INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

Information Brochure

M.Tech. Admissions

2012-13

CONTENTS

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 www.iitb.ac.in/admissions from **16th March 2012 to 2nd April 2012.** 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 in favour of '**Registrar, IIT Bombay**' payable at SBI or Canara Bank, IIT Powai/Mumbai branch.

   You must write your Name, Department, Application number or GATE registration number and Email address on reverse side of the Demand Draft.

   Applications without online payment details/Demand Draft will not be considered.

4. **Please refer to the Institute website** http://www.iitb.ac.in/mtechapp/mtechAdmissionLinks.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/ZS. Admission offered in these cases will be subject to the verification of the curriculum by the concerned Academic Unit of IIT Bombay.**

6. You should exercise the options ('Sr. No. 14' of the application form for the M.Tech programme) **CAREFULLY** as no change/alteration/addition will be entertained after **FINAL** submission of the application. However, you will have an option to withdraw or re-submit the application 'ONLINE' from **23rd March 2012 to 2nd April, 2012** .

   You can apply for more than one programme and can select up to 10 preferences. If a programme has multiple specialization, each specialization is counted as one option.

7. OBC candidates may note that the limit of annual income is raised to ₹ 4.5 lakhs for determining the creamy layer among Other Backward Classes (OBCs) candidates.

8. **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 CPI of 6.0 on the scale of 10; with corresponding proportional requirements when the scales are other than on 10,(for example, 4.8 on a scale of 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 CPI of 5.5 on the scale of 10; with corresponding proportional requirements when the scales are other than on 10,(for example, 4.4 on a scale of 8)

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 (CH), Biomedical (BM), Electrical (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. 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.

13. If you are paying through Demand Draft, you MUST send the Demand Draft along with the completed copy of the application. **You must write your Name, Department, Application number or GATE registration number and Email address on reverse side of the Demand Draft.**

14. 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 5th April 2012.

15. You should check the Institute website www.iitb.ac.in/admissions for results/important Announcements.

16. You should check emails sent to the email address provided in your application, for all important communications and announcements.

17. Candidates called for written test/interview should bring with them (i) hard copy of the application submitted online (ii) final year thesis / dissertation / report / publication / copy of certificates / marksheets.

Candidates need to apply ONLINE only. Availability of application forms for Postgraduate Admission is entirely ONLINE. No Downloadable Forms will be available.

II. IMPORTANT DATES

No	Particulars	Dates	
01.	**Advertisement** (in all leading Newspapers and on IIT website)	**March 11,2012**	
	Mode of Application form : Online		
02.	**Availability of application forms**	**March 16,2012**	
03.	**Last date for submission of completed application forms**	**April 2,2012**	
04.	**Withdrawal or re-submission of Application forms:**	**March 23,2012 to April 2, 2012**	
05.	**Last Date to convey the minimum qualifying score for cut-off for Direct admission to GN candidates by concerned academic units to academic office.**	**March 09,2012**	
06.	**Last Date to convey the minimum qualifying score for cut-off for Written Test/Interview to GN candidates by concerned academic units to academic office.**	**April 10,2012**	
07.	**Direct Admission Offer**		
	AE (1st round only),CH,CS,EE,ME (for ME2 & ME3 only), IE&OR (1st round only), SC, EN Admissions on the basis of GATE score only for TA/RA category (GN,SC,ST,OBC & PD candidates)(No Test/ Interview for CH/ CS/ ME (for ME2 & ME3 only) SC /ST for TA category)	**Result Announcement**	**Last date for payment of fees**
	1st offer	**April 12,2012**	**April 18,2012**
	2nd offer (except AE,IO)	**April 20,2012**	**April 26,2012**
	3rd offer (except AE,IO)	**April 28,2012**	**May 4,2012**
	4th offer for CH,EE,ME,SC (if required)	**June 19,2012**	**June 25,2012**
08.	**Written Test and/or Interview**		
	To display the list for candidates called for TA/ TAP/ RA/ PA/ PS/ IS/SW etc.) for Written Test and or/Interview schedule/details	April 17,2012	

09. **Dates for the Written Test and or Interview for all categories(i.e TA/RA/TAP/PA/PS/IS/SW etc.)**

Department	Teaching Assistantship (TA)	Research Assistantship (RA)	PS/IS/SW/TAP/PA
Aerospace Engg.	6th May 2012 (Written Test and/or Interview)	6th May 2012 (Written Test and/or Interview)	6th May 2012 (Written Test and/or Interview)
Bioscience & Bioengg.	7th & 8th May 2012 (Written Test and/or Interview)	7th & 8th May 2012 (Written Test and/or Interview)	7th & 8th May 2012 (Written Test and/or Interview)
Chemical Engg	--	9th & 10th May 2012 (Written Test and/or Interview)	9th & 10th May 201 (Written Test and/or Interview)
Civil Engg. *	**9th & 10th May 2012 (Written Test and/or Interview)	9th & 10th May 2012 (Written Test and/or Interview)	9th & 10th May 2012 (Written Test and/or Interview)

* Out of five specialisation choices (CE1,CE2,CE3,CE4 and CE6) in Civil Engg., 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 Department. Candidates shortlisted for written test/interview for specialization - CE1 and CE4 should report to Civil Engg. Deptt. at 8.30 a.m. on 9th May 2012 & 10h May 2012 and for remaining disciplines CE2, CE3 and CE6 there will be only Interview. **Those who are not able to attend written test/interview on 9th -10th May 2012 as a special case (only on account of qualifying degree related university examinations), they can appear on 13th May,2012 (Sunday) 8.30 am onwards.			
Computer Science & Engg.	--	21st May 2012 (Written Test and/or Interview)	21st May2012 (Written Test and/or Interview)
Earth Sciences	9th & 10th May 2012 (Interview)	9th & 10th May 2012 (Interview)	9th & 10th May 2012 (Interview)
Elect. Engg.	--	7th & 8th June 2012 (Written Test and/or Interview)	7th & 8th June 2012 (Written Test and/or Interview)
Energy Science and Engg.	6th & 7th May 2012 (Written Test and/or Interview)	6th & 7th May 2012 (Written Test and/or Interview)	6th & 7th May 2012 (Written Test and/or Interview)
Mechanical Engg.	7th May Written Test for ME1* & ME4*. Fellowship Interview for ME4 on July 9. ME2 & ME3 Through Direct Admissions Only (Refer Item No.7).	7th May Written Test for ME1* . July 9 written test/ interview for ME2 & ME3 only. No RA Position for ME4.	7th May Written Test for ME1* . July 9 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.		
Met. Engg. & Mat. Science	9th & 10th May 2012 (Written test and/or interview)	9th & 10th May 2012 (Written test and/or interview)	9th & 10th May 2012 (Written test and/or interview)
Cross-Departmental Programme - Materials, Manufacturing and Modeling (MMM)	9th & 10th May 2012 (Written test and/or interview)	9th & 10th May 2012 (Written test and/or interview)	4th July 2012 (Written test and/or interview)
IE&OR	8th , 9th & 10th May 2012 (Written Test and/or Interview)	8th , 9th & 10th May 2012 (Written Test and/or Interview)	8th ,9th & 10th May 2012 (Written Test and/or Interview)
Systems & Control Engg.	--	--	5th May 2012 (Written Test and/or Interview)
CESE	10th & 11th May 2012 (interview only)	10th & 11th May 2012 (interview only)	10th & 11th May 2012 (interview only)
CSRE	10th & 11th May 2012 (interview only)	10th & 11th May 2012 (interview only)	10th & 11th May 2012 (interview only)

CTARA	10th & 11th May 2012 (Written Test and/or Interview)	10th & 11th May 2012 (Written Test and/or Interview)	10th & 11th May 2012 ((Written Test and/or Interview)

10.	**Date for receipt of recommendations from Heads of Dept/ School/ Centre/ ID groups**		**May 16,2012**
11.	**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 23,2012**	**May 29,2012**
	2nd offer(if required)	**May 31.2012**	**June 6.2012**
	3rd offer(if required)	**June 8,2012**	**June 14,2012**
	Final offer (if required)	**June 24,2012**	**July 3,2012**
12	**Spot admissions (for Vacant Seats, if any, if required) for TA category only**		
	1. Aerospace Engg., Bioscience & Bioengg,Civil Engg., Elect. Engg, Mech. Engg.(TA/RA) 2. Energy, Syscon,CSRE,CESE 3. CTARA		**9 July2012** **10 July2012** **11 July2012**
13	**Registration and Orientation Programme**		**July 13,2012 to July 19,2012**
14	**Instructions begins**		**July 20,2012**

1. ***CH,EE,CS,ME2 & ME3,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)

- Results will be declared on IIT website: www.iitb.ac.in/admissions on the tentative date as mentioned above. Candidates should check emails sent to the email addresses provided in the application for all important communications and announcements.

- The applicants who appeared for the interviews should check the results on Institute website on above date.

- Payment of fees has to be made through Demand Draft drawn in favour of Registrar, IIT Bombay, payable at SBI, IIT Powai or Canara Bank, IIT Powai, Mumbai, Branch. You must write your Name, Department and E-mail ID on reverse side of the Demand Draft. The Draft may be submitted by post/courier to The Deputy Registrar(Academic), IIT Bombay, Powai, Mumbai-400 076.

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.

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. IIT Bombay 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, Biosciences & Bioengineering, 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 certain Interdisciplinary groups.

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 Institute has a Humanities and Social Sciences Department, which 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 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, M.Tech. in Petroleum Geoscience offered by the Department of Earth Sciences, M.Tech in Steel Technology offered by the Department of Metallurgical Engineering & Material Sciences.

The Institute has started New academic programmes, as given below:

From 2009-10

1. M.Sc.+ Ph.D-Dual Degree programme in Operations Research
2. M.Sc.+ Ph.D-Dual Degree programme in Biotechnology
3. Cross- Departmental M.Tech programme in Materials, Manufacturing & Modelling(MMM)
4. PG Dual Degree (M.Tech/M.Phil+Ph.D) in various disciplines

From 2010-11

1. M.Des programme in Mobility and Vehicle Design
2. M.Sc.+ Ph.D-Dual Degree programme in CESE

From 2011-12

1. M.Sc.+ Ph.D-Dual Degree programme in Earth Sciences in Applied Geology & Applied Geophysics
2. M.Sc.+ Ph.D-Dual Degree programme in Chemistry.
3. M.Sc. + M.Tech. Dual Degree programme in the Physics and Metallurgical Engg. & Materials Science.
4. M.Tech in Nuclear Engineering (ME4) as specialisation in Department of Mechanical Engg.

From 2011-12 *(Spring Semester)*

1. Interdisciplinary (IDP) Ph.D. programme in Climate Studies

Interdisciplinary Programmes in Industrial Engineering & Operations Research and Systems & Control Engineering offer Ph.D. & M.Tech. Programmes.

The Shailesh J. Mehta, School of Management offers a 2-year Master of Management programme and also a doctoral programme. The School of Management also conducts a wide range of courses for the Undergraduate and Postgraduate Programmes.

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

The Institute on an average admits 1129 candidates for the Undergraduate programmes and 1342 candidates for different Ph.D / Postgraduate 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 Cell) 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, under Quality Improvement programme (QIP), teachers from various engineering colleges also join Institute for the postgraduate and doctoral programmes.

A.2) RESEARCH FACILITIES

All the departments 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, Workshop, Xerox and Photography Sections. 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 Centre of Studies in Resources Engineering (CSRE) established in 1976 by the then Ministry of Education and Social Welfare, has the facilities and infrastructure for research in the area of Natural Resources exploration and management using modern tools of Remote Sensing and Geographic Information Systems.

The Centre for Research in Nano-Technology & Science (CRNTS), is well equipped for pursuing research in nanotechnology. Almost all sophisticated tools required for Nanotechnology research are housed here.

The Center for Environmental Science and Engineering (CESE) funded by the Department of Education, Govt. of India, is concerned with air and water quality management, computer aided design for waste water engineering systems, low waste techniques, etc.

The Department of Science and Technology (DST), Defense Research & Development Organization (DRDO) and Ministry of Human Resources Development (MHRD) of Government of India, has sponsored the setting of a National Geotechnical Centrifuge Facility (NGCF) to facilitate research in frontier areas.

The Centre for Technology Alternatives for Rural Areas (CTARA) is concerned with development, transfer and impact-assessment of technology in the context of socio-economic development of a small region. To this end, the centre offers courses (coupled with field work) to impart necessary perspectives and quantitative skills

The Industrial Design Centre (IDC), established in 1969, has followed an integrated and interdisciplinary approach towards design education. The Centre over the past years has experimented with different methods in design education to develop a flexible structure to suit the needs of students.

Schools in Cryogenics, Lasers and Laser Systems, Offshore Engineering and Management have also been established. New facilities under the Thrust Area Programmes in fields like Microelectronics, Microprocessor Applications, Intelligent Systems, Robotics, CAD/CAM, Remote Sensing, Telematics, etc. have been created.

Centre for Aerospace Systems Design & Engineering (CASDE) and Centre for Formal Design and Verification of Software (CFDVS) have been established recently. The Institute has many research collaborations with leading universities in USA, Europe, Japan, and other East 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.

The Centre for Distance Engineering Education Programme (CDEEP) was started by the Institute with the express aim of providing high quality distance education in engineering and science to a large number of participants throughout the country and abroad. CDEEP envisages to share the expertise of IIT Bombay faculty with students and working professionals elsewhere. The courses offered through distance education are the very same ones that are taken by IIT Bombay students. To reach as many learners as possible, CDEEP is using different mediums and various technologies.

Approximately 7 to 10 M.Tech. projects will be 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.

The Computer Centre of IIT Bombay provides high end computing facilities to the Institute. It has several high performance computing machines, which include a 4 CPU Digital machine, HP's K-class machine, SGI Octane and several SUN servers. Students are provided email access through a cluster of 10 J class HP computers. The Computer Centre is a level 3 Centre for the national computing facilities under the ICOSER project of the Department of Science and Technology's TIFAC.

The entire academic area of the Institute as well as its hostels are connected to the Institute's backbone by a 10 Mbps optical fiber link connected to an ATM switch through several fast ethernet switches. The Institute backbone is linked to a 2 Mbps Internet link through a radio modem. In addition, there are two lower capacity Internet links, each of 64 kbps. Each student hostel has a computer room with several PCs, which can directly access any server in the Institute through the Internet link.

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.

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 salient features of the programme are given below:

i. The Institute offers a full time programme of 2-year and a part time programme of 3-year duration.
ii. The part time programme is available to Sponsored(SW), Research Assistant(RA), Project Research Assistant (PA), Project Staff (PS) and Institute Staff (IS) of IIT Bombay. However, the working hours for the part time programme will include the normal working hours of 8.30 a.m. to 5.00 p.m. and also evening slots.

A.5) ADMISSIONS

Some of the departments and interdisciplinary groups, offer direct admission to the 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 choice(s).

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

OBC-NC/SC / ST /PD Candidates

Seats are reserved for Other Backward Class- Non-Creamy layer(OBC-NC)/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 choices.

Other Backward Class Non-Creamy layer(OBC-NC)/Person with Disability (PD)
Seats are reserved for Other Backward Class Non-Creamy layer(OBC-NC)/ Person with Disability (PD) category, as per Govt.of India rules. The admission will be through Written Test / Interview along with General candidates.

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 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

(Admissions to all categories are subject to availability of seats)

The continuation of the financial support and the registration for your selected programme will be subject to satisfactory performance of the duties assigned by the Department / Centre/ Schools/ IDPs as well as satisfactory academic performance (i.e. maintain SPI / CPI of 6.00 and above at the end of each semester) and fulfillment of the other academic and non-academic requirements, as per rules.

A.5.1.1 INSTITUTE TEACHING ASSISTANTSHIP (TA)

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

A.5.1.1.1 Candidates are selected through the following modes.

i. Direct Admissions based on valid GATE score.
ii. Valid GATE score and Performance in Test / Interview.

A.5.1.1.2 As per MHRD directives fellow holding TA ship 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 (TAship).

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.
ii. The assistantship will be available for a maximum period of 24 months and students with TA have to complete M.Tech. in 2 years.
iii. Assistantship will be paid on the basis of monthly attendance.

A.5.1.2 TEACHING ASSISTANTSHIP THROUGH PROJECT (TAP)

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

Candidate to this category will be admitted subject to:

i. Valid GATE score.
ii. Performance in Written Test / Interview.

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.

Fellowships are also 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) and Larsen & Toubro, etc.

A.5.1.3 INSTITUTE RESEARCH ASSISTANTSHIP (RA)/PROJECT RESEARCH ASSISTANTSHIP (PA) :

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

A.5.1.3.1 Institute Research Assistantship (RA)

Candidate to this category will be admitted subject to:

i. Valid GATE score.
ii. Performance in Written Test / Interview.

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 assigned by the Head of the department.

ii. They are required to work for about 20 hours a week. They have to complete the M.Tech. Programme in 3 years.

A.5.1.3.2 Project Research Assistantship (PA)

Candidate to this category will be admitted subject to:

i. Valid GATE score and
ii. Performance in Written Test / Interview.

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

A.5.1.4 PROJECT STAFF (PS)

(only for project staff members of IIT Bombay)

This category is for Employees working in Sponsored Research Project at the Institute.

Candidate to this category will be admitted 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 to candidates applying to M.Tech. Programme in Computer Science & Engineering.)
iii. Performance in Written Test / Interview.

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

i. The candidate under this category will be required to assist as assigned by the principal investigator of the concerned project.
ii. They are required to work for up to 20 hours a week.
iii. They have to complete M.Tech. programme in 3 years.

A.5.1.5 INSTITUTE STAFF (IS)

Candidate to this category will be admitted 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 to candidates applying to M.Tech. Programme in Computer Science & Engineering.)
iii. Performance in Written Test / Interview.
iv. They have to complete M.Tech. Programme in 3 years.

A.5.1.6 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 admission procedure for

sponsored candidates will be 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 Department must have valid GATE score in CS / IT.

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.

All Sponsored candidates (SW, PS, IS, etc) should have obtained First class or 60% marks (55% for SC/ST candidates) or equivalent grade in the qualifying examination.

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.**

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_____, an employee in our organization, for joining his / her M.Tech. Programme in _____ at your Institute as a full-time candidate.

He / She is employee of our organization for_____ years. We shall bear the total expenses of his / her studies. 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.

Date: Signature and seal of the Sponsoring Authority.

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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. _____ for joining M.Tech programme at your Institute on Part-time basis.

Shri / Smt./ Kum._____ is employed in our organization since _____. We are ready to release him / her during working hours to undergo the programme as per IIT Bombay, time-table. We understand that the duration for part time M.Tech. is expected to be 3 years.

It is noted that normal Instructional hours are from 8.30 a.m to 5.00 p.m. and also some courses are in evening slots. We shall bear the total expenses of his / her studies.

Date: Signature and seal of the Sponsoring Authority.

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c). Certificate for Project-RA, Project-TA & 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 state that in the event 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:

A.6) FEES AND DEPOSITS

Various fees, deposits and Hostel Rent are listed in **Table-A.1**

Table A.1: Fees, Deposits & Hostel Rent for M.Tech. Students

Sr. No.	Particulars	Revised 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
	i.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), (2) Research Assistantship (RA), (3)Govt./Semi-Govt. Fellowships awardees (QIP/ UGC/ CSIR/ DAE/ DST/ DBT/ NBHM/ ICSSR/ MNES/ ICAR/ ARCI/ CPHEEO/ ICMR/ HBNI/ ICPR/ AERB/ DAE/ AICTE/ ENDOWMENT etc.)

@ Sponsored categories
All other categories i.e. SW, EX(First & Second Semester), SF, TAP, PA, PS, DRDO Sponsored, IITB- Monash, SFA, etc

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

- Research Scholars 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 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. (Engg.)/ M.Sc. / M.CA / 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 CPI of 6.0 on the scale of 10; with corresponding proportional requirements when the scales are other than on 10,(for example, 4.8 on a scale of 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 CPI of 5.5 on the scale of 10; with corresponding proportional requirements when the scales are other than on 10,(for example, 4.4 on a scale of 8)

Eligibility criteria for the different programmes and specializations are given in the Section B of this brochure.

Table A.2: Summary of M.Tech. Programmes

Department/ID Groups/Centre	Specialization	Code
1. Aerospace Engineering	Aerodynamics Dynamics & Control Aerospace Propulsion Aerospace Structures	AE1 AE2 AE3 AE4
2. Biosciences & Bioengineering	Biomedical Engineering	BM
3. Chemical Engineering	Chemical Engineering	CH
4. Civil Engineering	Transportation Systems Geotechnical Engineering Water Resources Engineering Structural Engineering Remote Sensing	CE1 CE2 CE3 CE4 CE6
5.Computer Science & Engineering	Computer Science & Engineering	CS
6. Earth Sciences	Geoexploration Petroleum Geoscience	GS PG
7. Electrical Engineering	Communication Engineering Control & Computing Power Electronics & Power Systems Microelectronics Electronic Systems	EE1 EE2 EE3 EE4 EE5
8. Energy Science and Engineering	Energy Systems Engineering	EN
9 Mechanical Engineering	Thermal & Fluids Engineering. Design Engineering Manufacturing Engineering Nuclear Engineering	ME1 ME2 ME3 ME4
10. Metallurgical Engineering & Materials Science	Materials Science Process Engineering Steel Technology Corrosion Science & Engineering	MM1 MM2 MM3 MM4
11. Cross-Departmental Programme - Materials, Manufacturing and Modeling	Materials, Manufacturing and Modeling	MMM
Interdisciplinary Groups		
12. Industrial Engineering & Operations Research	Industrial Engineering & Operations Research	IO
13. Systems and Control Engineering	Systems and Control Engineering	SC
Centre 14. Centre for Environmental Science & Engineering	Environmental Science & Engineering	EV
15. Centre of Studies in Resources in Engineering (CSRE)	Geoinformatics and Natural Resources Engineering	GNR
16. Centre for Technology Alternatives for Rural Areas (CTARA)	Technology and Development	TD

Table–A.3: ELIGIBILITY FOR SEEKING ADMISSION TO DIFFERENT DISCIPLINES

Note:

1. For admission to Computer Science & Engineering (CS), the candidate should have taken the GATE Specialization Paper CS.
2. For admission to Civil Engineering Department, the candidate should have valid GATE score in CE only.
3. For admission to EV, the candidate must have Mathematics at Higher Secondary or Intermediate level.
4. For admission to Chemical Engineering, candidates must have taken GATE specialization paper CH.
5. For admission to Systems & Control Engg., candidates should have undergone a course in Control Theory.
6. For admission to MM1 and MM2, the candidates with M.Sc. must have passed Mathematics as a subject at the B.Sc. degree level.
7. For admission to MM2, the candidates with M.Sc., should have taken either general/physical/inorganic Chemistry as specialization at the M.Sc. Level.
8. For admission to various specializations in Aerospace & Electrical Engineering, there is specific requirement of GATE paper. The information is given in this brochure against respective Department.
9. For admission to Nuclear Engineering (ME4) specialisation offered by Mechanical Engineering Department, the candidate should have taken the GATE Specialization Paper in ME/CH/EE only.

If you have degree or equivalent in Engineering/Technology (CODE)	**You can seek admission to the following disciplines (Refer Table II for codes)**
Agricultural Engg. (AG)	IO, EV, CS, GNR, TD
Aerospace/Aeronautical Engg. (AE)	AE1, AE2, AE3, AE4, EE2, ME2, MM4, CS, EN, IO, ME1,SC, EV, TD
Automobile Engg (AU)	ME1, ME2, EN, IO, CS, TD,MMM
Architecture & Planning (AR)	IO, CS ,TD,GNR
Biomedical Engg. (BM)	BM, IO , EE5, CS, TD
Biotechnical Engg. (BE)	CS, IO, TD,
Biotechnology (BT)	BM
Ceramic and Glass Tech. (CG)	CS,MM4,MM1,IO, TD
Chemical Engg. (CH)	BM,CH,MM4,CS,EN,EV,IO,ME1,MM1,MM2,MM3,SC, TD, MMM, ME4
Civil Engg. (CE)	CE1,CE2, CE3, CE4, CE6, MM4, CS, EN,EV, IO, AE1, AE4, GNR, TD
Computer Science & Engineering (CS)	BM, CS, EE1, EE2, EE3, EE4, IO, GNR, TD
Energy Systems Engg. (EN)	EN, EV, IO, CS, TD
Electrical (EE)/Electronics Engg. (EL)	AE2,EE1, EE2, EE3, EE4, EE5, BM,MM4, CS, EN, IO, MM1, SC, GNR, TD, ME4
Telecommunication/Communication Engg. (EC)	EE1, EE2, EE3, EE4, EE5, BM, CS, IO,GNR, TD
Electro-chemical (EH)	MM4, MM1, MM2, IO,CS, TD
Engineering Physics (EP)	BM,EE1, EE2, EE4, EE5, MM1, CS, IO, GNR, TD
Industrial Engineering (IE)	ME3, IO, CS, TD*
Instrumentation Engg. (IN)	AE2,BM, CS, EE2, EE3, EE4, EE5, SC, IO, TD
Machine Tool Engg. (MC)	ME2, ME3, IO,CS,TD
Thermal Power Engg. (TP)	EN, IO, CS, TD
Mechanical Engg. (ME)	ME1, ME2, ME3, AE1, AE2, AE3, AE4, BM, MM4, CS, EN, EV, IO,MM1, MM2, MM3,MMM, SC, TD,ME4
Metallurgical Engineering (MT)	MM1, MM2,MM3, MMM,MM4, CS, EN, EV, IO, SC, BM, TD
Materials Sciences/Materials Sciences & Engg. (MS)	EE4
Mining Engineering (MN)	EV, CS, IO, GNR, TD
Production Engineering (PR)	ME2, ME3, MMM, CS, IO, TD

Petrochemical (PM)	CH,IO, CS, MM4, TD,EV
Environmental Engineering (EV)	EV, CS, GNR, IO, TD
Polymer Engineering (PP)	MM1,CS,TD,IO
MCA (with B.Sc. with Physics & Maths)	CS,TD
M.Sc. or equivalent	
Agriculture (AS)	TD
Atmospheric Science (AT)	EV, CS, TD
Biochemistry (BY)	BM, EV, CS, TD
Biophysics (BP)	BM, CS, TD
Biotechnology (BT)	BM, EV, CS,TD
Chemistry (CY)	BM, MM4, EV, MM1, MM2, CS,TD
Ceramics (CM)	BM, CS, TD
Environmental Science (EM)	EV, CS, GNR,TD
Environmental Toxicology (ET)	EV, CS, TD
Ergonomics (ER)	BM, CS, TD
Earth Sciences (ES):- Geology (GG)/Applied Geology(GA)/ Geochemistry(GC)/ Geophysics (GG)	EV, GS, CS, GNR,TD
Applied Geology (GA)/Geochemistry (GC), Applied Geophysics(GP)	GS,CS,TD
Life Sciences (LS/LV/LB/LZ)	CS,TD
Materials Science (MS)	BM, MM4, MM1, MM2, CS, TD
Mathematics (MA)	BM, CS, GNR, EE2, TD
Microbology (MB)	EV, CS, TD
Metereology (MO)	EV, CS, TD
Molecular Biology (MG)	BM, CS, TD
Physics (PH)	MM1, CS, EV, GNR, EE2, EE4, EE5, TD
Physics with Electronics as a Special Subject (PH)	BM,CS, EE1, EE5, MM1,TD
Electronic Science (EL)	BM, EE1, EE4, EE5,CS, TD
Physiology (PS)	BM, CS, TD
Polymer (PO)	MM1,,CS,TD
M.B.B.S (Medicine)	BM,TD
M. Pharm, B.Arch	BM, TD
B.Pharm (4 yr degree)	BM
BDS (4 yr. degree)/B.P.Th./B.OTH	BM

TABLE – A.4 : GATE & OTHER REQUIREMENT OF DIFFERENT DISCIPLINE

Discipline	**Eligibility criterion** **First Class or 60% marks (55% marks for SC/ST) in**	**GATE Requirement**
Aerospace Engineering (a) To any of the specializations (AE1, AE2, AE3, AE4) (b) To specific specializations	B.E./B.Tech. or equivalent in Aeronautical/Aerospace Engineering are eligible for all disciplines. Engineering graduates in other branches of Engineering (i.e. Mechanical, Civil, Electrical, Electronics, Instrumentation or allied branches) are eligible for admission to specific specializations of Aerospace Engineering, if they have valid GATE score in disciplines as shown in the table below:	Valid GATE score in any discipline.
Aerodynamics (AE1)	Bachelor's degree in Mechanical Engg./ Civil Engg.	ME, CE
Dynamics Control (AE2)	Bachelor's degree in Mech. Engg./ Electrical/ Electronics/ Instrumentation Engg.	ME/EE/EC/IN
Aerospace Propulsion (AE3)	Bachelor's degree in Mechanical Engineering	ME
Aerospace Structure (AE4)	Bachelor's degree in Mechanical Engg./ Civil Engg	ME, CE
Department of Biosciences & Bioengineering *(Biomedical Engg.) (BM)*	i) B.Tech./B.E./AMIE or equivalent in Biomedical, Chemical, Computer Science, Electrical, Electronics, Instrumentation, Mechanical Engg., Metallurgy & Materials Science, Telecommunications Engineering and Engineering Physics OR ii) M.Sc. or equivalent in Biochemistry,Biophysics, Biotechnology, Ceramics, Chemistry, Electronics, Ergonomics, Materials Science, Mathematics, Molecular Biology, Physics and Physiology; OR* iii) MBBS * OR iv) M. Pharm. * v) B.VSc., B.D.S., B.P.Th., B.O.Th., and B.Pharm degree (Duration 4 years or more) OR * vi) B.Tech. (Biotechnology) *Candidate with qualifications mentioned against (iii), (iv) & (v) must submit a certificate for their having First class or 60% marks (55% for SC/ST) in qualifying degrees, failing which, they will not be eligible for admission to M.Tech in Biomedical Engineering.	Valid GATE score in any discipline for engineering and science graduates, or AIIMS All India MCI / JIPMER/ PGI Chandigarh / AFMC-Pune / DNB Part I national level medical postgraduate entrance examinations or GATE Life Sciences examination for medical and biological sciences. All India level Pre-M.D.S/ M.VSc., M.Pharm. Selection examination for B.VSc., B.D.S and B.Pharm. Eligibility/ rank certificates of all such entrance examinations are required.
Chemical Engineering (CH)	B.E./B.Tech. in Chemical Engineering or equivalent	Valid GATE score in Chemcial Engg. (CH) only
Civil Engineering Transportation Sys. Engg.(CE1) Geotechnical Engg. (CE2) Water Resources Engg. (CE3) Structural Engg. (CE4) Remote Sensing (CE6)	B.E/B.Tech. in Civil Engineering or equivalent	Valid GATE score in CE only.
Computer Science & Engg.(CS)	Bachelors degree in Engineering / Master's degree in Science / MCA (with Physics & Mathematics at B.Sc. level) or equivalent degree with a valid GATE score in CS discipline.	Valid GATE score in CS is required for all applicants (including Project Staff (PS)/ Institute Staff(IS) and Sponsored candidates

Discipline	Eligibility criterion First Class or 60% marks (55% marks for SC/ST) in	GATE Requirement
Earth Sciences a) Geoexploration (GS) b) Petroleum Geoscience (PG)	Master's degree or equivalent in Geology / Applied Geology / Geophysics / Geochemistry Master's degree or equivalent in Geology/ Applied Geology/ Geophysics/ Applied Geophysics.	Valid GATE score in Geology & Geophysics Valid GATE score in Geology & Geophysics
Electrical Engineering **Communication Engg. (EE1)**	Bachelor's degree (B.E./B.Tech.) in Computer Science and Engineering, Electrical Engineering, Electronics Engineering, Telecommunications Engineering, Engineering Physics OR Master's degree (Master of Science) in Physics(with specialization in Electronics), Electronic Sciences	Valid GATE score in GATE subjects CS,EC, EE
Control & Computing (EE2)	Bachelor's degree (B.E./B.Tech.) in Computer Science & Engineering, Electrical Engineering, Electronics Engineering, Telecommunication Engineering, Instrumentation Engineering, Engineering Physics, Aeronautical/Aerospace Engineering OR Master's degree (Master of Science) in Physics, Mathematics	Valid GATE score in CS, EC, EE, IN
Power Electronics & Power Systems (EE3)	Bachelor's degree (B.E./B.Tech.) in Computer Science and Engineering, Electrical Engineering, Electronics Engineering, Telecommunication Engineering, Instrumentation Engineering	Valid GATE score in EC, EE, IN
Microelectronics (EE4)	Bachelor's degree(B.E./B.Tech.) in Computer Science and Engineering, Electrical Engineering, Electronics Engineering, Telecommunication Engineering, Instrumentation Engineering, Engineering Physics, Materials Science & Engg. OR Master's degree (Master of Science) in Physics , Electronic Sciences.	Valid GATE score in CS, EC, EE, IN, PH
Electronic Systems (EE5)	Bachelor's degree (B.E./B.Tech.) in Biomedical Engineering, Electrical Engineering, Electronics Engineering, Telecommunication Engineering, Instrumentation Engg, Engineering Physics, OR Master's degree (Master of Science) in Physics (with specialization in Electronics), Electronic Sciences	Valid GATE score in EC, EE, IN, PH
Energy Science and Engineering (EN)	Bachelor's degree in Mechanical, Electrical, Chemical, Energy Systems, Thermal Power, Automobile, Aerospace, Aeronautical, Metallurgical or Civil Engineering or equivalent	Valid GATE score in any discipline.
Mechanical Engineering **Thermal & Fluids Engg. (ME1)**	**ME 1 :** Bachelor's degree in Mechanical/ Aeronautical/ Aerospace/ Automobile Engineering or Chemical Engg.	Valid GATE score in any discipline.
Design Engg. (ME2)	**ME 2 :** Bachelor's degree in Aerospace/ Mechanical/ Production/ Automobile/ Machine tool Engineering	Valid GATE score in any discipline.
Manufacturing Engg. (ME3)	**ME 3 :** Bachelor's degree in Mechanical/ Production/ Machine Tool/ Industrial Engineering	Valid GATE score in any discipline.
Nuclear Engineering (ME4)	**ME4 :** Bachelor's degree in Mechanical Engineering or Chemical Engineering or Electrical Engineering	Valid GATE score in ME,CH, EE disciplines only.
Met. Engg. & Mat. Sc. **Materials Science (MM1)**	**MM1 :** Bachelor's degree in Ceramic/ Chemical/ Electrical/ Electronics/ Electrochemical/ Mechanical/ Metallurgical Engineering/Polymer/Engineering Physics or M.Sc. in Chemistry/ Materials Sciences/ Physics. AMIE/AMIIM are also eligible.	Valid GATE score in any discipline
Process Engineering (MM2)	**MM2 :** Bachelor's degree in Chemical/ Electrochemical/ Mechanical/ Metallurgical Engineering or M.Sc. in Chemistry (General or specialization in Physical or Inorganic Chemistry)/ Materials Science. AMIE/AMIIM are also eligible.	Valid GATE score in any discipline
Steel Technology (MM3)	**MM 3 :** Bachelor's degree in Chemical, Mechanical, Metallurgical Engg.	valid GATE score
Corrosion Sc. & Engg. (MM4)	**MM4 :** Bachelor's degree in Aeronautical/ Aerospace/ Chemical/ Civil/ Electrical/ Electrochemical/ Mechanical/ Metallurgical	Valid GATE score in any discipline.

	Engineering or Master's degree in Chemistry/ Material Science/ Ceramics/ Petrochemical. AMIE/AMIIM are also eligible.	
For all specializations, the applicants with M.Sc. qualifying degree, Maths as a subject at his / her B.Sc. degree level is an essential requirement. Industry- Sponsored Fellowship, Some industry-sponsored fellowship covering project related expenses are available to meritorious M.Tech. students.		
Cross-Departmental programme - Materials, Manufacturing and Modeling (MMM)	B.Tech./B.E. or equivalent in Chemical/Automobile/ Metallurgical / Mechanical / Production Engineering	valid GATE score or 2 years relevant professional experience. AMIE/ AMIIM are also eligible
Industrial Engg. & Operations Research (IO)	Bachelor's degree in any branch of Engineering	Valid GATE score in any discipline.
Systems & Control Engg. (SC)	Bachelor's degree in Aeronautical / Aerospace / Chemical / Electrical / Electronics / Instrumentation / Mechanical / Metallurgical Engineering. Candidate should have undergone a basic course in Control Theory.	Valid GATE score in any of these disciplines
Centre for Environmental Sc. & Engg (EV)	1. Bachelor of Engineering degree in Aeronautical/ Aerospace, Agricultural, Chemical, Civil, Energy, Biotechnology, Environmental, Mechanical, Metallurgical and Mining Engineering with valid GATE score in any of these disciplines are eligible for M.Tech admission. **OR** 2a.Master of Science degree in Atmospheric Science, Biochemistry, Biotechnology, Chemistry, Earth Sciences, Environmental Toxicology, Environmental Science, Meteorology, Microbiology and Physics . and 2b. For Science graduates, Mathematics is mandatory at Higher Secondary/ Intermediate level/ (10+2) level.	Valid GATE score in any of these disciplines
Centre of Studies in Resources Engineering *(Geoinformatics & Natural Resources Engg.) (GNR)*	Candidates with Bachelor degree in Engineering /Masters degree in Science with valid GAET score in any of the following papers are eligible for admission to this programme. The candidates with M.Sc. must have passed Mathematics as a subject at 10 + 2 level	Engineering & Science discipline : Agricultural Engg (AG), Architecture & Planning (AR) Civil Engg.(CE) Computer Science & Information Technology (CS) Electronics & Communication Engg. (EC) Electrical Engg.(EE) Environmental Engg (EV), Geology & Geophysics (GG), Mathematics(MA), Mining Engg.(MN), Physics (PH)
Centre for Technology Alternatives for Rural Areas (CTARA) - *(Technology & Development)(TD).*	BE/B.Tech/B.Arch in any branch of Engineering OR M.Sc. Degree in any discipline	Valid GATE score

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.

Please indicate the qualifying discipline in which you have pursued your degree programme by writing the appropriate code form the following table (for column No.10 of the application form).

Engineering/Technology	**CODE**
Agricultural Engg.	AG
Applied Mechanics	AM
Aerospace/Aeronautical Engg.	AE
Automobile Engg	AU
Architecture & Planning	AR
Biochemical Engg.	BI
Biomedical Engg.	BM
Biotechnical Engg.	BE
Biotechnology	BT
Ceramic and Glass Tech.	CG
Chemical Engg. /Chemical Tech.	CH
Civil Engg. /Civil & Environmental/Structural Engg.	CE
Computer Science & Engineering/ Information Technology	CS/IT
Energy Systems Engg./Energy Engg.	EN
Electrical Engg.	EE
Electronics Engg. /Telecommunication/Communication Engg.	EC
Electronic Sciences	EL
Electro-chemical	EH
Engineering Physics	EP
Environmental Engineering (EV)	EV
Food Technology	FT
Industrial Engineering	IE
Instrumentation Engg./Instrumentation Tech./Instrumentation	IN
Machine Tool Engg.	MC
Manufacturing Engg.	MF
Mechanical Engg.	ME
Metallurgical Engineering	MT
Mineral Engg.	MR
Mineral Dressing	MD
Material Sciences & Engineering	MS
Mining Engineering	MN
Naval Architecture/Marine Engg.	NA
Oil Technology	OL
Paint Technology	PT
Petroleum Engg.	PE
Petroleum Technology	PC

Metallurgical Engineering	MT
Planning	PN
Plastic Technology	PL
Polymer Technology	PO
Production Engineering /Production Engg. & Management	PR
Petrochemical	PM
Polymer Engineering	PP
Production & Industrial Engg.	PI
Rubber Technology	RT
Reliability Engineering	RE
Textile Engg. & Fibre Science	TF
Thermal Power Engg.	TP
All other disciplines in Engg./Tech.	**ZE**
Sciences	
Applied Physics	AP
Applied Geology	GA
Applied Geophysics	GP
Agriculture Science	AS
Atmospheric Science	AT
Biochemistry	BY
Bio-Sciences	BS
Biophysics	BP
Computer Applications	CA
Chemistry	CY
Ceramics (M.Sc. or equivalent)	CM
Industrial Chemistry	CI
Environmental Science	EM
Environmental Toxicology	ET
Ergonomics	ER
Electronic Science	EL
Earth Sciences	ES
Geology/Geophysics	GG
Geochemistry	GC
Applied Geophysics	GP
Life Sciences	LS
Life Sciences (Veterinary/Animal Sciences)	LV
Life Sciences (Botany)	LB
Life Science (Zoology)	LZ
Materials Science	MS
Mathematics /Applied Mathematics	MA
Microbiology	MB
Metereology	MO
Molecular Biology	MG
Operations Research	OR

Molecular Biology	MG
Physics	PH
Pharmaceutical Sc./Pharmacy	PY
Physiology	PS
Radio Physics	RP
Statistics	ST
Textile Chemistry	TC
All other disciplines in Science	**ZS**

A.9. DUAL DEGREE (M.TECH./M.PHIL. + Ph.D.) PROGRAMME

The Students who are admitted to M.Tech/M.Phil Programme at IIT Bombay can convert themselves to the Dual Degree (M.Tech/M.Phil+Ph.D) Programme after the first stage of evaluation of the Masters' dissertation – with the concurrence of the proposed Doctoral Supervisor and Postgraduate Committee (PGC) of the concerned academic unit. However, he/she has to clear the Qualifying Examination (QE) of the concerned Academic unit, if it is mandatory and complete the procedures pertaining to confirmation of Ph.D. Registration.

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./ M.Phil. 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

DEPARTMENTS

B.1) AEROSPACE ENGINEERING : AE

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

First class or 60% marks (55% marks for SC/ST) in *:
* as specified in the clause '8' in the "Important Guidelines for M.Tech. Application" of this brochure.

Bachelor's degree (B.E. / B.Tech. or equivalent) in Aeronautical or Aerospace Engineering and valid GATE score in any discipline are eligible for admission to any of the four specializations (AE1, AE2, AE3 & AE4) .

Candidates with degree in other branches of Engineering (i.e. Mechanical, Civil, Electrical, Electronics, Instrumentation or allied branches) are eligible for admission to specific specializations of Aerospace Engineering, if they have valid GATE score in disciplines as shown in the table below:

Specialization	Eligibility
Aerodynamics (AE1)	Bachelor's degree in Mechanical Engg./ Cvil Engg. with valid GATE score in ME/CE
Dynamics & Control (AE2)	Bachelor's degree in Mechanical Engg,/ Electrical / Electronics/Instrumentation Engg. with valid GATE score in ME / EE/EC /IN.
Aerospace Propulsion (AE3)	Bachelor's degree in Mechanical Engg. with valid GATE score in ME.
Aerospace Structure (AE4)	Bachelor's degree in Mechanical Engg./ Civil Engg. with valid GATE score in ME/CE.

Candidates having two years of relevant work experience are exempted from requirement of GATE score, provided their candidature is sponsored by the employer. Sponsored candidates wanting to take up specialisations must satisfy eligibility criterion in terms of qualifying degrees as specified above. However, they are not eligible for award of Teaching/Research Assistantship.

RESEARCH AREAS

I. Aerodynamics
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
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
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
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) BIOSCIENCES AND BIOENGINEERING *(Biomedical Engineering)* : BM

Introduction

The Biomedical Engineering Group (BME) 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 in BME at IIT Bombay 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, making it the only program in the country to offer M.Tech. admissions to such an unique mix of candidates. The creation of a heterogeneous class composition promotes interaction between students and faculty of different backgrounds and provides opportunities for research in exciting interdisciplinary areas.

Course work & Project

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 be taken during that period. 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. 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 after 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 departments other than BME. In special cases electives other than the institute elective may be taken from other departments in IIT after obtaining necessary permissions from the School Post Graduate Committee.

ELIGIBILITY FOR ADMISSION

First class or 60% marks (55% marks for SC/ST) in *:

* as specified in the clause '8' in the "Important Guidelines for M.Tech. Application" of this brochure.

i. B.Tech/B.E./AMIE or equivalent in Biomedical, Chemical, Computer Science, Electrical, Electronics, Instrumentation, Mechanical Engineering, Metallurgy and Materials Science, Telecommunications Engineering and Engineering Physics. OR
ii. M.Sc. or equivalent in Biochemistry, Biophysics, Biotechnology, Ceramics, Chemistry, Electronics, Ergonomics, Materials Science, Mathematics, Molecular Biology, Physics and Physiology; OR*
iii. MBBS OR *
iv. M. Pharm OR *
v. B.V.Sc., B.D.S., B.P.Th.B.O.Th. and B.Pharm degree (Duration 4 years or more) OR
vi. B.Tech. (Biotechnology) and Valid GATE score in any discipline for engineering and science graduates, or AIIMS / All India MCI/JIPMER/PGI Chandigarh/AFMC-Pune/DNB Part I national level medical

postgraduate entrance examinations or GATE Life Sciences examination for medical and biological sciences.

* Candidate with qualifications mentioned against (iii), (iv) & (v) must submit a certificate for their having First class or 60% marks (55% for SC/ST)* in qualifying degrees, failing which, they will not be eligible for admission to M.Tech in Biodmedical Engineering

All India level Pre-M.D.S/ M.V.Sc., M.Pharm. Selection examination for B.V.Sc., B.D.S and B.Pharm. Eligibility/ rank certificates of all such entrance examinations are required.

Written test and Interview
Prospective candidates called for the interview will be required to appear in a written test in the morning of the first day of the interview. The written examination, 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.

RESEARCH AREAS
Currently fundamental and applied research is being conducted in the broad areas of:
- 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 replacemens 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 of BME 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. (National Instruments, USFA) and GUI development software (LabWindows, LabView)

B.3) CHEMICAL ENGINEERING : CH

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.

Fields of Study
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

FIRST class or 60% marks (55% marks for SC/ST) in*:
* as specified in the clause '8' in the "Important Guidelines for M.Tech. Application" of this brochure.

Bachelors degree in Chemical Engineering or equivalent and with a valid GATE score in Chemical Engineering (CH) are eligible to the M.Tech. programme in Chemical Engineering.

RESEARCH AREAS

- **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

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

Areas of Specialization

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

1. Transportation Systems Engineering(CE1)
2. Geotechnical Engineering (CE2)
3. Water Resources Engineering (CE3)
4. Structural Engineering (CE4)
5. Remote Sensing (CE6)

Out of five specialisation choices (CE1,CE2,CE3,CE4 and CE6) in Civil Engg., 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 Department.

ELIGIBILITY FOR ADMISSION

FIRST class or 60% marks (55% marks for SC/ST) in *:

* as specified in the clause '8' in the "Important Guidelines for M.Tech. Programme" of this brochure.

Bachelor's degree in Civil Engineering or equivalent with valid GATE score **in CE only** are eligible to apply for any of the five specialisaions.

Areas of Research

Transportation Systems Engineering
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
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
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
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.

Remote Sensing
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

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
First class or 60% marks (55% marks for SC/ST) in*:
* as specified in the clause '8' in the "Important Guidelines for M.Tech. Application" of this brochure.

Bachelor's degree in Engineering/Master's degree in Science /MCA (with Physics and Mathematics at B.Sc. level) or equivalent degree with a valid GATE score in CS discipline. Valid GATE score in CS is required for all applicants (including Project Staff (PS) / Institute Staff (IS) and Sponsored candidates).

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 : ES

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.

ELIGIBILITY FOR ADMISSION

a. Geoexploration (GS)

First class or 60% marks (55% marks for SC/ST) in*:

* as specified in the clause '8' in the "Important Guidelines for M.Tech. Application" of this brochure.

Master's degree or equivalent in Geology / Applied Geology / Geophysics / Geochemistry with valid GATE score in Geology & Geophysics are eligible for admission.

b. Petroleum Geoscience (PG)

First class or 60% marks (55% marks for SC/ST) in*:

* as specified in the clause '8' in the "Important Guidelines for M.Tech. Application" of this brochure.

Master's degree or equivalent in Geology / Applied Geology / Geophysics / Applied Geophysics with valid GATE score in Geology & Geophysics are eligible for admission.

Specilalization : a. Geoexploration (GS)
b. Petroleum Geoscience (PG)

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.

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

B.7 ELECTRICAL ENGINEERING : EE

AREAS OF SPECIALIZATION

1. Communication Engineering EE1
2. Control and Computing EE2
3. Power Electronics and Power Systems EE3
4. Microelectronics EE4
5. Electronic Systems EE5

ELIGIBILITY FOR ADMISSION

I. For admission under TA/TAP/RA/PA/PS categories, where valid GATE score has been specified as essential, the EE-specialization-wise eligibility of GATE subjects is below: (Yes: Eligible, No: Not eligible)

	CS	**EC**	**EE**	**IN**	**PH**
EE1	Yes	Yes	Yes	No	No
EE2	Yes	Yes	Yes	Yes	No
EE3	No	Yes	Yes	Yes	No
EE4	Yes	Yes	Yes	Yes	Yes
EE5	No	Yes	Yes	Yes	Yes

II. 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 Department, given by an applicant.

III. The qualifying degrees for each specialization are as follows:

Specialisation	**Bachelors Degrees (B.E./B. Tech)**	**Masters Degrees (Master of Science)**
EE1	Computer Science and Engg., Electrical Engg., Electronics Engg., Telecommunications Engg., Engineering Physics	Physics (with specialization in Electronics), Electronic Sciences
EE2	Computer Science and Engg., Electrical Engg., Electronics Engg., Telecommunications Engg., Instrumentation Engg., Engineering Physics, Aeronautical/Aerospace Engineering	Physics, Mathematics
EE3	Computer Science and Engg., Electrical Engg., Electronics Engg., Telecommunications Engg., Instrumentation Engg.	None
EE4	Computer Science and Engg., Electrical Engg., Electronics Engg., Telecommunications Engg., Instrumentation Engg., Engineering Physics, Materials Science and Engg.	Physics, Electronic Sciences
EE5	Biomedical Engg., Electrical Engg., Electronics Engg., Telecommunications Engg., Instrumentation Engg., Engineering Physics	Physics (with specialization in Electronics), Electronic Sciences

CURRENT RESEARCH AREAS

Communication Engineering (EE 1)

- 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 (EE 2)

- 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 (EE 4)

- 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 (EE 5)

- Electronic Instrumentation

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

B.8) ENERGY SCIENCE AND ENGINEERING : EN

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 a 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. This also provides scope for engineering innovators/entrepreneurs. The DESE programme has two laboratories (Solar Energy and Energy Systems Laboratory) and a computational facility. In addition to this, DESE 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. DESE 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. This has ensured the relevance of the DESE research output.

The Department of Energy Science and Engineering 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.

ELIGIBILITY FOR ADMISSION

First class or 60% marks (55% marks for SC/ST) in*:

* as specified in the clause '8' in the "Important Guidelines for M.Tech. Application" of this brochure.

Bachelor's degree in Mechanical, Electrical, Chemical, Energy Systems, Thermal Power, Automobile, Aerospace, Aeronautical, Metallurgical or Civil Engineering or equivalent with valid GATE score in any discipline are eligible for admission.

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 - Industry Fellowship Forbes Marshall, Pune (₹ 9000 per month), MERC Fellowship (₹ 8000/ per month) and support candidates from the energy sector to carry out M.Tech. in Energy Systems Engineering. Few Atomic Energy Regulatory Board (AERB) fellowships will be sponsored for M.Tech. in Energy Systems Engineering with specialization in Nuclear Engineering. They will be offered a stipend of ₹ 20,000/- on successful completion of the M.Tech. These students will be absorbed by AERB as Scientific Officer(C). The students undergoing this programme will have to execute a bond to serve the AERB for a period of 3 years.

Most of the fellowships also include tuition fee waiver. Fellowship will be offered on the basis of separate interviews.

B.9) MECHANICAL ENGINEERING : ME

Areas of Specialization

1. Thermal and Fluids Engineering	ME 1
2. Design Engineering	ME 2
3. Manufacturing Engineering	ME 3
4. Nuclear Engineering	ME4

ELIGIBILITY FOR ADMISSION

The qualifications necessary for admission to the various specialization are as follows :

All applicants must have First class or 60% marks (55% marks for SC/ST)* in qualifying degrees in areas mentioned below:

* as specified in the clause '8' in the “Important Guidelines for M.Tech. Application” of this brochure.

1) **Thermal and Fluids Engineering(ME1):** Bachelor’s degree in Mechanical Engineering or Aeronautical/ Aerospace Engineering or Automobile Engg. or Chemical Engg. with valid GATE score in any discipline.
2) **Design Engineering(ME2):** Bachelor’s degree in Aerospace Engineering, Mechanical Engineering or Production Engineering or Automobile Engg. or Machine Tool Engineering with valid GATE score in any discipline.
3) **Manufacturing Engineering(ME3)**: Bachelor’s degree in Mechanical Engineering, Production Engineering or Machine Tool Engineering or Industrial Engineering with valid GATE score in any discipline.
4) **Nuclear Engineering (ME4):**Bachelor's degree in Mechanical Engineering or Chemical Engineering or Electrical Engineering with a valid GATE score in ME/CH/EE discipline only.

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.10) METALLURGICAL ENGINEERING AND MATERIALS SCIENCE: MM

M.Tech. in Metallurgical Engineering & Materials Science

Areas of Specialization

1. Materials Science MM1
2. Process Engineering MM2
3. Steel Technology MM3
4. Corrosion Science & Engg. MM4

ELIGIBILITY FOR ADMISSION

Materials Science: MM1

First class or 60% marks (55% marks for SC/ST) in*:

* as specified in the clause '8' in the “Important Guidelines for M.Tech. Application” of this brochure.

Bachelor’s Degree in Ceramic, Chemical, Electrical, Electronics, Electrochemical, Mechanical, Metallurgical Engineering, Polymer, Engineering Physics with valid GATE score or First class or 60% marks (55% marks for SC/ST) in M.Sc. degree in Chemistry, Materials science, Physics with valid GATE score in any discipline are eligible for admission. AMIE/AMIIM are also eligible.

Process Engineering: MM2

First class or 60% marks (55% marks for SC/ST) in*:

* as specified in the clause '8' in the “Important Guidelines for M.Tech. Application” of this brochure.

Bachelor’s degree in Chemical, Electrochemical, Mechanical, Metallurgical Engineering with valid GATE score OR First class or 60% marks (55% for SC/ST) in M.Sc. in Chemistry (General or Specialization in Physical or Inorganic Chemistry), Materials Science with valid GATE score in any discipline are eligible for admission. AMIE/AMIIM are also eligible.

Steel Technology: MM3 - (Industry sponsored) + 5 seats under Teaching Assistantship category

First class or 60% marks (55% marks for SC/ST) in*:

* as specified in the clause '8' in the "Important Guidelines for M.Tech. Application" of this brochure.

Bachelor's degree in Chemical, Mechanical, Metallurgical Engg. with valid GATE score are eligible for admission.

Eligibility criterion as mentioned for sponsored candidates in 5.8

Five seats in open category (Institute TA) with eligibility criterion as per 5.1.

Five seats have been available under Teaching Assistantship Category in Steel Technology Programme (MM3) for GN/OBC-NC/SC/ST categories.

Corrosion Science & Engineering: MM4

First class or 60% marks (55% marks for SC/ST) in*:

* as specified in the clause '8' in the "Important Guidelines for M.Tech. Application" of this brochure.

Bachelor's degree in Aeronautical / Aerospace, Chemical, Civil, Electrical, Electro Chemical, Mechanical, Metallurgical Engineering with valid GATE score OR First class or 60% marks (55% marks for SC/ST) in Master's degree in Chemistry/ Material Science/Ceramics/Petrochemical
with valid GATE score in any discipline. AMIE/AMIIM are also eligible.
For all specializations, the applicants with M.Sc. qualifying degree, Mathematics as a subject at his /her B.Sc. degree level is an essential requirement.

Industry Sponsored Fellowship, Some industry sponsored fellowship covering project related expenses are available to meritorious M.Tech. students.

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.11) CROSS-DEPARTMENTAL PROGRAMME MATERIALS, MANUFACTURING AND MODELING: MMM (Mechanical Engg, Met.Engg. & Mat. Sci. & Mathematics) - **(Industry Sponsored) + 5 seats under Teaching Assistantship category**

ELIGIBILITY FOR ADMISSION

First class or 60% marks (55% marks for SC/ST) in*:

* as specified in the clause '8' in the "Important Guidelines for M.Tech. Application" of this brochure.

B. Tech / B.E. or equivalent in Chemical/Automobile Metallurgical/Mechanical/ Production Engineering . The candidates must have either a valid GATE score or 2 years relevant professional experience. AMIE/AMIIM are also eligible.

Eligibility Criterion as mentioned for sponsored candidates in 5.8. Selection will be based on the performance in a written test and / or interview.

Five seats in open category (Institute TA) with eligibility criterion as per 5.1.

Five seats have been available under Teaching Assistantship Category in Materials, Manufacturing and Modeling (MMM) for GN/OBC-NC/SC/ST categories.

INTERDISCIPLINARY GROUPS

B.12) INDUSTRIAL ENGINEERING AND OPERATIONS RESEARCH : IO

ELIGIBILITY FOR ADMISSION :

First class or 60% marks (55% marks for SC/ST) in*:

* as specified in the clause '8' in the "Important Guidelines for M.Tech. Application" of this brochure.

Bachelor's degree in any branch of Engineering with valid GATE score in any discipline are eligible to apply.

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.13) SYSTEMS AND CONTROL ENGINEERING : SC

It 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

First class or 60% marks (55% marks for SC/ST) in*:

* as specified in the clause '8' in the “Important Guidelines for M.Tech. Application” of this brochure.

Bachelor’s Degree in Aeronautical / Aerospace / Chemical / Electrical / Electronics/ Instrumentation / Mechanical/ Metallurgical Engineering with a valid GATE score in one of these disciplines. **Candidate should have undergone a basic course in Control theory.**

AREAS OF RESEARCH

Modeling and simulation of various types of dynamic systems, Linear and Nonlinear controls, Variable structure systems and sliding mode control, Control of large size nuclear reactor, System identification, Adaptive and learning systems, Robust and optimal control, Statistical dynamic of system, Aircraft control systems, Process control systems, Robotics control systems, Fuzzy logic systems and Neural network based control systems, Reliable computing, Quantitative feedback theory, Geometric mechanics and control, Underactuated systems.

CENTRES:

B.14)CENTRE FOR ENVIRONMENTAL SCIENCE AND ENGINEERING(CESE)

Environmental Science and Engineering: EV

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.

ELIGIBILITY FOR ADMISSION

First class or 60% marks (55% marks for SC/ST) in*:

* as specified in the clause '8' in the "Important Guidelines for M.Tech. Application" of this brochure.

1. Bachelor of Engineering degree in Aeronautical/Aerospace, Agricultural, Chemical, Civil, Energy, Biotechnology, Environmental, Mechanical, Metallurgical and Mining Engineering with valid GATE score in any of these disciplines are eligible for M.Tech admission.

OR

2a. Master of Science degree in Atmospheric Science, Biochemistry, Biotechnology, Chemistry, Earth Sciences, Environmental Toxicology, Environmental Science, Meteorology, Microbiology and Physics with valid GATE score in any of these disciplines are eligible for M.Tech. admission.

and

2b. For Science graduates, Mathematics is mandatory at Higher Secondary/Intermediate level/(10+2) level.

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.15) CENTRE OF STUDIES IN RESOURCES ENGINEERING (CSRE)

Geoinformatics & Natural Resources Engineering : *GNR*

Centre of Studies in Resources Engineering at IIT Bombay 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.

ELIGIBILITY FOR ADMISSION

First class or 60% marks (55% marks for SC/ST) in*:

* as specified in the clause '8' in the "Important Guidelines for M.Tech. Application" of this brochure.

Bachelor degree in Engineering/ Masters degree in Science* with valid GATE score in any of the following papers are eligible for admission to this programme.

Engineering & Science discipline	
Agricultural Engg.	AG
Architecture & Planning	AR
Civil Engineering	CE
Computer Science & Information Technology	CS
Electronics & Communication Engg.	EC
Electrical Engineering	EE
Environmental Engineering	EV
Geology & Geophysics	GG
Mathematics	MA

Mining Engg. MN
Physics PH
* Candidates with M.Sc. must have passed Mathematics as a subject at 10+2 level.

Courses Available
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.

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.16) CENTRE FOR TECHNOLOGY ALTERNATIVES FOR RURAL AREAS (CTARA)

Technology and Development: TD

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.

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.

ELIGIBILITY FOR ADMISSION
First class or 60% marks (55% marks for SC/ST) in*:
* as specified in the clause '8' in the "Important Guidelines for M.Tech. Application" of this brochure.

1) BE / B.Tech./B.Arch in any branch of Engineering with valid GATE score
OR
2) M.Sc. degree in any discipline with valid GATE score.

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

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. Briefly describe 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 _____