5.2 The students joining the programme under this category will be considered for Assistantships supported under Sponsored Research Project being carried out at the Institute based on the following norms:

i. Research Assistants have to work in the assigned Sponsored R&D project. They are required to work for about 20 hours a week on the Sponsored Research Project. They will do their thesis / dissertation in same project area.
ii. They have to complete the programme in 3 years.

A.5.1.5.3 Only some disciplines/specializations have RAP seats. The candidates do not have to indicate their preferences for RAP separately.

A.5.1.5.4 Employees on the rolls (with or without pay) of any organization are <u>not eligible</u> for admission under this category.

A.5.1.6 PROJECT STAFF (PS)

This category is only for the persons employed at IIT Bombay and working in a Sponsored Research Project at the Institute.

A.5.1.6.1 Candidates to this category are selected subject to (i) 6 months service in project (ii) Valid GATE score OR 2 years total experience of which 6 months in the Project of the Institute (the option of 2-years of relevant professional experience is not applicable for applying to M.Tech. programme in Computer Science & Engineering) and (iii) Performance in Written Test / Interview.

A.5.1.6.2 The students joining the programme under this category require to satisfy following norms:

i. The candidate under this category will be required to continue working on the sponsored project and carry out the tasks as assigned by the Principal Investigator of the concerned project.
ii. They will select their thesis / dissertation area in consultation with the Principal Investigator of the project.
iii. They have to complete M.Tech. programme in 3 years.

The certificate to be submitted by the selected candidates under Project Staff(PS) is given in **Appendix-III.**

A.5.1.7 INSTITUTE STAFF (IS)

This category is only for the persons employed at IIT Bombay.

A.5.1.7.1 Candidates to this category are selected subject to (i) A staff of the Institute (IIT Bombay) having completed at least ONE year of service and having at least TWO years of service period remaining at the time of application (ii) Valid GATE score OR more than 2 years relevant experience (the option of 2-years of relevant professional experience is not applicable for applying to M.Tech. Programme in Computer Science & Engineering). (iii) Performance in Written Test / Interview and (iv)They have to complete M.Tech. Programme in 3 years.

A.5.1.8 SPONSORED CANDIDATES (SW)

With a view to encourage persons working in Industries, the Institute admits a limited number of sponsored candidates to the M.Tech. Programme. It is expected that such candidates after successfully completing the programme, are better equipped to work in organizations sponsoring them. The selection criterion for sponsored candidates are as follows:

i. They must be from reputed Industrial Organization /Academic Institutions.
ii. Valid GATE score OR 2 years of relevant professional experience after obtaining FIRST class in qualifying degree. However, candidates applying to M.Tech. in Computer Science &

Engineering must have valid GATE score in CS.

iii. Performance in Written Test/Interview. The written test will be conducted to examine their knowledge in the discipline of their qualifying degree, which forms the prerequisite for admission to the corresponding specialization of the M.Tech. Programme.

Sponsored candidates who are admitted to the programme should have full financial support from the concerned sponsoring agency for the entire duration of the programme. They can complete the programme on full-time (duration 2-year) or part-time (duration 3-year) basis, depending on the nature of sponsorship. Sponsored candidates are not eligible for any financial assistance from the Institute.

Sponsorship certificate (full-time) is given in Appendix-I and Sponsorship certificate (part-time) is given in Appendix-II.

A.6) FEES AND DEPOSITS

Various fees, deposits and Hostel Rent are listed in **Table- I**

Table I : Fees, Deposits & Hostel Rent for M.Tech. Students
(subject to revision as per MHRD/BoG decision)

Sr. No.	Particulars	Fee payable (₹)			
		GN/OBC		SC/ST/PD	Institute Staff
		Non-spons. Category#	Spons. category@		
A) One time payment at the time of Admission					
	a.1. Admission fee	1400	1400	1400	1400
	2. Grade Card	300	300	300	300
	3. Medical Examination	200	200	200	00
	b.1. Provisional Certificate	200	200	200	200
	2. Student Welfare Fund	1000	1000	1000	1000
	3. Modernisation	1500	1500	1500	1500
	4. Identity Card	400	400	400	00
	5. Courses of Study bulletin	00	00	00	00
	6. Institute Day Celebration	00	00	00	00
	7. Valedictory Function Fee	00	00	00	00
	Total (A) ₹	5000	5000	5000	4400
B) Per Semester Fees					
	a.1. Tuition Fee - **Statutory fees**	5000	25000	00	00
	2. Examination Fee	500	500	500	500
	3. Registration Fee	500	500	500	500
	4. Gymkhana Fee	750	750	750	00
	* 5. Hostel Seat Rent	500	500	500	00
	* 6. Elect. & Water Charges	2500	2500	2500	00
	b.1. Medical Fee	1000	1000	1000	00
	2. Student Benevolent Fund	1000	1000	1000	1000
	* 3. Hostel Establ. Charges	2000	2000	2000	00
	4. Medical Fund	00	00	00	00
	* 5. Contribution to Hostel Subsidy	6000	6000	6000	00
	6. Internet Fee	00	00	00	00
	* 7. Hostel Maint. Fees	00	00	00	00
	Total (B) ₹	19750	39750	14750	2000
C)	**Annual Med. Insu. Premium (once in a year) ₹**	126	126	126	00
D) Deposits (Refundable) to be paid at the time of Admission					
	1. Institute Security Deposit	1000	1000	1000	00
	2. Library Security Deposit	1000	1000	1000	00
	*3. Mess Security Deposit	1000	1000	1000	00
	Total (D) ₹	3000	3000	3000	00
	Total Fees (A+B+C+D) ₹ -for GN/OBC categories - for SC/ST categories	27876	47876	22876	6400

* Students not staying in Hostel are exempted from the payment of Hostel fees.

Non-sponsored categories

(1) Teaching Assistantship(TA)/Teaching Assistantship Through Project (TAP),

(2) Research Assistantship (RA)/ Research Assistantship Through Project(RAP),

(3)Govt./Semi-Govt. Fellowships awardees

@ Sponsored categories

All other categories i.e.

- Sponsored (SW),
- Project Staff(PS),

- Students who have been granted temporary withdrawal from the programme are required to pay ₹ 2000/- as continuation fee per semester.

- Students who are staying in quarters such as Tansa, Tulsi, QIP etc. are required to pay license fee, F.R., etc., as applicable to this quarters as per Estate Office rules.

A.7) GENERAL ELIGIBILITY FOR M.TECH/M.TECH.+PH.D.(DUAL DEGREE) PROGRAMMES IN ALL DEPARTMENTS / CENTRES / SCHOOLS / ID GROUPS / CROSS-DEPARTMENTS

A.7.1	Candidates with First class or 60% (55% marks for SC/ST) marks in B.E./ B.Tech./ B.Sc. (Engineering)/ M.Sc. / M.C.A. / MBBS / M.Pharm./ B.Pharm. (4 yr. Degree)/ BDS (4 yr. Degree)/ Associate Membership Examinations conducted by recognized professional bodies (like Institution of Engrs. (India), Institute of Chemical Engrs., Aeronautical Society of India, Institute of Electronics & Telecommunication Engrs., Indian Institute of Metals etc.,) and recognized as equivalent to B.E. / B.Tech. Degree.
A.7.2	**Admission for IIT B.Tech. degree holders** Candidate having an IIT B.Tech. degree and having a CGPA/CPI score of 8.00 and above are exempted from requirement of GATE qualification. They will be admitted to M.Tech. Programme under TA/RA positions through written test and/or interview.
A.7.3	**Requirement of First Class/60% for PG admission at IIT Bombay** For general category students and/or for students where no concession in academic performance is called for, the First Class/60% in the qualifying degree examination as the eligibility requires meeting ANY ONE of the following criteria: (1) a minimum of 60 percent marks in the final academic year of the programme (2) a minimum of 60 percent marks in aggregate or as specified by the university (any one of them) (3) a first class as specified by the university (4) a minimum Cumulative Grade Point Average (CGPA) or Cummulative Peformance Index (CPI) of 6.0 on the scale of 0-10; with corresponding proportional requirements when the scales are other than on 0-10,(for example,4.8 on a scale of 0-8) For students from the SC/ST category, the corresponding criteria are: (1) a minimum of 55 percent marks in the final academic year of the programme (2) a minimum of 55 percent marks in aggregate or as specified by the university (any one of them) (3) a first class as specified by the university (4) a minimum Cumulative Grade Point Average (CGPA) or Cummulative Peformance Index (CPI) of 5.5 on the scale of 0-10; with corresponding proportional requirements when the scales are other than on 0-10,(for example,4.4 on a scale of 0-8).
Eligibility criteria for the different programmes and specializations are given in the Table-III of this brochure.	

Table II: Summary of M.Tech. Programmes

Department/ID Groups/Centre	Specialization	Code
1. Aerospace Engineering [Department of Aerospace Engineering]	Aerodynamics Dynamics & Control Aerospace Propulsion Aerospace Structures	AE1 AE2 AE3 AE4
2. Biomedical Engineering [Department of Biosciences and Bioengineering]	Biomedical Engineering	BM
3. Chemical Engineering [Department of Chemical Engineering]	Chemical Engineering	CH
4. Civil Engineering [Department of Civil Engineering]	Transportation Systems Geotechnical Engineering Water Resources Engineering Structural Engineering Offshore Engineering Remote Sensing	CE1 CE2 CE3 CE4 CE5 CE6
5.Computer Science & Engineering [Department of Computer Science and Engineering]	Computer Science & Engineering	CS
6. Earth Sciences [Department of Earth Sciences]	Geoexploration Petroleum Geoscience	GS PG
7. Electrical Engineering [Department of Electrical Engineering]	Communication Engineering Control & Computing Power Electronics & Power Systems Microelectronics Electronic Systems	EE1 EE2 EE3 EE4 EE5
8. Energy Systems Engineering [Department of Energy Science and Engineering]	Energy Systems Engineering	EN
9. Environmental Science & Engineering [Centre for Environment Science and Engineering]	Environmental Science & Engineering	EV
10. Geoinformatics and Natural Resources Engineering [Centre of Studies in Resources in Engineering]	Geoinformatics and Natural Resources Engineering	GNR
11. Industrial Engineering & Operations Research [Interdisciplinary Group in Industrial Engineering & Operations Research]	Industrial Engineering & Operations Research	IO
12. Mechanical Engineering [Department of Mechanical Engineering]	Thermal & Fluids Engineering. Design Engineering Manufacturing Engineering Nuclear Engineering	ME1 ME2 ME3 ME4

13. Metallurgical Engineering & Materials Science [Department of Metallurgical Engineering & Materials Science]	Materials Science Process Engineering Steel Technology Corrosion Science & Engineering	MM1 MM2 MM3 MM4
14. Materials, Manufacturing and Modeling [Cross-Departmental Programme of Mechanical Engineering Metallurgical Engineering &Materials Science and Mathematics]	Materials, Manufacturing and Modeling	MMM
15. Systems and Control Engineering	Systems and Control Engineering	SC
16. Technology and Development [Centre for Technology Alternatives for Rural Areas	Technology and Development	TD

TABLE – III : ELIGIBILITY FOR ADMISSION TO DIFFERENT DISCIPLINES

Discipline [Academic Unit]/Specialization	Degree/Qualifying Discipline First class or 60% marks (55% marks for SC/ST) as specified in the clause A.7.3.	GATE Requirement
Aerospace Engineering (AE) [Department of Aerospace Engineering] Aerodynamics (AE1)	B.E./B.Tech./AMIE or equivalent in Aeronautical/Aerospace Engineering (AE) --- B.E./B.Tech./AMIE or equivalent in Civil Engineering (CE) Mechanical Engineering (ME)	Any discipline --- CE, ME
Aerospace Engineering (AE) [Department of Aerospace Engineering] Dynamics and Control (AE2)	B.E./B.Tech./AMIE or equivalent in Aeronautical/Aerospace Engineering (AE) --- B.E./B.Tech./AMIE or equivalent in Electronics/Telecommunications Engineering (EC) Electrical Engineering(EE) Instrumentation Engineering (IN) Mechanical Engineering (ME)	Any discipline --- EC, EE, IN, ME
Aerospace Engineering (AE) [Department of Aerospace Engineering] Aerospace Propulsion (AE3)	B.E./B.Tech. /AMIE or equivalent in Aeronautical/Aerospace Engineering (AE) --- B.E./B.Tech./AMIE or equivalent in Mechanical Engineering(ME)	Any discipline --- ME
Aerospace Engineering (AE) [Department of Aerospace Engineering] Aerospace Structure (AE4)	B.E./B.Tech./AMIE or equivalent in Aeronautical/Aerospace Engineering (AE) --- B.E./B.Tech./AMIE or equivalent in Civil Engineering (CE) Mechanical Engineering(ME)	Any discipline --- CE, ME
Candidates having two years of relevant work experience are exempted from requirement of GATE score, provided their candidature is sponsored by the employer. They are not eligible for award of Teaching/Research Assistantship.		
Biomedical Engineering (BM) (Department of Biosciences & Bioengineering)	(i) B.E./B.Tech. /AMIE or equivalent in Biomedical Engineering (BM) Biotechnology (BT) Chemical Engineering (CH) Computer Science and Engineering/ Information Technology (CS) Electrical Engineering (EE) Electronics / Telecommunications Engineering (EC) Engineering Physics (EP) Instrumentation Engineering (IN) Mechanical Engineering (ME) Metallurgy & Materials Science (MT) --- (ii) M.Sc. or equivalent in Biochemistry (BY) Biophysics (BP) Biotechnology (BT) Ceramics (CG) Chemistry (CY) Electronics / Electronic Sciences (EC)	Any discipline --- Any discipline

	Ergonomics (ER) Materials Science (MS) Mathematics (MA) Molecular Biology (MG) Physics (PH) Physiology (PS) --- (iii) MBBS (Medicine) --- (iv) B.V.Sc., B.D.S., B.P.Th., B.O.Th., and B.Pharm. degree (Duration 4 years or more)	--- AIIMS All India MCI / JIPMER/ PGI Chandigarh / AFMC-Pune / DNB Part I national level medical postgraduate entrance examinations OR GATE - XL Eligibility/ rank certificate of the entrance examination is required. --- All India level Pre-M.D.S/ M.V.Sc., M.Pharm. Selection examination for B.VSc., B.D.S and B.Pharm. OR GATE - XL Eligibility/ rank certificate of the entrance examination is required.
Written test and Interview : (i) Candidates called for the interview will appear in a written test in the morning of the first day of the interview. The written test, of two hours duration, will be conducted in Mathematics (for candidates with a Medical /Pharmacy / Life Sciences/Biotechnology background) and Biology with special emphasis on Physiology (for candidates with Engineering/ Physical sciences background). The syllabi for the tests will be in accordance with the 12th std. syllabi of CBSE. (ii) Candidates having two years of relevant work experience are exempted from requirement of GATE score, provided their candidature is sponsored by the employer. They are not eligible for award of Teaching/Research Assistantship.		
Chemical Engineering (CH) [Department of Chemical Engineering]	B.E./B.Tech./AMIE or equivalent in Chemical Engineering (CH) or equivalent	CH
Candidates having two years of relevant work experience are exempted from requirement of GATE score, provided their candidature is sponsored by the employer. They are not eligible for award of Teaching/Research Assistantship.		
Civil Engineering (CE) [Department of Civil Engineering] Transportation Systems Engineering(CE1)	B.E./B.Tech./AMIE or equivalent in Civil Engineering (CE)	CE

Civil Engineering (CE) [Department of Civil Engineering] Geotechnical Engineering CE2)	B.E./B.Tech./AMIE or equivalent in Civil Engineering (CE)	CE
Civil Engineering (CE) [Department of Civil Engineering] Water Resources Engineering (CE3)	B.E./B.Tech./AMIE or equivalent in Civil Engineering (CE)	CE
Civil Engineering (CE) [Department of Civil Engineering] Structural Engineering(CE4)	B.E./B.Tech./AMIE or equivalent in Civil Engineering (CE)	CE
Civil Engineering (CE) [Department of Civil Engineering] Offshore Engineering(CE5)	B.E./B.Tech./AMIE or equivalent in Civil Engineering (CE)	CE
Civil Engineering (CE) [Department of Civil Engineering] Remote Sensing(CE6)	B.E./B.Tech./AMIE or equivalent in Civil Engineering (CE)	CE
(i) Out of six specialisation choices (CE1,CE2,CE3,CE4,CE5 and CE6) in Civil Engineering, the candidates has to choose only three choices in the order of their preference. Written Test/Interview will be conducted only for the FIRST three choices given by an applicant pertaining to Civil Engineering. (ii) Candidates having two years of relevant work experience are exempted from requirement of GATE score, provided their candidature is sponsored by the employer. They are not eligible for award of Teaching/Research Assistantship.		
Computer Science & Engineering(CS) [Department of Computer Science & Engineering]	(i). B.E./B.Tech./AMIE or equivalent in any engineering discipline. (ii). M.Sc. or equivalent in any science discipline. (iii). MCA (with Physics & Mathematics at B.Sc. level) or equivalent	CS
Valid GATE score is required for all applicants (including Project Staff (PS)/Institute Staff(IS) and Sponsored (SW) candidates).		
Earth Sciences (ES) [Department of Earth Sciences] Geoexploration (GS)	M.Sc. or equivalent in Geology/Applied Geology (GL) Geophysics/Applied Geophysics (GP)	GG
Earth Sciences (ES) [Department of Earth Sciences] Petroleum Geoscience (PG)	M.Sc. or equivalent in Geology / Applied Geology (GL) Geophysics / Applied Geophysics (GP)	GG
Candidates having two years of relevant work experience are exempted from requirement of GATE score, provided their candidature is sponsored by the employer. They are not eligible for award of Teaching/Research Assistantship.		
Electrical Engineering (EE) [Department of Electrical Engineering] Communication Engineering (EE1)	(i). B.E./B.Tech./AMIE or equivalent in Computer Science and Engineering / Information Technology (CS) Electronics / Telecommunication Engineering (EC) Electrical Engineering (EE) Engineering Physics (EP) (ii). M.Sc. or equivalent in Electronics / Electronic Sciences (EC) Physics (PH)	CS, EC, EE, IN
Electrical Engineering (EE) [Department of Electrical Engineering] Control & Computing (EE2)	(i). B.E./B.Tech./AMIE or equivalent in Aeronautical / Aerospace Engineering (AE) Computer Science and Engineering / Information	CS, EC, EE, IN

	Technology (CS) Electronics / Telecommunication Engineering (EC) Electrical Engineering (EE) Engineering Physics (EP) Instrumentation Engineering (IN) (ii). M.Sc. or equivalent in Electronics/Electronic Sciences (EC) Mathematics (MA) Physics (PH)	
Electrical Engineering (EE) [Department of Electrical Engineering] Power Electronics & Power Systems (EE3)	(i). B.E./B.Tech./AMIE or equivalent in Computer Science & Engineering / Information Technology(CS) Electronics / Telecommunication Engineering (EC) Electrical Engineering (EE) Instrumentation Engineering (IN)	EC, EE, IN
Electrical Engineering (EE) [Department of Electrical Engineering] Microelectronics (EE4)	(i). B.E./B.Tech./AMIE or equivalent in Computer Science & Engineering / Information Technology (CS) Electronics / Telecommunication Engineering (EC) Electrical Engineering (EE) Engineering Physics (EP) Instrumentation Engineering (IN) Metallurgical Engineering / Materials Science & Engineering (MT) (ii). M.Sc. or equivalent in Electronics / Electronic Sciences (EC) Physics (PH)	CS, EC, EE, IN, PH
Electrical Engineering (EE) [Department of Electrical Engineering] Electronic Systems (EE5)	(i). B.E./B.Tech./AMIE or equivalent in Biomedical Engineering (BM) Electrical Engineering (EE) Electronics / Telecommunication Engineering (EC) Engineering Physics (EP) Instrumentation Engineering (IN) (ii). M.Sc. or equivalent in Electronics/Electronic Sciences (EC)	EC, EE, IN
(i) Out of the five specialization choices (EE1, EE2, EE3, EE4, EE5) in Electrical Engineering, each candidate is permitted up to THREE choices in the order of his/her preference. All admission procedures will be conducted only for the FIRST three choices pertaining to the Electrical Engineering. (ii) Candidates having two years of relevant work experience are exempted from requirement of GATE score, provided their candidature is sponsored by the employer. They are not eligible for award of Teaching/Research Assistantship.		
Energy Systems Engineering (EN) [Department of Energy Science & Engineering]	B.E./B.Tech./AMIE or equivalent in Automobile Engineering (AU) Aeronautical / Aerospace Engineering (AE) Chemical Engineering (CH) Civil Engineering (CE) Electrical Engineering (EE) Energy Systems Engineering (EN) Mechanical Engineering (ME) Metallurgical Engineering / Materials Science &	Any discipline

	Engineering (MT) Thermal Power Engineering (TP)	
Candidates having two years of relevant work experience are exempted from requirement of GATE score, provided their candidature is sponsored by the employer. They are not eligible for award of Teaching/Research Assistantship.		
Environmental Science & Engineering (EV) [Centre for Environmental Science & Engineering(CESE)]	(i). B.E./B.Tech./AMIE or equivalent in Aeronautical / Aerospace Engineering (AE) Agricultural Engineering (AG) Biotechnology (BT) Chemical Engineering (CH) Civil Engineering (CE) Energy Engineering (EN) Environmental Engineering (EV) Mechanical Engineering (ME) Mining Engineering (MN) Metallurgical Engineering / Materials Science & Engineering (MT) ---------- (ii). M.Sc. or equivalent in Atmospheric Science (AT) Biotechnology (BT) Biochemistry (BY) Chemistry (CY) Earth Sciences (ES) Environmental Toxicology (ET) Environmental Science (EM) Meteorology (MO) Microbiology (MB) Physics (PH)	AE, AG, BT, CH, CE, EN, ME, MN, MT, XE, XL ---------- BT, CY, GG, PH, XE, XL
(i) For candidates with M.Sc., Mathematics is essential at Higher Secondary/ Intermediate(10+2) level. (ii) Candidates having two years of relevant work experience are exempted from requirement of GATE score, provided their candidature is sponsored by the employer. They are not eligible for award of Teaching/Research Assistantship		
Geoinformatics & Natural Resources Engineering (GNR) [Centre of Studies in Resources Engineering (CSRE)]	(i). B.E./B.Tech./AMIE or equivalent in Agricultural Engg (AG) Architecture & Planning (AR) Civil Engineering(CE) Computer Science (CS) / Information Technology (CS) Electronics / Telecommunication Engineering (EC) Electrical Engineering (EE) Environmental Engineering (EV) Mining Engineering (MN) (ii).M.Sc. or equivalent in Geology / Applied Geology (GL) Geophysics / Applied Geophysics (GP) Mathematics (MA) Physics (PH)	AG, AR, CE, CS, EC, EE, GG, MA, MN, PH
(i) For candidates with M.Sc. Mathematics is essential at Higher Secondary/ Intermediate(10+2) level. (ii) Candidates having two years of relevant work experience are exempted from requirement of GATE score, provided their candidature is sponsored by the employer. They are not eligible for award of Teaching/Research Assistantship.		

Industrial Engineering & Operations Research (IO) [Interdisciplinary Group in Industrial Engineering & Operations Research (IE&OR)]	B.E./B.Tech./AMIE or equivalent in any Engineering discipline	Any discipline
Candidates having two years of relevant work experience are exempted from requirement of GATE score, provided their candidature is sponsored by the employer. They are not eligible for award of Teaching/Research Assistantship.		
Mechanical Engineering (ME) [Department of Mechanical Engineering] Thermal & Fluids Engineering (ME1)	B.E./B.Tech./AMIE or equivalent in Aeronautical / Aerospace Engineering (AE) Automobile Engineering (AU) Chemical Engineering (CH) Mechanical Engineering (ME)	Any discipline
Mechanical Engineering (ME) [Department of Mechanical Engineering] Design Engineering(ME2)	B.E./B.Tech./AMIE or equivalent in Aeronautical / Aerospace Engineering (AE) Automobile Engineering (AU) Mechanical Engineering (ME) Machine Tool Engineering (MC) Production / Industrial Engineering (PI)	Any discipline
Mechanical Engineering (ME) [Department of Mechanical Engineering] Manufacturing Engineering (ME3)	B.E./B.Tech./AMIE or equivalent in Mechanical Engineering (ME) Machine Tool Engineering (MC) Production / Industrial Engineering (PI)	Any discipline
Mechanical Engineering (ME) [Department of Mechanical Engineering] Nuclear Engineering(ME4)	B.E./B.Tech./AMIE or equivalent in Chemical Engineering (CH) Electrical Engineering (EE) Mechanical Engineering (ME)	CH, EE, ME
Candidates having two years of relevant work experience are exempted from requirement of GATE score, provided their candidature is sponsored by the employer. They are not eligible for award of Teaching/Research Assistantship.		
Metallurgical Engineering and Materials Science (MM) [Department of Metallurgical Engineering and Materials Science] Materials Science (MM1)	(i). B.E./B.Tech./AMIE or equivalent in Ceramic Engineering (CG) Chemical Engineering (CH) Electrical Engineering (EE) Electronics /Telecommunication Engineering (EC) Electro-chemical Engineering (EH) Engineering Physics (EP) Mechanical Engineering (ME) Metallurgical Engineering/Materials Science & Engineering (MT) Polymer Engineering (PO) (ii). M.Sc. or equivalent in Chemistry (CY) Materials Sciences (MS) Physics (PH)	Any discipline
Metallurgical Engineering and Materials Science (MM) [Department of Metallurgical Engineering and Materials Science] Process Engineering (MM2)	(i). B.E./B.Tech./AMIE or equivalent in Chemical Engineering (CH) Electro-chemical Engineering (EH) Mechanical Engineering (ME) Metallurgical Engineering / Materials Science & Engineering (MT) (ii). M.Sc. or equivalent in Chemistry (CY), General or specialization in	Any discipline

	Physical or Inorganic Chemistry Materials Science (MS)	
Metallurgical Engineering and Materials Science (MM) [Department of Metallurgical Engineering and Materials Science] Steel Technology (MM3)	B.E./B.Tech./AMIE or equivalent in Chemical Engineering (CH) Mechanical Engineering (ME) Metallurgical Engineering/Materials Science & Engineering (MT)	Any discipline
Metallurgical Engineering and Materials Science (MM) [Department of Metallurgical Engineering and Materials Science] Corrosion Science & Engineering (MM4)	(i). B.E./B.Tech./AMIE/AMIIM or equivalent in Aeronautical/Aerospace Engineering (AE) Chemical Engineering (CH) Civil Engineering (CE) Electrical Engineering (EE) Electro-chemical Engineering (EH) Mechanical Engineering (ME) Metallurgical Engineering / Materials Science & Engineering (MT) (ii). M.Sc. or equivalent in Chemistry (CY) Ceramic (CG) Materials Science (MS) Petrochemical Sciences (PM)	Any discipline
(i) For candidates with M.Sc., Mathematics as a subject at B.Sc. degree level is essential. (ii) Candidates having two years of relevant work experience are exempted from requirement of GATE score, provided their candidature is sponsored by the employer. They are not eligible for award of Teaching/Research Assistantship.		
Materials, Manufacturing and Modeling (MMM) [Cross-Departmental Programme of Mechanical Engineering, Metallurgical Engineering & Materials Science, and Mathematics]	B.E./B.Tech./AMIE or equivalent in Automobile Engineering (AU) Chemical Engineering (CH) Metallurgical Engineering / Materials Science & Engineering (MT) Mechanical Engineering (ME) Production Engineering (PI)	Any discipline
(i) Candidates having two years of relevant work experience are exempted from requirement of GATE score, provided their candidature is sponsored by the employer. They are not eligible for award of Teaching/Research Assistantship.		
Systems & Control Engineering (SC) [Interdisciplinary Group Systems & Control Engineering]	(i) B.E./B.Tech./AMIE or equivalent in any engineering discipline (ii) M.Sc. in Mathematics (MA) Physics (PH)	Any discipline
Candidates having two years of relevant work experience are exempted from requirement of GATE score, provided their candidature is sponsored by the employer. They are not eligible for award of Teaching/Research Assistantship.		
Technology & Development (TD) [Centre for Technology Alternatives for Rural Areas](CTARA)	(i). BE/B.Tech/B.Arch/AMIE or equivalent in any engineering discipline. (ii). M.Sc. or equivalent in any science discipline	Any discipline
Candidates with a qualifying degree (BE/ B.Tech./ B.Arch./M.Sc.) without a GATE score can apply under "Sponsored" category if they have minimum two years experience in development related work.		

A.8 GUIDELINES FOR FILLING UP THE APPLICATION FORM

Please refer to the Institute website http://www.iitb.ac.in/mtechapp/mtechAdmissionLinks.jsp under 'Instructions' for filling ONLINE application form.

If the name of your qualifying discipline does not match exactly with the qualifying discipline listed in the brochure, you may select the code for the discipline closest to your qualifying degree discipline. In case you do not find a close match, you may select ZE (in case of B.E./B.Tech. degree) or ZS (in case of M.Sc. degree). Admission offered in these cases will be subject to the verification of the curriculum by the concerned Academic Unit of IIT Bombay.

A.9. M.Tech. + Ph.D. (Dual Degree) Programme

In addition to M.Tech. Programme, IIT Bombay offers Dual Degree M.Tech.+ Ph.D. Programmes in certain disciplines.

A.9.1 Admission to M.Tech. + Ph.D. (Dual Degree) Programme

Starting July 2013, some of the disciplines offer admissions to the M.Tech. + Ph.D. (Dual degree) programme. Successful completion of the programme requirements will lead to the award of both, M.Tech and Ph.D. degrees. The programme offers attractive scholarship for five years from the start of the programme. The program is designed to induct bright students who have completed their B.E./ B. Tech./M.Sc. degrees directly to the doctoral programme. Key features of this programme are:

- The timelines and key milestones of this programme are aligned with the M. Tech and Ph.D. programmes currently offered.
- The student will be required to complete mandatory coursework in the first three semesters (similar to that of M. Tech programme).
- Successful completion of an annual progress seminar/qualifier examination after first year may entitle the student to enhanced scholarship at the Ph.D. level.
- After successful completion of required course work and PhD thesis, the student will be awarded both M.Tech. and Ph.D. degrees. Under exceptional circumstance, the student may be considered to exit the programme with an M.Tech. Degree at the end of three years subject to completion of required coursework and M.Tech. dissertation.

The interested candidates should apply by filling up the M.Tech. admission form and indicating their interest to be considered for this programme at the appropriate location in the form.

A.9.2 Conversion from M.Tech. Programme to M.Tech. + Ph.D. (Dual Degree) Programme.

The Students who are admitted to M.Tech. Programme at IIT Bombay can convert themselves to the Dual Degree (M.Tech.+Ph.D.) Programme after the first stage of evaluation of the Masters' dissertation – with the concurrence of the proposed Doctoral Supervisor and Postgraduate Programme Committee of the concerned academic unit. After successful completion of Annual Progress Seminar/ qualifier examination may entitle the student to enhanced scholarship at Ph.D. Level.

A student who moves to this Dual Degree Programme is eligible for scholarship as admissible for a Ph.D student with Master's qualification after the date of successful examination of Research Proposal, for a maximum of FIVE years from the commencement of the M.Tech./ M.Phil. Degree. In the cases, (hopefully rare) when a student moves to the Dual Degree programme and is not able to complete the requirements of the Ph.D, an exit option with the M.Tech./M.Phil. Degree is available at any time at or after the end of the final semester of the normal M.Tech. /M.Phil. Programme.

On successful completion and examination of the Doctoral Thesis, BOTH the degrees – M.Tech. and Ph.D. are awarded to the candidate.

A.10. Termination of Studentship

All candidates should note that failure to meet academic performance criterion set by the Institute during the M.Tech. programme will cause termination of studentship.

B) M.TECH. PROGRAMMES

B.1) Aerospace Engineering AE (AE1, AE2, AE3, AE4)
[Department of Aerospace Engineering]

The Master's degree programme in Aerospace Engineering provides education in multi-disciplinary areas involving Aerodynamics, Dynamics & Control, Aerospace Propulsion and Aerospace Structures.

ELIGIBILITY FOR ADMISSION - as given in Table III- Eligibility for Admission to Different Disciplines.

AREAS OF RESEARCH

I. Aerodynamics (AE1)
Experimental Aerodynamics, Experimental Hypersonic Aerothermodynamics, Shock Waves and their applications, Computational Hypersonic Aerothermodynamics, Computational Fluid Dynamics, Computational Electromagnetics, Vortex and Particle methods, Vortex flows, Aero- acoustics, Aircraft Design, Air Transportation, Turbulence modeling and applications, Computational studies of scramjet intakes, Supersonic mixing, Computation of high enthalpy flows, Turbulence and transport in magnetized plasmas, Plasma assisted flow control.

II. Dynamics and Control of aerospace vehicles (AE2)
Flight mechanics, guidance, navigation, tracking and control of launch vehicles, spacecraft, missiles, aircraft, mini aerial vehicles (MAV), Formation control of satellites, integrated navigation systems, airborne and space-borne sensors and precision tracking systems, space-based aircraft navigation; attitude dynamics and control, reentry dynamics and GN&C, Hardware-In-Loop- Simulation, Co-operative missions for MAVs.

III. Propulsion (AE3)
Aircraft and Spacecraft Propulsion, Experimental and numerical studies on detonations, Combustion instabilities, Development of new techniques for emission reduction from combustion systems, Heat Transfer, Infra-red Signatures of Aerospace Vehicles, Micro-channel Cooling of Gas Turbine Blades, CFD of propulsive systems, Aerodynamic design and performance analysis of axial flow turbomachines, Flow control of turbomachines and internal duct flows, Computational hypersonic aerothermodynamics, Turbulence modeling and applications, Computational studies of scramjet engines, Supersonic mixing and combustion, Computation of high enthalpy flows, Turbulence and transport in magnetized plasmas, Plasma assisted combustion and flow control.

IV. Aerospace Structures (AE4)
Structural Health Monitoring, Wave Propagation, Aeroelasticity, Aeroservoelasticity, Structural Dynamics & Stability, Multidisciplinary Optimization, Mechanics of Materials (Metals, Metallic Alloys and Composites), Fracture and Fatigue in materials.

B.2) Biomedical Engineering (BM)
[Department of Biosciences and Bioengineering]

The Biomedical Engineering Group at IIT Bombay was set up in 1988. It is now a part of Department of Biosciences and Bioengineering (BSBE). Biomedical Engineering is one of the youngest disciplines in engineering and has made tremendous progress in the last 4 decades. This has been aided by rapid advancements in Semiconductor Technology, Information Technology, and Biotechnology. In the field of Biomedical Engineering, researchers with expertise in diverse areas work towards the unified goal of creating products and techniques for better health care. The backgrounds of faculty reflect the wide spectrum of expertise required to make better and more affordable health care a reality. Further, the students admitted to the programme have backgrounds in Engineering, Physical Sciences, Life Sciences and Medicine. The heterogeneous class composition promotes interaction between students and faculty of different backgrounds and provides opportunities for research in exciting interdisciplinary areas.

Over the first two semesters, M.Tech. students are required to do substantial amount of course work to complement their undergraduate or masters level education. The third semester is devoted mostly to the M.Tech. projects although some courses may also be taken. The fourth semester is fully devoted to completion of the project. The curriculum has been designed to provide all students with a general background in Biomedical Engineering followed by more specific knowledge in the area of their choice. The former is achieved through core (for everyone) and compulsory (for students with a particular background) courses in the first semester. Electives taken during the second and third semester provide specialized knowledge in the area of the individual interest.

In the first semester, students with backgrounds in life sciences and medicine are required to take compulsory courses in mathematics, electronic circuits and instrumentation. Students with backgrounds in physical sciences and engineering take courses in physiology. Further, everyone is required to present a seminar on a topic related to Biomedical Engineering under the guidance of a faculty member. There are other elective courses to be taken as well.

In the second semester, all students have to go through a core course on Biostatistics and Design of Experiments. Students with backgrounds in physical sciences and engineering undergo a compulsory course in Clinical Physiology. All students are required to undergo a course on quantitative and experimental methods in physiology. The rest of the courses are electives which the students choose in consultation with the faculty adviser.

Elective are offered in bioelectricity, ergonomics, medical instrumentation, bioMEMS, medical physics, physiological systems modeling, signal processing, etc. All students are required to take a course designated as an Institute Elective offered by another departments. In special cases, electives other than the institute elective may be taken from other departments after obtaining the due permissions.

ELIGIBILITY FOR ADMISSION - as given in Table III- Eligibility for Admission to Different Disciplines.

AREAS OF RESEARCH

- Bioinstrumentation for diagnostics and therapeutics
- Biomaterials and tissue engineering, prostheses and medical devices
- Bionanotechnology
- Controlled drug delivery systems
- Neurophysiology
- Physiological system modelling and analysis

Students can do their projects in, but not restricted to, the following areas:

- Bioinstrumentation for early detection of carcinoma and tropical diseases,
- Biointerfaces and Langmuir models of biological membranes,
- Biomaterials and tissue engineering,
- Biomedical transducers and sensors including biosensors and bioMEMS devices,
- Bionanotechnology,
- Biostatistics and mathematical modeling,
- Cardiac electrophysiology and muscle mechanics,
- Controlled drug delivery systems,
- Diagnostic tools based on spectroscopic and imaging techniques,
- Neurophysiology,
- Prosthetic devices including aids for the handicapped,
- Pulmonary surfactant replacements for therapeutics,
- Signal processing,
- Telemedicine and knowledge based systems

RESEARCH FACILITIES

Research in Biomedical Engineering is conducted in laboratories set up by core as well as associated faculty of the group. The various research labs and facilities available are as follows:

- Biointerfaces laboratory for evaluation of surface phenomena in biological systems well equipped with specialized Langmuir Blodgett systems and surfactometers
- Biomaterials Laboratory with facilities for the development and evaluation of novel materials for clinical applications
- Biomedical Instrumentation Laboratory with standard test and measurement instruments such as digital storage oscilloscopes, signal generators, etc.
- Biophotonics Laboratory to study the interaction of photons with tissues with a view to elicit information of tissue function and develop non-invasive diagnostic tools.
- Cardiac Electrophysiology Laboratory with high speed data acquisition and signal conditioning modules for research into electrophysiology of ischemia and fibrillation.
- Cellular Engineering Laboratory to conduct cellular and subcellular research. This Laboratory is equipped for cell and tissue culture as well as hybridoma research.
- Haemorheology Laboratory, with instruments like cone and plate viscometer, red cell platelet aggregaometer for the evaluation of viscosity and flow parameters of biological fluids
- Nerve and Muscle Physiology laboratory has facilities for experiments on skeletal, cardiac and smooth muscles
- Work on Ergonomics and Biomechanics is carried on in the Ergonomics Laboratory in Industrial Design Centre (IDC)
- Work on Medical Image Processing and Electrophysiological Signal Processing is carried on in Signal Processing and Artificial Neural Networks (SPANN Lab) Laboratory and the Instrumentation and Projects Laboratory in Electrical Engineering Department.

The computing facility houses multiple workstations and servers. Fibreoptic local area network exists in the Institute. Students and faculty have access to the Institute facilities which include high end machines. The computing facilities are complimented by several PC-s with data acquisition cards.

B.3) Chemical Engineering (CH)

[Department of Chemical Engineering]

A wide variety of courses are offered to enable a student to obtain proficiency in various facets of the Chemical Engineering Profession–Design, Production, Research and Development, and academics. The programme provides strong core courses together with a set of elective courses in the following areas : Biotechnology and Bio-Systems Engineering; Energy and Environment; Transport, Colloids and Interface Science; Catalysis and Reaction Engineering; Materials Engineering; Process Systems Engineering and Control.

ELIGIBILITY FOR ADMISSION - as given in Table III- Eligibility for Admission to Different Disciplines.

AREAS OF RESEARCH

- **Biotechnology & Bio-Systems Engineering**

Metabolic & Genetic Engineering, Bio-separations, Bioinformatics, Systems Biology, Drug Discovery, Enzymology, Bioprocess Development, Vermiculture for Waste Management, Dehydration of Food Systems, Controlled Atmosphere Storage, and Process Development of Food Systems.

- **Energy and Environment**

Climate change, Coal Gasification, Energy Integration, Green Engineering, Renewable Resources, Waste Management, Pollution Control, Air Pollution Prediction & Control and Vermiculture.

- **Transport, Colloids and interface Science**

Fluidization, Granular flows, Powder Mixing, Membrane Separations, Rheology of Complex Fluids, Colloids, Sol-gels, Emulsions & Foams, Paints and Coatings, Microstructural Engineering, Aerosols, Electro-hydrodynamics, Fluid Mechanics & Stability, Computational Fluid Dynamics, Heat & Mass transfer, Porous media, and Surfactants.

- **Catalysis and Reaction Engineering**

Catalysis, Multiphase Reaction, Bio-reaction Engineering and Reactor Modelling, Process

intensification & reactive distillation.

- **Materials Engineering**

Polymer materials, Polymer Reaction Engineering, Polymer Processing, Polymer Physics, Polyurethane, Rubber, Polymer Rheology, Ceramics, Polymers, Biomaterials, Drug Delivery, Food Engineering, Microscopy, Nano-composites, Statistical Thermodynamics, and Supercritical Fluids.

- **Process Systems Engineering and Control**

Process Simulation, Optimization, Process Integration and Scheduling, Energy Conservation and Optimal Resource Management, Artificial Intelligence and Mathematical Modelling, Multi-scale Modelling, Systems Identification and Process Safety Analysis, Nonlinear control, fault diagnosis.

B.4) Civil Engineering CE (CE1, CE2, CE3, CE4, CE5, CE6)
[Department of Civil Engineering]

The programme is geared to meet the growing demand for designers, consultants, development engineers, research-scientists and faculty.

A student entering the M.Tech. programme in Civil Engineering can follow one of the following streams :

(i) Transportation Systems Engineering(CE1)
(ii) Geotechnical Engineering (CE2)
(iii) Water Resources Engineering (CE3)
(iv) Structural Engineering (CE4)
(v) Offshore Engineering (CE5)
(vi) Remote Sensing (CE6)

ELIGIBILITY FOR ADMISSION - as given in Table III- Eligibility for Admission to Different Disciplines.

AREAS OF RESEARCH

Transportation Systems Engineering(CE1)

Modelling traffic flow, Urban regional transport network design, Transport planning models, Urban public transport operation and management; Economic evaluation, analysis and impact assessment; Land-use transport planning, Pavement analysis and design, Pavement maintenance management. FS, ANN, AI, GA, ES, GIS applications to transport modelling.

Geotechnical Engineering (CE2)

Geotechnical properties of soils, Soil-structure interaction, Foundation for offshore structures, Earth dam problems, Stability and Seepage, Mechanics of Swelling Soils, Rock Mechanics and tunneling, Soil dynamics, Pile foundations, Soil stabilization, Anchored geosynthetics, Reinforced soil structures and geosynthetics, Geotechnical centrifuge study, Optimization techniques and environmental geotechniques; Landslides.

Water Resources Engineering (CE3)

Real fluid flow, Dispersion in surface and ground water, Jets, Stratified flow, Fluid transients, Sediment transport in pipes and open channels, Mathematical and analogue models for ground water flows, Hydraulic structures, Hydrology, Optimization techniques in water resources Engineering, Water balance studies; Conveyance network; Urban water management; Urban water supply, Strom water and wastewater treatment and disposal.

Structural Engineering(CE4)

Earthquake engineering, Structural dynamics; Finite element techniques; Composite materials and mechanics; Earthquake disaster management; Reinforced and prestressed concrete; Computational mechanics; Wind effects on structures; Concrete technology; Steel structures; Strength, stability and dynamics of thin membranes; Plates and shells; Structural optimization; Structural response to impact and shock loading; Pressure vessels; Reliability analysis; Probabilistic design methods; Curved grid; Cable networks, Plastic analysis techniques; Inverse problems and artificial intelligence applications;

Offshore Structures; Shell foundation.

Offshore Engineering (CE5)
This programme consists of developing basic as well as advanced level knowledge in the area of offshore engineering through course work and a dissertation. The course work involves exposure to fundamentals of fluid, structural and soil engineering with relevance to offshore environment followed by hydrodynamic, structural and geo-technical application to a variety of offshore facilities including oil platforms, coastal and harbor structures. There are a large number of organizations in government bodies and public sector, research labs, private consultancy firms, and educational institutes that need candidates with such background.

Remote Sensing(CE6)
Development of methods and algorithms for digital analysis of remotely sensed data; Digital analysis of thermal and microwave SAR data; Digital terrain modelling; Remote sensing and spatial information analysis systems in hydrological modelling; Land degradation and soil erosion assessment; Spectral studies of crops and soils. Fuzzy, ANN and other approaches in remotely sensed data Analysis; Statistical analysis of geodetic and remote sensing data; Geodesy and geodetic techniques; Global positioning systems and its applications.

B.5) Computer Science and Engineering (CS)
[Department of Computer Science and Engineering

The M.Tech. programme in Computer Science is a flexible, second level programme offering students wide choice of electives from areas such as algorithms, programming languages, databases, machine intelligence, computer graphics and vision, networks, architecture, distributed computing and formal methods. The programme is aimed at generation of high quality technical manpower for Research, Design and Development in Computer Science and Computer Applications by exposing students to courses in theory as well as application areas. The department has strong ties with the computer industry and many M.Tech. students work on sponsored projects.

ELIGIBILITY FOR ADMISSION- as given in Table III- Eligibility for Admission to Different Disciplines.

AREAS OF RESEARCH

(i) **Algorithms**
Algorithms and complexity; Combinatorics and graph theory; Geometric algorithms.

(ii) **Artificial Intelligence**
Image Processing, Pattern Recognition and Computer Vision; Intelligent systems and their applications–tutoring systems, Natural language understanding; Machine learning and neural networks.

(iii) **Computer Graphics, Computer Vision and Image Understanding**
Computeraided graphics design; Multimedia; High Performance computing; Visualization; Rendering; Graphics design and Animation; Computer vision; Image retrieval.

(iv) **Computer Networks**
Performance modeling of networks & distributed systems; Quality of service in distributed systems; Wireless LANs: analysis and design; Design, implementation and verification of network security protocols; Distributed control algorithms and operating systems.

(v) **Databases and Data Mining**
Object oriented, temporal parallel databases; Query optimization and transaction management; Hypertext mining and information retrieval; Data dissemination networks; Integrating mining with relational DBMS, temporal mining, integrating mining with OLAP, indexing multidimensional data, precomputation techniques, mining extensions and extending relational DBMS for e commerce, Widearea distributed database systems, forecasting and smart e business.

(vi) Distributed Systems
System Performance Evaluation, Distributed Client Server Information Systems, Scalable Services, Fault Tolerance, Distributed Object Based Systems, Autonomic/Adaptive Distributed Applications, Programming Models and Runtimes for Generic Agents, Information Appliances, Parallel Computing, Java Security, high performance cluster computing.

(vii) **Formal Methods**
Formal specification, design and verification of hardware and software systems including distributed systems; Logic, automata theory and their applications in reasoning about systems; Automated theorem proving; Model checking.

(viii) **Programming languages and Compilers**
Theory of code optimization; Optimizing and parallelizing compilers; Analysis and implementation of functional and logic programming languages; Theory of programming languages.

(ix) **RealTime and Embedded Systems**
Functional Programming Applications, reconfigurable computing, Automobile Telematics, Embedded control units.

(x) **Software Engineering**
Object oriented software development; Component architectures; Reengineering of software; Systems Analysis and Design, MIS systems, Project Management, Quality Assurance.

B.6) Earth Sciences (GS, PG)
[Department of Earth Sciences]

The M.Tech programme of the department lays special emphasis on developing skills for exploration of mineral, petroleum and groundwater. The students of this programme have good placement opportunities in leading national and international mineral & oil exploration companies, Geological Survey of India, National Mineral Development Corporation, Atomic Mineral Division, Mineral Exploration Corporation and software companies.

a. Geoexploration : GS
The programme is structured such that the students can learn various aspects of mineral, petroleum and groundwater explorations. It offers wide ranging courses in exploration Well Logging, Basin Analysis, Marine
Mineral Resources, Groundwater Hydrology, Environmental Geology and Hydrogeochemistry.

b. Petroleum Geoscience : PG
This Specialization is introduced from July 2007. It prepares graduates for a career in petroleum exploration and development. The course provides advanced skills in seismic interpretation, basin analysis and applied micropaleontology, sequence stratigraphy, reservoir sedimentology, petrophysics, wireline logging tools and data interpretation using workstations and software as used in the industry.

ELIGIBILITY FOR ADMISSION - as given in Table III- Eligibility for Admission to Different Disciplines.

AREAS OF RESEARCH

- Active Tectonics and Tectonics
- Electromagnetism
- Engineering Geology
- Geochemistry
- Geothermics
- Geostatistics
- Geomagnetism
- GPS and Geodesy
- Gravity and Magnetic
- Hydrogeology

- Isotope Geology
- Igneous Petrology
- Mineralogy
- Micropalaeontology
- Metamorphic Petrology
- Ore Petrology and Ore deposit modeling
- Organic Geochemistry
- Petroleum Geology
- Remote Sensing and GIS
- Sedimentology
- Structural Geology
- Stratigraphy
- Seismology
- Volcanology
- Numerical modelling in Geophysics

B.7) Electrical Engineering EE (EE1, EE2, EE3, EE4, EE5)
[Department of Electrical Engineering]

ELIGIBILITY FOR ADMISSION - as given in Table III- Eligibility for Admission to Different Disciplines.

AREAS OF SPECIALIZATION

Communication Engineering	EE1
Control and Computing	EE2
Power Electronics and Power Systems	EE3
Microelectronics	EE4
Electronic Systems	EE5

AREAS OF RESEARCH

Communication Engineering (EE1)
- Communication Systems
- Communication Networks and Internet
- Computational Electromagnetics
- Image Processing and Computer Vision
- Microwaves, RF and Antennas
- Multimedia Systems
- Optical Communication and Photonics
- Signal Processing
- Speech Processing
- Wireless and Mobile Communication
- Information Theory and Coding
- Magnetic Resonance Imaging

Control and Computing (EE2)
- Linear Systems Theory
- Optimal Control and Optimization
- Modeling and Identification of Dynamical Systems
- Control of Distributed Parameter Systems
- Nonlinear Systems
- Modern Filter and Network Theory
- Behavioral Systems Theory
- Computational Methods in Electrical Engineering
- Software and System Reliability
- Cryptography and Security
- GPU-based Computing

Power Electronics and Power Systems (EE3)

- FACTS, HVDC and Power Quality
- Distributed Generation
- Power System Restructuring
- Wide Area Measurements and System Protection
- EMI / EMC
- Coupled Field Computations
- Electrical Machines: Modeling, Analysis, Design and Control
- Special Machines
- Power Electronic Converters, Electric Drives
- Power Electronics for Non-conventional Energy Sources
- Reliability in Power Systems and Power Electronic Systems
- Smart Grids for Energy Harvesting

Microelectronics (EE4)

- Devices and IC Technology
- Reliability of Electronic Devices and Circuits
- Device Simulation and Modeling
- VLSI and System Hardware Design
- CAD Tools
- MEMS Design and Technology (including Bio-MEMS)
- Flash Memory Devices
- Organic Semiconductor Devices
- CMOS Devices
- Spintronic Devices
- Photovoltaic Devices
- Material Growth and Characterization

Electronic Systems (EE5)

- Electronic Instrumentation
- Signal Processing Applications
- Speech and Audio Processing
- Biomedical Electronics
- Embedded System Design

B.8) Energy Systems Engineering (EN)

[Department of Energy Science & Engineering]

Energy is a critical input required for development. Fossil fuel reserves in the country are limited and there is a need to develop viable cost effective alternatives. Renewable and Nuclear Energy can provide possible longterm solutions for the energy problems. There are problems in the large scale development and deployment of these alternatives that need to be addressed. In the short run, India has to aggressively pursue energy efficiency and Demand Side Management to improve the efficiency of supply and utilization devices and systems. The development of new energy technologies provides technological challenges as well as significant business opportunity. In order to help meet these challenge, the Department of Energy Science and Engineering (DESE) has been established with a mission to develop sustainable energy systems and solutions for the future. There is a requirement for high quality trained manpower in the energy sector. It also provides scope for engineering innovators/entrepreneurs. The M.Tech. programme offers a mix of compulsory courses and elective courses that can be chosen according to the specialization and interest of the students.

The programme has two laboratories (Solar Energy and Energy Systems Laboratory) and a computational facility. In addition to this, the students are actively involved in the research and development activities of the Thermal Hydraulics facility, Gasification Laboratory, Heat Pump Laboratory (Mechanical Engineering), Power Electronics and Power Systems Laboratory (Electrical Engineering). DESE faculty have been organizing several Continuing Education Programmes on a

continuous basis on Renewable Energy, Energy Management, Process Integration, Solar Passive Architecture and have initiated a series of programmes for the Nuclear Power Corporation. The department has established linkages with industries like Thermax, Forbes Marshall, BSES, Mahindra & Mahindra, BHEL and organization like Atomic Energy Regulatory Board, Ministry of New and Renewable Energy, International Energy Initiative and The Energy and Resource Institute which have sponsored M.Tech/Ph.D Projects, ensuring the relevance of the research output.

ELIGIBILITY FOR ADMISSION - **as given in Table III- Eligibility for Admission to Different Disciplines.**

AREAS OF RESEARCH

Energy Efficiency / Improvements in conventional Energy Systems.
Heat pumps, Energy integration, Process integration for resource optimization, Pinch Analysis Development of techniques for optimization of Utility systems, Demand Side Management/Load Management in the Power Sector, Variable Speed Drives, Power Generation and Systems Planning, Energy Management and Auditing, Efficient Motor Drive Systems, Electronics Ballasts, Static VAR compensators, Illumination control, Power Electronics in Energy Efficient Systems, Electric Vehicles, Boilers and Fludised Bed Combustion, Exhaust Heat Recovery, Cogeneration, Building Energy Management, Efficient Air Conditioning Systems, Hydrogen Generation and Storage, Fuel Cells.

Renewables
Coal Gasification, Biomass Gasifier Design, Development and Testing, Liquid fuels from Biomass through the thermochemical and algal route, Microbial Hydrogen, Pyrolysis for liquid fuels and chemical, CNG Kit development, Testing of Solar Collectors and systems, Passive Solar Architecture, Development of Carbon PV cell, Decentralized Power Systems Grid Integration Issues, Hybrid Systems for Rural Electrification, Wind Energy, Low Cost Solar Drier, Fuel Cells, Thin film solar cells, Carbon nano tubes for hydrogen storage, Solar photovoltaic concentrator, Development of Engines of SVO, Biodiesel, Dual fuelling etc., Biodiesel manufacturing process. Complex Fluid Dynamics, Flow of Granular Materials, Multiphase flows, Computational Fluid Dynamics, Molecular Dynamic Simulation of Particulate Flows.

Nuclear
Nuclear Safety, Nuclear Waste management, Thermal Hydraulics Research, Computer Simulation Models for Analysis of Transients in Pressurized Heavy Water Reactor. Nuclear thermal hydraulics and safety, Analytical solution of multilayer heat conduction problems.

Fellowships
Several fellowships are normally available to DESE students ranging from ₹ 8000 to ₹ 15000 per month. Most of the fellowships also include tuition fee waiver. Fellowship will be offered on the basis of separate interviews.

B.9) Environmental Science & Engineering (EV)
[Centre for Environmental Science & Engineering (CESE)]

The interdisciplinary programme in Environmental Science and Engineering aims to offer a balanced training in scientific, engineering and social aspects of this field. The course has been designed to meet the requirements of industry, consultancy services, academic and R & D organizations related to Environmental Management, treatment of emission and effluents and remediation of contaminated environment. The programme provides ample choice of electives to enable students to delve deeper in to various aspects related to this discipline, i.e. Environmental Monitoring and Modeling, Environmental Impact Analysis, Environment Biotechnology, Industrial Air & Water Pollution Control, Industrial Ecology, Clean Technology and Hazardous Waste Management and Aerosol Science and Technology. Maharashtra Pollution Control Board under their MoU with IIT Bombay has provided financial asistance for fellowship for Two year M.Tech. Programme in Environmental Science and Engineering.

ELIGIBILITY FOR ADMISSION - as given in Table III- Eligibility for Admission to Different Disciplines.

AREAS OF RESEARCH

The research and development activities of the CESE encompass a wide spectrum of areas in Environmental Science and Engineering with special emphasis on the solution of real life environmental problems such as environmental monitoring, industrial air and water pollution control, solid and hazardous waste management, air and water quality modelling, environmental systems optimization, environmental microbiology and biotechnology, bioremediation, indoor air quality, aerosol science and technology, environmental impact assessment and global issues. For further details visit www.cese.iitb.ac.in

B.10) Geoinformatics & Natural Resources Engineering)(GNR)
[Centre of Studies in Resources Engineering (CSRE)]

Centre of Studies in Resources Engineering offers an M.Tech programme in Geoinformatics & Natural Resources Engineering which is multidisciplinary in nature. The emphasis of the programme is on the use of modern technological tools such as Satellite Remote Sensing, Geographic Information Systems, Global Positioning Systems, etc. for natural resources studies. The course provides a balanced coverage on natural resources exploration and management as well as on the application areas of interest such as Agriculture & Rural Development, Atmospheric Studies including Ozone Depletion, Coastal and Marine Environment, Digital Image Processing, Digital Photogrammetry, Natural Hazard Assessment and Disaster Mitigation, Snow, Avalanche and Glacial Studies, Terrain Evaluation, Water Resources (Surface and Ground water), High Performing Computing, etc.

Due to multidisciplinary nature of the subject of Geoinformatics and Natural Resources Engineering, emphasis is laid on training the students with an integrated approach to various issues pertaining to natural resources exploration and scientific management using the most modern tools and techniques. The courses offered cover fundamentals to advanced topics in the use of Remote Sensing, GIS and GPS to natural resources of Land, Earth and Atmosphere as well as natural hazards and disasters.

ELIGIBILITY FOR ADMISSION - as given in Table III- Eligibility for Admission to Different Disciplines.

AREAS OF RESEARCH

Remote Sensing and GIS applications, Surface and ground water resources, Terrain evaluation, Landuse Planning, Agro-Informatics and Rural Development, Sensor Network in Precision Agriculture, Mineral and hydrocarbon exploration, Snow and avalanche studies, Hazards of landslide, Drought and desertification, Marine and coastal environmental studies, Atmospheric remote sensing, Development of tools and techniques of spatial data processing, Digital Image processing, Stereo image analysis and digital cartography, Microwave remote sensing, Geo-computational systems, Climate change aspects, etc.

B.11) Industrial Engineering and Operations Research (IO)
[Interdisciplinary Group in Industrial Engineering and Operations Research (IE&OR)]

ELIGIBILITY FOR ADMISSION- as given in Table III- Eligibility for Admission to Different Disciplines.

AREAS OF RESEARCH

The group is interested in research related to modeling, quantitative analysis and optimal resource allocation from decision problems in deterministic and stochastic contexts. Broad areas of application are in manufacturing systems, supply chains, logistics, transport including railways, finance, services, infrastructures and other industrial systems; application of quantitative methods in quality and maintenance management systems; development and application of decision support, intelligent and knowledge -based systems.

The specific problems of interest include: production planning, scheduling and control systems; management of inventories in production, distribution and service systems; industrial scheduling, facilities planning, project management, quality management, material management and productivity management; operation, planning and control related to CMS, MRP, flexible assembly, FMS, JIT, Supply Chains and ERP; reverse logistics and RFID applications, product variety management.

Operations Research applications in management of technology and resource allocation; optimal control in stochastic systems; applications of game theory, modeling and simulation of supply chains, manufacturing and service systems; theory and applications of distributed simulation, discrete event and system dynamics simulations; applied stochastic models; scheduling and control of railways and other transport operations; time tabling of services, crew and vehicle scheduling for transport operations; optimization and design problems arising from e-commerce, including auctions and mechanism design for electronic exchanges; risk analysis and contract design; revenue management; quantitative models for financial engineering. Theory and applications of neural nets and fuzzy systems in manufacturing and management; development and applications of modern information systems for managing manufacturing, supply chain and service organizations.
The IEOR programme is unique in its contemporary flavour, with new courses in Financial Engineering, Services Management, Knowledge Based Systems, Neural Networks, Supply Chain Management, Engineering Economy, Manufacturing systems to name a few. The programme is equally strong in background building, with updated courses in Optimization Techniques, Stochastic Models and Simulation.

B.12) Mechanical Engineering ME (ME1, ME2, ME3, ME4)
[Department of Mechanical Engineering]

ELIGIBILITY FOR ADMISSION - as given in Table III- Eligibility for Admission to Different Disciplines.

Areas of Specialization

1. Thermal and Fluids Engineering (ME1)
2. Design Engineering (ME2)
3. Manufacturing Engineering (ME3)
4. Nuclear Engineering (ME4)

AREAS OF RESEARCH

Thermal and Fluids Engineering (ME1)

Fluid Mechanics, Fluid Machinery, Fluid Power Control and Fluidics, Analysis of Thermal Systems, Numerical prediction of convective and radiative heat transfer, Combustion, Fluidised bed combustion, Refrigeration and Airconditioning, Cryogenics, Miniature Cryorefrigerators, Food preservation, Performance Studies on IC Engines, Alternate Fuels, Nuclear Energy and Reactor Physics, Fuel Cells, Nuclear Reactor Thermal Hydraulics, Electronics Cooling, Microfluidics and Microscale Heat Transfer, Transport in porous media, Computational Fluid Flow and Heat Transfer, Analysis of Turbulent Flows, Low Temperature Plasma Modelling, Molecular Gas Dynamics, Enhanced Oil Recovery.

Design Engineering (ME2)
Stress and Vibration Analysis – Analytical, numerical (Finite Element and Boundary Element Methods) and experimental methods, Fatigue and Fracture-Linear elastic and elastic-plastic fracture mechanics, Fracture of composite materials, Fatigue-creep-corrosion interaction, Tribology and Machinery Maintenance, Pressure Vessel Design, Computer Aided Simulation and Design Optimization, Linear and non-linear vibrations, Chaos, Vehicle Dynamics, Rotor Dynamics, Acoustics and Noise, Active Vibration and Noise Control, Smart Structure, Robotics, Kinematics and control of Rigid and Flexible

Manipulators, Microprocessor based control and automation, Mechatronics, Mobile Robots, Textile Machinery, MEMS.

Manufacturing Engineering (ME3)
CAD / CAM / CIM, CNC, Computer Assisted Process Planning, Design for Manufacturing and Assembly, Manufacturing Automation & Control, Intelligent Manufacturing Systems, Rapid Prototyping and Tooling.

Design, Optimization and Modelling of Manufacturing Processes (Casting, Forming, Machining, and Welding), Precision and Micro-Manufacturing Processes, Computer Aided Tool Design.

Applications of IE & OR in Manufacturing, Logistics, Quality and Maintenance Systems.

Nuclear Engineering (ME4)
Nuclear Reactor Theory, Nuclear Reactor Dynamics and Control, Nuclear Reactor Thermal Hydraulics, Nuclear Reactor Safety, Reliability and Probabilistic Risk Assessment.

Fellowships
There will be about four fellowships from Atomic Energy Regulatory Board (AERB) given to deserving M.Tech. Students. Those selected (based on an interview) will be offered and enhanced stipend of ₹ 20,000/-, along with fee wavier. These students will be absorbed as Scientific Officer (C) in AERB and would be required to execute a bond to serve the organisation for atleast three years. A similar Fellowship program is also likely to be available from Nuclear Power Corporation of India Ltd. (NPCIL).

B.13) Metallurgical Engineering and Materials Science MM (MM1, MM2, MM3, MM4)
[Department of Metallurgical Engineering and Materials Science]

ELIGIBILITY FOR ADMISSION - as given in Table III- Eligibility for Admission to Different Disciplines.

Areas of Specialization

Materials Science	MM1
Process Engineering	MM2
Steel Technology	MM3
Corrosion Science & Engineering	MM4

AREAS OF RESEARCH
Faculty in the Metallurgical Engineering and Materials Science Dept. carry out research on a range of materials:

Metals
Process analysis, instrumentation and control, Iron and Steel making, deformation behavior and microstructure evolution during creep and superplasticity, mineral processing and extractive metallurgy, metal forming, mechanical behavior, welding, physical metallurgy, phase transformation, structure property relationship, thermomechanical processing and texture analysis.

Ceramics
Electronic ceramics, bioceramics, glass ceramics, ceramic foams, industrial ceramics, IR transmitting glasses, near net shape forming, gel casting, rheology of suspensions.

Semiconductors and magnetic materials
Devices of thin film elemental semiconductors and alloy systems, surface treatment and surface engineering, chemical vapor deposition, structure property correlation in nanocrystalline magnetic materials, magnetoresistor materials.

In addition, research into materials for sensors and batteries, superconductors, synthesis and processing of ion conductors, materials for energy generation and storage is going on in the Dept.

Polymers and Composites
Polymer blends, Polymercarbon nanotube composites, metalmatrix composites, structure property relations.

Wear and Corrosion
Fracture and failure, nondestructive evaluation, aqueous corrosion, metallurgy of corrosion, oil and gas corrosion, and protective coatings (paints, high temperature coatings etc.). Localized Corrosion including Stress Corrosion Cracking; Corrosion Fatigue and Hydrogen embrittlement, High Temperature Corrosion, Hot Corrosion, Protective Coatings, Organic Coatings, and High Temperature Coatings, Corrosion Control and Monitoring, Corrosion of Steel in Concrete, Microbial Corrosion, Inhibitors, Cathodic Protection, Corrosion of Weldments, Biomaterials, Intermatallics/Aluminides, Light Metals, Stainless steels.

Modeling and Simulations
Modeling of metallurgical processes, heat and mass transport, modeling of metal forming, Optimization, Monte Carlo simulations, Dislocation dynamics simulations.

FACILITIES AVAILABLE

Various facilities are available for research in the department:

Basic XRD with Xcelerator and thin film attachment

1600 Degree Horizontal Single Sample Dilatometer with Accessories

Image Intensifier System and ExRay Source

High Temp. Attachment and Texture and Stress Attachment Unit

Air Vacuum Induction Melting System

Hitachi Scanning Electron Microscope

Simultaneous Thermal Analysis System

R/S SST Plus with Coaxial Cylinder Rheometer

Atomic Absorption Unit AVANTAP

Carbon Sulphur Analyser

High Temp. Furnaces 1700 Deg.C.

UV Visible Spectrophotometer

Thin film processing units

MTS machines

Vibrating sample magnetometer

National facility on OIM and stress determination by XRD

Electrochemical Measurement Systems - The State of the art Model PAR 338.

Potentiostat model Wenking PSG 581

Automated 10 Ton/SCC systems.

Thermogravimetry analysers.

Computer Facilities.

Optical & Stereo microscopes

Acoustic Emission Systems.

Wear and Corrosion Machines.

Facilities for testing Paint and Other Coatings.

Dynamic loop system.

High temperature high pressure autoclaves

B.14) Materials, Manufacturing and Modeling (MMM)

[Cross-Departmental Programme of Mechanical Engineering, Metallurgical Engineering & Materials Science and Mathematics]

ELIGIBILITY FOR ADMISSION - as given in Table III- Eligibility for Admission to Different Disciplines.

B.15) Systems & Control Engineering (SC)

[Interdisciplinary Group in Systems & Control Engineering (SC)]

The programme provides a balanced choice of courses in theory and application of Systems and Control Engineering with the possibility of concentration in either theory or application. It provides an interdisciplinary background to all the students by exposing them to other areas. The exercises, examples and projects are based on real world systems, so as to impart a deep understanding of the subjects and their applications.

ELIGIBILITY FOR ADMISSION - as given in Table III- Eligibility for Admission to Different Disciplines.

AREAS OF RESEARCH

Large Scale Systems, System Reduction, Nuclear Reactor Control, Sliding Mode Control (Continuous & Discrete), Power Systems – Stability and Control, Modeling, Control & Implementation of Smart Structures, Space Launch Vehicles - Stability & Control, Gas Turbines – Stability & Control, Flexible manipulators, Stability & Control Multirate Output Feedback based Control (POF/FOS).

Robust Stability and Control especially using quantitative feedback theory (QFT) techniques, Nonlinear System Analysis and Control, and Reliable Computing using interval analysis techniques.

Optimal control, Constrained and optimization based control, in particular, stochastic model-predictive/ receding- horizontal control;

Nonlinear and adaptive control, geometric mechanics, Lagrangian and Hamiltonian mechanics.

Cooperative control of multi-agent systems, resource allocation, team theory and its application, decentralized control, cooperative and network control,

Game theory, economics, optimization, variational inequalities, coding theory, information theory, operations research, stochastic control, systems biology, team decision theory

Reconfigurable hardware, embedded control systems, robotic path planning algorithms, hardware/software co-design.

Switched and hybrid systems; control under communication and computation constraints; stochastic control; applications of probability in engineering systems.

B.16) Technology and Development (TD)

[Centre for Technology Alternatives for Rural Areas (CTARA)]

The two-year trans-disciplinary course is designed to prepare professionals in the area of “Technology and Development” to work in diverse fields and in different roles for managing / influencing /consulting/ innovating / choosing in different public, private and civil society organizations. The core

courses will deal with important rural resource assessment (land, water, energy), techniques for choice of technology, development theory and policy, social science research methods and system dynamics models, and project management. Students will be able to choose electives based on their background and interest.

ELIGIBILITY FOR ADMISSION - as given in Table III- Eligibility for Admission to Different Disciplines.

Facilities available

Metal and wood working workshop, Food Processing laboratory, contacts with active organization in the region for practical training and field-based project work.

AREAS OF RESEARCH

- Technology and Development
- Rural/Agro-based Industries
- Natural Resources (Energy, water, Land use)
- Environment, Climate Change and Development
- Public Policy and Governance
- Agriculture and Biodiversity
- Rural and regional planning

STATEMENT OF PURPOSE(SoP)

(for candidates applying to M.Tech. In Aerospace Engineering(AE) & Technology & Development (TD) of IIT Bombay)

Statement of Purpose (SoP) is your opportunity to share with the admission committee your thoughts and feeling about Postgraduate studies at IIT Bombay including your preparation for the same. Include a brief description of past project/ research work done by you. Restrict yourself to 500-600 words. The personal SOP will aid the admission committee in evaluating your application.

1. **Name**: _____

2. **Programme of study:** M.Tech. **Department:** _____ (AE /TD)

Date: _____ **Signature with Name _____**

Appendix-I

a) Sponsorship Certificate – for full-time candidates
(On the letterhead of the Sponsoring Organization).

SPONSORSHIP CERTIFICATE(for full-time candidates)

To,

The Director,

Indian Institute of Technology,

Mumbai - 400 076.

Sub : Sponsoring of an employee for M.Tech. Programme

Dear Sir,

We hereby Sponsor the candidature of Shri / Smt. / Kum_____, employed in our organization as _____, for joining his / her M.Tech. Programme in _____ at your Institute as a full-time candidate.

He / She is employee of our organization since_____. We shall fully relieve him / her of his / her duties in the organization during the entire period of the M.Tech. programme, to enable him / her to devote full time to his / her studies in the Institute. We shall bear the total expenses of his / her studies.

Date: Signature and seal of the Sponsoring Authority.

Appendix-II

b) Sponsorship Certificate – for part-time candidates
(On the letterhead of the Sponsoring Organization).

SPONSORSHIP CERTIFICATE (for part-time candidates)

To,
The Director,
Indian Institute of Technology,
Mumbai - 400 076.

Dear Sir,

We hereby sponsor the candidature of Shri / Smt. / Kum. _____ , employed in our organisation as _____for joining M.Tech programme at your Institute on a part-time basis.

He/She is _____ is employed in our organization since _____. We shall release him / her during working hours to undergo the programme as per the time-table of the programme at IIT Bombay. We understand that the duration for part time M.Tech. is expected to be 3 years.

We shall bear the total expenses of his / her studies.

Date: Signature and seal of the Sponsoring Authority.

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Appendix-III

c) CERTIFICATE FOR PROJECT STAFF

This is to certify that Shri / Smt / Kum. _____ has been working in Project _____ from dt. _____.

The duration of the project is _____ years. Appointment of Shri / Smt / Kum_____ _____ is for the period of _____ years. His / Her appointment is likely to be extended for the further period.

I have no objection if he / she register for M.Tech. Programme in _____Department under _____ category.

Signature _____

Prof. _____

Project Investigator: _____

Project Code : _____

Project Title : _____

Undertaking

I, Shri / Smt / Kum_____hereby declare that in the event of termination of my appointment in the project, I shall continue my studies as Self-financed student for the remaining period.

Signature:

Date: Name of Student: