Joint Admission Test for M.Sc. 2012

JAM 2012

Admission to M.Sc. (Two Year), Joint M.Sc.-Ph.D., Dual Degree and other post-bachelor degree programmes at the Indian Institutes of Technology (IITs)

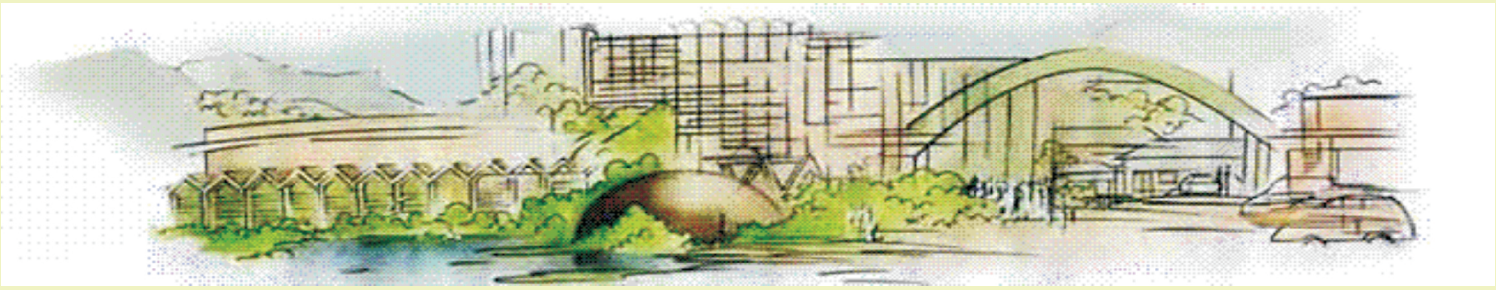
To be held on Sunday, 12 Feb. 2012

Information Brochure

Participating IITs

BOMBAY - DELHI - GUWAHATI - HYDERABAD

KANPUR - KHARAGPUR - MADRAS - ROORKEE



Organizing Institute

Indian Institute of Technology Bombay

MUMBAI 400 076

CONTENTS

JAM 2012

What's new?

JAM 2012 will be held on Sunday, 12 February, 2012. This is approximately 3 months earlier than the past years and has resulted in changes in application dates and other deadlines. Please read the brochure carefully.

1. INTRODUCTION

The Indian Institutes of Technology (IITs) are institutions of national importance established through an Act of Parliament. The IITs are well known, the world over, for quality education in engineering and science, and research in frontier areas. The aim of the IITs is to build a sound foundation of knowledge, pursue excellence and enhance creativity in an intellectually stimulating environment. The current pace of advancement of technology needs a coherent back-up of basic science education and research. So, the vibrant academic ambience and research infrastructure of the IITs motivate the students to pursue Research and Development careers in frontier areas of basic sciences as well as interdisciplinary areas of science and technology. Further, IITs have well equipped modern laboratories, efficient computer networks and state-of-the-art libraries. The teaching process is structured to promote close and continuous contact between the faculty and the students. A number of financial assistantships are available to SC/ST and other deserving and meritorious students at individual institutes.

From the Academic Session 2004-05, Indian Institutes of Technology have started conducting a **Joint Admission Test for M.Sc. (JAM)**. The objective of JAM is to provide admissions to various M.Sc., Joint M.Sc.-Ph.D., M.Sc.-Ph.D. Dual Degree and other post-bachelor's degree programmes at the IITs based on the performance in a single test and to consolidate Science as a career option for bright students from across the country. JAM is expected to be a benchmark for undergraduate level science education in the country.

The M.Sc., Joint M.Sc.-Ph.D, M.Sc.-Ph.D. Dual Degree and other post-bachelor degree programmes at the IITs offer high quality education in their respective disciplines, comparable to the best in the world. The curricula for these programmes are designed to provide the students with opportunities to develop academic talent leading to challenging and rewarding professional life. The curricula are regularly updated at each IIT. The interdisciplinary content of the curricula equips the students with the ability to utilize scientific knowledge for practical applications. The medium of instruction in all the programmes is English.

2. GENERAL INFORMATION

(i) The JAM 2012 is open to all nationals (Indian/Foreign). Candidates seeking admission to academic programmes covered under JAM 2012 need to appear in JAM 2012. There is no age restriction.

(ii) **Note that JAM 2012 will be held on 12 February 2012. The date for the JAM 2012 examination is earlier than previous years.**

(iii) For admission, foreign nationals are required to satisfy the rules and regulations of the admitting Institute(s) pertaining to foreign students. For further details, they are advised to contact the Admitting Institute(s) concerned.

(iv) To apply for admission to a desired programme, a candidate is required to qualify in the corresponding test paper and also satisfy the minimum educational qualifications and eligibility criteria of the respective academic programme.

(v) The candidates who have either appeared or are due to appear in the final examination of their qualifying degree in 2012 are also eligible to appear in the test. By qualifying in JAM 2012, candidates can apply for provisional admission subject to the condition that: (i) all parts of their final examination shall be completed by the date of registration of the Admitting Institute, and (ii) proof of having passed the qualifying degree with required eligibility, as specified by the admitting institute will be submitted by **30 September 2012**.

(vi) Admissions to various academic programmes at different institutes will be made on the basis of merit in JAM 2012. On the basis of performance in the test, for each test paper, separate merit lists will be prepared for General, OBC (non-creamy layer), SC, ST and Persons with Disability (PD) category candidates.

(vii) Request for the change of category, if any, with proper documentation, should reach the Organizing Institute by **13 December 2011.** Requests received after this date will not be accepted under any circumstances.

(viii) **Candidates should note that mere appearance in JAM 2012 or being in the merit list of any test paper neither guarantees nor provides any automatic entitlement to admission.** Qualified candidates will have to apply for admission as per the prescribed procedure. Admissions shall be made in order of merit and depending on the number of seats available at the Admitting Institute(s).

(ix) With regard to the interpretation of the provisions of any matter not covered in this Information Brochure, the decision of the Organizing Institute shall be final and binding on all the parties concerned.

3. ACADEMIC PROGRAMMES

The following are the full-time M.Sc., Joint M.Sc.-Ph.D., M.Sc.-Ph.D. Dual Degree and other post-bachelor's degree programmes at different IITs to which admissions shall be made on the basis of JAM 2012.

IIT Bombay (IITB): Two-year Master of Science (M.Sc.) programmes in (i) Applied Geology (ii) Applied Geophysics (iii) Applied Statistics and Informatics (iv) Biotechnology (v) Chemistry (vi) Mathematics and (vii) Physics.
Four-year Dual Degree Programme in M.Sc. (Physics)-M.Tech. (Materials Science) with specialization in Nano-Science and Technology).
M.Sc.-Ph.D. Dual Degree programmes in (i) Applied Geology (ii) Applied Geophysics (iii) Biotechnology (iv) Chemistry (v) Energy (vi) Environmental Science and Engineering (vii) Operations Research and (viii) Physics. Both the degrees will be awarded together after the successful completion of the programmes.

IIT Delhi (IITD): Two-year Master of Science (M.Sc.) programmes in (i) Chemistry (ii) Mathematics and (iii) Physics.

IIT Guwahati (IITG): Two-year Master of Science (M.Sc.) programmes in (i) Chemistry (ii) Mathematics and Computing and (iii) Physics.

IIT Hyderabad (IITH): Two-year Master of Science (M.Sc.) programmes in (i) Chemistry and (ii) Physics.

IIT Kanpur (IITK): Two-year Master of Science (M.Sc.) programmes in (i) Chemistry (ii) Mathematics (iii) Physics and (iv) Statistics.
M.Sc.-Ph.D. Dual Degree programme in Physics (Transfer from M.Sc.-Ph.D. Dual Degree programme to M.Sc. Physics programme is not permitted. However, for the students admitted to the M.Sc.-Ph.D. Dual Degree programme, the M.Sc. degree will be given after successful completion of all academic requirements of the first six semesters while working towards Ph.D. degree).

IIT Kharagpur (IITKgp): Joint M.Sc.-Ph.D. programmes in (i) Chemistry (ii) Geology (iii) Mathematics and (iv) Physics.

IIT Madras (IITM): Two-year Master of Science (M.Sc.) programmes in (i) Chemistry (ii) Mathematics and (iii) Physics.

IIT Roorkee (IITR): Two-year Master of Science (M.Sc.) programmes in (i) Applied Geology (ii) Applied Mathematics (iii) Biotechnology (iv) Chemistry (v) Industrial Mathematics and Informatics and (vi) Physics.
Three-year Master of Technology (M.Tech.) programmes (Lateral entry at 3rd Year level in the Integrated M.Tech. programmes) in (i) Geological Technology and (ii) Geophysical Technology.
Three-year Interdisciplinary Master of Computer Applications (MCA) programme.

The academic programmes, their durations and number of seats available in different institutes with programme codes are listed in Table 1.

4. MINIMUM EDUCATIONAL QUALIFICATIONS FOR ADMISSION / TEST PAPERS FOR ACADEMIC PROGRAMMES

Minimum educational qualifications for admissions, name of the test papers with their codes and the corresponding academic programmes for admission are given in Table 2. Admission to each academic programme shall be made on the basis of merit in the corresponding test paper(s) of JAM 2012.

5. ELIGIBILITY REQUIREMENTS FOR ADMISSION

The candidates who qualify in JAM 2012 shall have to fulfill the following eligibility criteria for admissions in IITs.

(i) At least **55% aggregate** marks (taking into account all subjects, including languages and subsidiaries, all years combined) for General/OBC category candidates and at least **50% aggregate** marks (taking into account all subjects, including languages and subsidiaries, all years combined) for SC, ST and PD category candidates in the qualifying degree.
For candidates with letter grades/CGPA (instead of percentage of marks), the equivalence in percentage of marks will be decided by the Admitting Institute(s).

(ii) Proof of having passed the qualifying degree with the minimum educational qualification as specified by the admitting institute should be submitted by **30 September 2012**.

At the time of admission, all admitted candidates will have to submit a physical fitness certificate from a registered medical practitioner in the prescribed form. At the time of registration, the admitted candidates may also have to undergo a physical fitness test by a medical board constituted by the Admitting Institute. In case a candidate is not found physically fit to pursue his/her chosen course of study, his/her admission is liable to be cancelled.

Note:

(a) It will entirely be the responsibility of the candidate to prove that he/she satisfies the minimum educational qualifications and eligibility requirements for admissions.

(b) The admitting institute has the right to cancel, at any stage, the admission of a candidate who is found to have been admitted to a course to which he/she is not entitled, being unqualified or ineligible in accordance with the rules and regulations in force.

6. PATTERN OF TEST PAPERS

The questions for Biotechnology and Computer Applications test papers will be fully objective type. These test papers have to be answered in an Objective Response Sheet (ORS) by darkening appropriate bubbles using black HB pencil. Since the ORS will be evaluated by electronic means, it is imperative that the instructions given on the ORS are carefully read and followed by the candidates.

All other test papers will be objective-cum-subjective type. There will be a "question-cum-answer booklet" for each of these six test papers. Answers to various questions are to be given at appropriate places in the "question-cum-answer booklet" itself. No supplementary sheet will be provided. In each of these six test papers, objective and subjective questions will carry weightages of 30% and 70%, respectively. The objective type questions in all the test papers will have four choices as possible answers, of which, only **one** will be correct. There will be **negative** marking for wrong answers to the **objective type questions** in **all the test papers.** For wrong answer to an objective type question, candidates will get **negative** 1/3 (**negative** one third) of the maximum marks assigned to that question.

Note:

(a) **Use of logarithmic tables/calculator of any kind/ cellular phone/electronic gadgets is NOT permitted in the examination hall.**

(b) All answers to the subjective type questions must be written in blue/ black/ blue-black ink only. Sketch pen, pencil or ink of any other colour is not permitted.

(c) The medium for all the test papers will be English only.

(d) Use of unfair means by a candidate in JAM 2012, whether detected at the time of test, evaluation or at any other stage, will lead to cancellation of his/her candidature as well as disqualification of the candidate from appearing in JAM in future.

(e) Disclosure of identity in any form, such as writing registration number or name inside the question-cum-answer booklet, or making any kind of distinguishing marks, may lead to disqualification of the candidate.

Table 1: Academic programmes available at different institutes for JAM 2012 qualified candidates[+]

IIT Bombay

M.Sc. (4 semesters)	Applied Geology	Applied Geophysics	Applied Statistics and Informatics	Biotechnology	Chemistry	Mathematics	Physics
[Programme code] Seats Available	[101] 15+8+5+2 OBC(1)	[102] 8+4+3+1 SC(1)	[103] 19+10+5+3	[104] 14+8+4+2 SC(1)	[105] 20+11+5+3	[106] 15+8+5+2	[107] 17+8+5+2 OBC(1)

M.Sc. - Ph.D dual degree	Applied Geology	Applied Geophysics	Biotechnology	Chemistry	Energy	Environmental Science & Engineering	Operations Research	Physics
[Programme code] Seats Available	[108] 2+1+1+0 SC (1)	[109] 2+1+1+0 ST (1)	[110] 4+2+1+1	[111] 8+4+2+1 OBC (1)	[112] 9+5+3+1 ST(1)	[113] 5+3+1+1 GE (1)	[114] 6+3+2+1	[115] 4+2+1+1

M.Sc.-M.Tech Programme (8 semesters)	M.Sc.(Physics)-M.Tech (Materials Sciences with specialization in Nano-Science & Tech.)
[Programme code] Seats Available	[116] 4+2+1+1

IIT Delhi

M.Sc. (4 semesters)	Chemistry	Mathematics	Physics
[Programme code] Seats Available	[201] 27+15+8+4 GE(1),OBC (1)	[202] 27+15+8+4 GE(1),SC(1)	[203] 27+15+8+4 GE(1)

IIT Guwahati

M.Sc. (4 semesters)	Chemistry	Mathematics & Computing	Physics
[Programme code] Seats Available	[301] 24+13+7+4 GE(2)	[302] 24+13+7+4 GE(1)	[303] 24+13+7+4 GE(1)

IIT Hyderabad*

M.Sc. (4 semesters)	Chemistry	Physics
[Programme code] Seats Available	[801] 10+5+3+2	[802] 5+3+1+1

IIT Kanpur*

M.Sc. (4 semesters)	Chemistry	Mathematics	Physics	Statistics
[Programme code] Seats Available	[401] 21+11+6+3	[402] 20+11+6+3	[403] 15+8+5+2	[404] 20+11+6+3

M.Sc.- Ph.D dual degree	Physics
[Programme code] Seats Available	[405] 7+4+2+1

IIT Kharagpur

Joint M.Sc.- Ph.D (4 semesters)	Chemistry	Geology	Mathematics	Physics
[Programme code] Seats Available	[501] 23+12+7+4 GE (1)	[502] 15+8+5+2 GE (1)	[504] 15+8+5+2 OBC (1)	[505] 23+12+7+4 SC(1)

IIT Madras

M.Sc. (4 semesters)	Chemistry	Mathematics	Physics
[Programme code] Seats Available	[601] 27+15+8+4 GE(1) ST(1)	[602] 27+15+8+4 ST(1)	[603] 22+12+7+3 GE(1) ST(1)

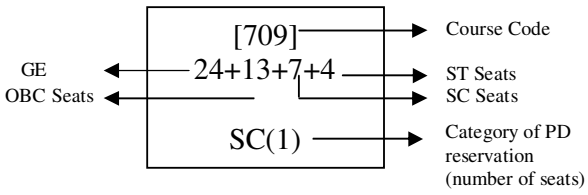
IIT Roorkee

M.Sc. (4 semesters)	Applied Geology	Applied Mathematics	Biotechnology	Chemistry	Industrial Mathematics and Informatics	Physics
[Programme code] Seats Available	[701] 8+4+2+1	[702] 8+4+2+1	[703] 18+10+6+3 SC(1)	[704] 13+6+4+2 SC(1)	[705] 8+4+2+1 SC(1)	[706] 13+6+4+2 SC(1)

M.Tech. (6 Semesters)	Geological Technology**	Geophysical Technology**
[Programme code] Seats Available	[707] 6+3+2+1 SC(1)	[708] 6+3+2+1

M.C.A. (6 Semesters)	Master of Computer Applications
[Programme code] Seats Available	[709] 24+13+7+4 SC(1)

Explanation of cells in Table 1



+ The number of seats is subject to change.
* The number of PD seats at IITK and IITH will be announced later on the JAM website.
** Lateral entry at 3rd Year level in the Integrated M.Tech. programmes

Table 2: Test papers with codes, corresponding academic programmes and minimum educational qualifications for admission

Test Paper/ Test paper Code	Academic Programme(s)	Institute(s)	Minimum Educational Qualification(s) for admission
Biotechnology (BT)	M.Sc. Biotechnology	IITB, IITR	Bachelor's degree in any branch of Science/ Agriculture / Pharmacy / Veterinary / Engineering / Medicine (MBBS). NOTE: For IITB only, M.Sc. Biotechnology and M.Sc.- Ph.D. Dual Degree in Biotechnology, the candidate should have passed Mathematics at the (10+2) level.
	M.Sc.- Ph.D. Dual Degree in Biotechnology	IITB	
	M.Sc.- Ph.D. Dual Degree in Environmental Science & Engineering	IITB	Bachelor's degree with any one of Biology, Biotechnology, Chemistry, Mathematics and Physics for two years/four semesters, and any one of the other four subjects for at least one year/two semesters. The candidate should have passed Mathematics at (10 + 2) level.
Chemistry (CY)	M.Sc. Chemistry	IITB, IITD, IITG, IITH, IITK, IITM, IITR	Bachelor's degree with Chemistry as a subject for three years/six semesters and Mathematics at (10+2) level.
	Joint M.Sc.- Ph.D. Programme in Chemistry	IITKgp	
	M.Sc.- Ph.D. Dual Degree Programme in Chemistry	IITB	
	M.Sc.- Ph.D. Dual Degree Programme in Energy	IITB	Bachelor's degree with any one of Chemistry, Mathematics and Physics for two years/four semesters and any one of the remaining two subjects for at least one year/ two semesters.
	M.Sc.- Ph.D. Dual Degree in Environmental Science & Engineering	IITB	Bachelor's degree with any one of Biology, Biotechnology, Chemistry, Mathematics and Physics for two years/four semesters, and any one of the other four subjects for at least one year/two semesters. The candidate should have passed Mathematics at (10 + 2) level.
Computer Applications (CA)	Master of Computer Applications	IITR	Bachelor's degree with Mathematics as a subject for at least one year for annual system candidates/ at least two papers of Mathematics for semester system candidates.
Geology (GG)	M.Sc. Applied Geology	IITB, IITR	Bachelor's degree with Geology as a subject for three years/six semesters and any two subjects among Mathematics, Physics, Chemistry, and Biological science. The candidate must have Mathematics at (10+2) level.
	Joint M.Sc.- Ph.D. Programme in Geology	IITKgp	
	M.Tech. in Geological Technology	IITR	
	M.Sc.- Ph.D. Dual Degree Programme in Applied Geology	IITB	
Geophysics (GP)	M.Sc. Applied Geophysics	IITB	Bachelor's degree with both Mathematics and Physics as subjects for two years and at least one of them as a subject for three years.
	M.Sc.- Ph.D. Dual Degree Programme in Applied Geophysics	IITB	
	M.Tech. in Geophysical Technology	IITR	Bachelor's degree with Mathematics and Physics as subjects and anyone of the following subjects: Chemistry, Geology, Statistics, Electronics and Computer Science.

Test Paper/ Test paper Code	Academic Programme(s)	Institute(s)	Minimum Educational Qualification(s) for admission
Mathematics (MA)	M.Sc. Mathematics	IITB, IITD, IITK, IITM	Bachelor's degree with Mathematics as a subject for at least two years/four semesters.
	M.Sc. Mathematics & Computing	IITG	
	M.Sc. Applied Mathematics	IITR	
	M.Sc. Industrial Mathematics and Informatics	IITR	
	Joint M.Sc.- Ph.D. Programme in Mathematics	IITKgp	Bachelor's degree with Mathematics / Statistics as a subject for at least two years/four semesters.
	M.Sc.- Ph.D. Dual Degree in Operations Research	IITB	
	M.Sc.- Ph.D. Dual Degree in Environmental Science & Engineering	IITB	Bachelor's degree with any one of Biology, Biotechnology, Chemistry, Mathematics and Physics for two years/four semesters, and any one of the other four subjects for at least one year/two semesters. The candidate should have passed Mathematics at (10 + 2) level.
	M.Sc.- Ph.D. Dual Degree Programme in Energy	IITB	Bachelor's degree with any one of Chemistry, Mathematics and Physics for two years/four semesters and any one of the remaining two subjects for at least one year/ two semesters.
Mathematical Statistics (MS)	M.Sc. Applied Statistics and Informatics	IITB	Bachelor's degree with either Mathematics or Statistics as a subject for at least two years or four semesters.
	M.Sc.- Ph.D. Dual Degree in Operations Research	IIT B	
	M.Sc. Statistics	IITK	
Physics (PH)	M.Sc. Physics	IITB, IITD, IITG, IITH, IITK, IITM, IITR	Bachelor's degree with Physics as a subject for at least two years/four semesters and Mathematics for at least one year/two semesters.
	Joint M.Sc.- Ph.D. Programme in Physics	IITKgp	
	M.Sc.- Ph.D. Dual Degree Programme in Physics	IITB, IITK	
	M.Sc.(Physics) - M.Tech (Materials Sciences with specialization in Nano-Science & Tech.)	IITB	
	M.Sc.- Ph.D. Dual Degree Programme in Energy	IITB	Bachelor's degree with any one of Chemistry, Mathematics and Physics for two years/four semesters and any one of the remaining two subjects for at least one year/ two semesters.
	M.Sc.- Ph.D. Dual Degree in Environmental Science & Engineering	IITB	Bachelor's degree with any one of Biology, Biotechnology, Chemistry, Mathematics and Physics for two years/four semesters, and any one of the other four subjects for at least one year/two semesters. The candidate should have passed Mathematics at (10 + 2) level.

7. TEST SCHEDULE

The JAM 2012 exam will be held on 12 February, 2012 (Sunday) in two sessions. The schedule for different test papers of JAM 2012 is given in Table 3.

Table 3: Test schedule for JAM 2012

Date	Session	Time	Test Paper Codes
12 February 2012, (Sunday)	I	9:00 a.m.-12:00 noon	CA/CY/ GG/MS/PH
	II	2:00 p.m.- 5:00 p.m.	BT/GP/MA

The test schedule will not be changed under any circumstances.

7.1. Number of test papers allowed: A candidate can appear in either one or two test papers, subject to the restrictions imposed by the Test schedule (Table 3) and on payment of requisite additional fees for the second test paper, if applicable. Candidates desiring to appear in two test papers must ensure, from the Test schedule (Table 3), that there is no clash of time schedule for the chosen test papers.

8. CHOICE OF EXAMINATION CENTRES

The location of test centres for JAM 2012 are listed in **Appendix-I**. Candidates have to indicate the codes of two cities where they are willing to appear in JAM 2012. If enough candidates are not available at a listed city/town, then the city/town may be dropped from the list, and candidates will either be allotted a centre in the city of their second choice or in a city near the city of first choice. A centre once allotted will not normally be changed.

A request for change of a centre within the same city/town will **not** be permitted. In exceptional circumstances, a change of centre to another city/town may be permitted if a request with a valid reason for the same is received in the office of the Organizing Chairman, JAM 2012, IIT Bombay, on or before **13 December 2011** along with a Demand Draft of Rs. 250 (Rs. 125 for SC/ST and PD candidates) drawn in favour of **"Chairman, JAM, IIT Bombay",** on any Nationalized Bank, payable at Mumbai. The decision of the Organizing Chairman, JAM 2012, in this regard will be final.

9. RESERVED SEATS

In every programme, a certain number of seats are reserved for candidates belonging to various reserved categories. The number of seats reserved under various categories is given in **Table 1**. The category rank in a JAM paper will be prepared based on the category declaration by the candidate in his/her application form. The final seat allotment will be done based on a valid category certificate (in the prescribed format) submitted along with the application form for admission.

A candidate who seeks admission under SC/ST category must submit, along with the application form for admission, the requisite certificate issued by a competent authority as specified in **Appendix-II**, failing which his/her candidature for admission will not be considered under the reserved category.

A candidate who seeks admission under the OBC category must submit an OBC certificate in the format shown in **Appendix-III** alongwith the application form for admission. **The candidate will be considered in the General Category in case of non-compliance of OBC non-creamy layer certificate with the prescribed format and no opportunity will be given to the candidate for late submission under any circumstances.**

For PD candidates with any category of disability (viz., blindness or low vision, hearing impairment, locomotor disability or cerebral palsy), benefit will be given to only those who have at least 40% permanent physical impairment in relation to a body part/system/extremity/ whole body, etc. Such candidates must submit, along with the Application Form, the certificate of disability from a Government Medical Board and should be fit to pursue the programme. The percentage of disability of candidates selected for admission under PD category will also be required to be certified by a Medical Board, duly constituted by the Admitting Institute.

Note:

(a) The provisions for the reserved seats given above are subject to modification in accordance with any Government order, if issued subsequently by the Government of India.

(b) It will entirely be the responsibility of a candidate to prove his/her eligibility for admission in terms of minimum educational qualifications, etc., and for claiming reservation under a specific category.

10. APPLICATION PROCEDURE FOR JAM 2012

Candidates may apply for JAM 2012 through an "offline" procedure or an "online" procedure. The application fees for different categories are given in Table 4.

10.1 Offline Procedure: The "OMR (Optical Mark Recognition) Application Form" along with the "Information Brochure" will be available from **22 September 2011** to **22 October 2011** on **cash payment** of application fee of Rs. 1000 for General/OBC category male candidates, Rs. 900 for General/OBC category female candidates and Rs. 500 for SC/ST and PD candidates from the following designated branches of **Canara Bank:**

Agra (Cantonment)**, Ahmedabad** (Revdi Bazar)**, Aligarh** (Apsara Complex)**, Allahabad** (Civil Lines)**, Amritsar** (Dharam Singh Market)**, Bareilly** (Civil Lines)**, Bengaluru** (Town Hall)**, Bhopal** (Maharana Pratap Nagar)**, Bhubaneswar** (Bapuji Nagar)**, Chandigarh** (Sector 17 C)**, Chennai** (IIT Campus and T. Nagar)**, Coimbatore** (Oppannakara Street)**, Delhi** (IIT Campus, Janpath, Maharani Bagh and Vivek Vihar)**, Dhanbad (**New Market Bank More), **Durgapur** (RH Benachitty)**, Ernakulam** (Nettipadam Road)**, Faridabad** (New Industrial Town)**, Goa** (F. L. Gomes Road, Vasco), **Gorakhpur** (Bank Road)**, Gurgaon** (Alwar Road)**, Guwahati** (Fancy Bazar), **Haldwani** (Bareilly Road)**, Hubli** (Billappanavar Nagar)**, Hyderabad** (Abid Road)**, Indore** (MG Road)**, Jabalpur** (M.K. Chowk)**, Jaipur** (Ajmeri Gate)**, Jammu** (Shalimar Road)**, Jamshedpur** (Loyola School, Bistupur)**, Jhansi** (Civil Lines)**, Jodhpur** (12th Chopasani Road)**, Jorhat** (Garali)**, Kadapa** (Chinna Chowk)**, Kakinada** (Jawahar Street), **Kanpur** (Mall Road), **Kharagpur** (Fatak Bazar, Kharida), **Kochi** (Mattanchery)**, Kolkata** (College Street and Gariahat), **Kurukshetra** (Railway Road), **Lucknow** (Hazratganj), **Madurai** (Eastmasi Street), **Mangalore** (Balmatta Road), **Meerut** (Abu Lane), **Mumbai** (IIT Campus and Fort), **Muzzafarpur** (Motijheel), **Nagpur**

(Sitabuldi), **Nanded** (Tara Singh Market), **Nellore** (Jonnagaddavari Street), **Noida** (Sector VI, Noida Complex), **Patna** (Exhibition Road), **Pune** (Camp), **Raipur** (Malviya Road), **Ranchi** (SN Ganguli Road), **Roorkee** (Anaj Mandi), **Rourkela** (Uditnagar), **Secunderabad** (MG Road), **Shillong** (Gulasta Fancy Market), **Shimla** (The Mall), **Silchar** (Rangerkhiri), **Siliguri** (Sevoke Road), **Thiruvananthapuram** (MG Road, Spencer Junction), **Tiruchirapalli** (Teppakulam), **Vadodara** (Manick Rao Road), **Varanasi** (Bansphatak), **Vijayawada** (Sivalayam Street), **Visakhapatnam** (Daba Garden).

The "OMR Application Form" and the "Information Brochure" can also be obtained by **Post** from the **JAM Office, IIT Bombay** by making a written request along with a Demand Draft of Rs.1000/- for General/OBC category male candidates, Rs. 900/- for General/OBC category female candidates and Rs. 500/- for SC/ST and PD candidates, drawn in favour of "**Chairman, JAM, IIT Bombay",** on any Nationalized Bank, payable at Mumbai and a self-addressed slip (11.0 cm x 6.0 cm). Such requests must reach the JAM office, IIT Bombay, latest by **18 October, 2011**. The application material shall be dispatched by registered post/speed post. JAM Office, IIT Bombay, however, does not take any responsibility for the late delivery of application material, due to postal delay or loss of documents in transit. Once an Application Form has been purchased either from the Bank or by post from the JAM Office, IIT Bombay, any claim for refund of the fees, for any reason whatsoever, will not be entertained nor can this fee be held in reserve for the future.

The OMR Application Form enclosed in the envelope provided with the Information Brochure is to be completed by the candidate in all respects. After reading the instructions given in **Section 12,** carefully fill in all the items of the form. **Fold the form only where it was originally folded**. Also write the code(s) of the test paper(s) applied, and the first choice of city /town of test on the top - left portion of the envelope.

Candidates desiring to appear for a second test paper must clearly mention their option in the OMR Application Form. Such candidates are required to pay **an additional fee** of Rs. 300/- (Rs. 150/- for SC/ST and PD candidates) through a demand draft in favour of "**Chairman, JAM, IIT Bombay**", on any Nationalized Bank, payable at Mumbai. This demand draft is to be sent along with the OMR Application Form.

10.2. Online Procedure: The facility for Online Registration will be available through the website http://www.iitb.ac.in/jam from **22 September 2011**. The last date for submission of Online Application Forms on website is **25 October, 2011 at 18:00 hours**. A candidate can fill in electronically his/her personal data and the appropriate application fee can be paid by a Demand Draft drawn in favour of **"Chairman, JAM, IIT Bombay",** on any **Nationalized Bank,** payable at Mumbai.

After electronically filling his/her personal data and information pertaining to the Demand Draft in the Online Application Form on the website, the candidate can download this form and take a print out of the same. The photograph, declaration and signature will have to be provided by the candidate on the printed Online Registration Form. The photograph should be glued at the appropriate place provided in the form and must not be stapled and not be signed/attested. The candidate is advised to keep a photocopy of the completed Online Registration Form for his/her record.

10.3. List of enclosures and address for sending the completed OMR Application Form/Online Registration Form:

The following documents should be enclosed along with the completed OMR Application Form: (i) Bank/JAM Office Pay-in-slip, (ii) Demand Draft for the second test paper, if applicable, (iii) SC/ST Certificate (copy), if applicable, and (iv) Disability Certificate (copy), if applicable.

The following documents should be enclosed along with the completed Online Registration Form: (i) Demand Draft for the application fee, (ii) SC/ST Certificate (copy), if applicable, and (iii) Disability Certificate (copy), if applicable.

Irrespective of the choice of the test centres, the candidate must send the duly filled in OMR Application Form or completed Online Registration Form, as the case may be, along with all necessary enclosures indicated above, to the following address:

Organizing Chairman, JAM 2012
Indian Institute of Technology Bombay
Powai, Mumbai – 400 076

The candidates are advised to send their completed Application Forms/Online Registration Forms by **Speed Post/Registered Post only** and retain the receipt of posting. The completed OMR Application Form/Online Registration Form can also be submitted in person at the JAM office, IIT Bombay, during office hours on working days.

10.4. Last Date for Receipt of the Completed OMR Application Form/Online Registration Form:

The last date for receipt of the duly completed OMR Application Form/Online Registration Form at the JAM Office, IIT Bombay, is **1 November 2011**. Any OMR Application Form/Online Registration Form received after this date will not be accepted. Any delay in receiving the application material by the candidate will not be considered as a valid reason for the late submission of the completed OMR Application Form after the deadline. The organizing institute is not responsible for any postal delay or irregularity or loss in postal transit.

Table 4: Application fees

Category	Fee for application form from banks / IITB JAM office	Fee for online registration	Application fee for 2nd test paper
General/ OBC Male Female	 Rs 1000 Rs 900	 Rs 900 Rs 800	 Rs 300 Rs 300
SC/ST/PD	Rs 500	Rs 400	Rs 150

11. ADMIT CARD

An Admit Card, bearing the candidate's name, registration number, photograph, signature, category as declared by the candidate, disability status and name(s) and code(s) of the test paper(s) applied along with the name and address of the test centre allotted, will be sent by speed/registered post to the mailing address given by the candidate in his/her OMR Application Form/Online Registration Form. The candidate should carefully examine the Admit Card received by him/her for all the entries made therein. In case of any discrepancy, the candidate should inform the Organizing

Chairman, JAM 2012, IIT Bombay immediately. Admit cards will also be available online through the website http://www.iitb.ac.in/jam.

If the Admit Card is not received by **15 January 2012**, and if the candidate is not able to download the online admit card, then the Chairman JAM of the IIT Zone (**see Appendix-I**), under which the first choice test centre of the candidate falls, may be contacted through Phone/Fax/E-mail, giving the Application Form Number/Online Registration Number, name, mailing address and city code of the desired test centre (first choice) to get information about registration number and name of the test centre allotted. Those candidates who have not received their Admit Card, due to postal delay or any other reason, will be issued a Duplicate Admit Card by the Presiding Officer of their respective Test centres, on the morning of the date of examination, **12 February, 2012** (before 8.00 a.m.), on production of a photograph identical to that pasted on the Application/ Online Registration Form and the Identity Card from the institution last attended (bring original Identity Card and its photocopy).

No candidate will be permitted to appear in JAM 2012 test without a valid Admit Card. The Admit Card should be presented to the invigilators/JAM officials for verification.

The Admit Card of JAM 2012 must be carefully preserved by the candidate and produced at the time of admission/registration, if required by the Admitting Institute.

The Organizing Institute will not be responsible for any postal delay or irregularity resulting in non/late delivery of the Admit Card. A plea that the candidate failed to appear in JAM 2012 due to non-receipt of the Admit Card will not be accepted as a reason for the refund of application fee or any other redressal.

The Organizing Institute may withdraw the permission granted to a candidate to appear in JAM 2012, if it is found that he/she is not eligible to appear in the Test even though an Admit Card has been issued and is produced by the candidate before the Presiding Officer of the test centre.

12. INSTRUCTIONS FOR FILLING THE OMR APPLICATION FORM

Read the following instructions carefully and follow the SAMPLE filled-in OMR Application Form on Page Nos. 13 and 14.

(i) Note down the OMR Application Form number and keep a photocopy of the completely filled-in form as a personal record for future reference.

(ii) The OMR Application Form will be processed by a machine, which picks up only black HB pencil marks. The signature and address will be scanned by a machine that reads only dark black images and only from the specified areas of the form. Ensure that the required information in Item numbers 15, 16, 17 and 24 of the OMR Application Form are written using **black ink ball-point pen and only inside the boxes, wherever applicable**. The colour photograph must be of good quality and taken not more than two months earlier.

(iii) Fill the form in English only. First, write in capital letters the required information in the boxes above the bubbles (wherever provided), and then darken the appropriate bubble underneath each letter. **Darken the bubbles by using black HB pencil only.**

(iv) Options filled in this form cannot be changed at a later stage.

(v) The name and date of birth should be exactly the same as recorded in the High School (10^{th} Class) Certificate. Any departure, whenever discovered, may lead to cancellation of candidature.

(vi) If any change of name has been accepted by the government, a copy of the gazette notification has to be attached.

(vii) The application must be complete in all respects. Incomplete Application Forms will be summarily rejected.

You may now proceed to fill the OMR Application Form for the Item numbers as given below:

Item 1: Name of the Candidate

Fill in the name in CAPITAL letters using black ink ball-point pen, as recorded in High School (10^{th} Class) Certificate. Write a single letter in each box. Do not leave any blank box within any part of the name. Leave only one blank box between any two parts of the name. If the name has several initials, leave one blank after each of them. Darken the appropriate bubble under each letter of the name using black HB pencil. *Any change in name/surname at any stage has to be duly supported by a proper affidavit.*

Item 2: Nationality

Darken the appropriate bubble corresponding to INDIAN or FOREIGNER.

Item 3: Gender

Darken the appropriate bubble for MALE or FEMALE.

Item 4: Category

Darken the appropriate bubble: SC for Schedule Caste, ST for Schedule Tribe, OBC (non creamy layer) for Other Backward Class (non-creamy layer) and GEN for General Category (all others).

Item 5: Date of Birth

Fill in your date of birth as given in your High School (Class 10^{th}) certificate in the space provided and darken the appropriate bubbles.

Example: if the date of birth is 17 September 1989, fill in

D	D	M	M	Y	Y
1	7	0	9	8	9

Item 6: Person with Disability (PD)

Darken the appropriate bubble, YES or NO

PD candidates claiming concession for buying the Application Form must attach a duly attested copy of Disability Certificate issued by an appropriate medical authority.

If any PD candidate requires the services of a scribe, darken the bubble YES. Otherwise, darken the bubble NO. Requests for scribe received at a later date may not be considered. The role of the scribe will be to read the question paper for the candidate and darken the bubbles/write the answer as per the instructions of the candidate.

Item 7: Number of the Test Paper(s) Applied for

The total number of Test Paper(s) (1 or 2) the candidate wishes to appear must be entered in the box provided and the appropriate bubble must be darkened.

Item 8: Choice of test paper(s)

Depending on the number of test papers mentioned in Item 7, darken one or two bubble(s) shown against the choice(s) of test paper(s). If only one test paper scheduled in Session I (or Session II) is chosen, then all the bubbles shown against Session II (or Session I) must be left blank. If two test papers are chosen, it must be ensured that they are not scheduled in the same session and that one bubble shown against each session is darkened.

Item 9: Choice of cities/towns for the test

A candidate must choose any two cities/towns for the test from the list of cities/towns of JAM 2012 centres given in **Appendix–I**. Write the codes (see Appendix-I) of FIRST Choice and SECOND Choice for the test city/town in the corresponding boxes and darken the appropriate bubbles.

Item 10: Name of the Qualifying Degree

Darken the bubble shown against the qualifying degree. If the qualifying degree is other than B.Sc., B.A., and B.E. / B.Tech., darken the bubble shown against OTHERS.

Item 11: Qualifying Examination Passed

If the candidate has already passed the final examination of the qualifying degree, darken the bubble shown against YES. If the candidate is going to appear or has already appeared in (and is awaiting results of) the final examination, darken the bubble shown against NO.

Item 12: Year of Qualifying Examination

Write the year of passing/appearing at the qualifying examination in the boxes provided and darken the appropriate bubbles.

Item 13: Percentage of Aggregate Marks/CGPA

In the first column, darken the bubble corresponding to the grading scheme followed at your institution. In the boxes provided in the second column, write the percentage of aggregate marks/CGPA (calculated **out of 10** considering all subjects, including languages and subsidiaries, all years combined) up to two decimal places, obtained in the qualifying examination or up to pre-final year/semester, if appearing in the qualifying examination in 2012, as the case may be. Darken the bubbles accordingly.

Item 14: Photograph

Paste (do not staple) a 3.0 cm x 4.0 cm recent good quality colour photograph. The photograph must not be larger than the space (box) provided for pasting it. Retain some spare copies of this photograph for future need. The photograph should neither be signed nor attested.

Item 15: Name and complete postal address

Write the name, complete postal address (in CAPITAL letters using black ink ball-point pen) where your Admit Card or any other communication is to be sent and e-mail address, if any.

Item 16: Full signature of the candidate

Sign using black ink ball-point pen within the box provided. The signature must not overflow or touch the border of the box provided. The signature must be in running hand. The signature here and the one below the declaration (Item 24) should be identical. Application Forms without signatures or with different signatures at the two places will be treated as incomplete and rejected.

Item 17: E-mail address (if any)
Write your e-mail address in the box

Item 18: Name of the parent/guardian

The name of parent or guardian must be written in CAPITAL letters. Write a single letter in a box. Darken the appropriate bubble under each letter of the name. Follow the instructions as given in Item 1.

Item 19: Relationship of parent/guardian to the candidate

Darken the bubble against the relationship of parent/ guardian, whose name is given in Item 18, to the candidate.

Item 20: Details of the Demand Draft enclosed (if applicable)

Write, in the boxes under Demand Draft Number, the Demand Draft number for additional fee (if applicable) to be enclosed with the Application Form and darken the bubbles below the boxes accordingly. Also write the day, month and year of the date of issue of the Demand Draft in the boxes under DD, MM and YY and darken the bubbles accordingly.

Item 21: Amount of Additional Fee paid (if applicable)

Darken the appropriate bubble shown against the amount of additional fee paid for appearing in the second test paper according to the provisions in Sections 7.1 and 10.1.

Item 22: Landline Phone Number with STD Code

Write, in the boxes, STD Code and landline telephone Number on which you may be contacted. Accordingly, darken the appropriate bubbles.

Item 23: Mobile Number

Write, in the boxes, the Mobile Number on which you may be contacted. Accordingly, darken the appropriate bubbles.

Item 24: Declaration by the Candidate

The declaration is to be signed by the candidate using black ink ball-point pen. Read the declaration carefully before signing it. The place and date should be written at the places marked for this purpose. Unsigned OMR Application Forms will not be considered. The signature must be in running hand and identical to the signature in item 16

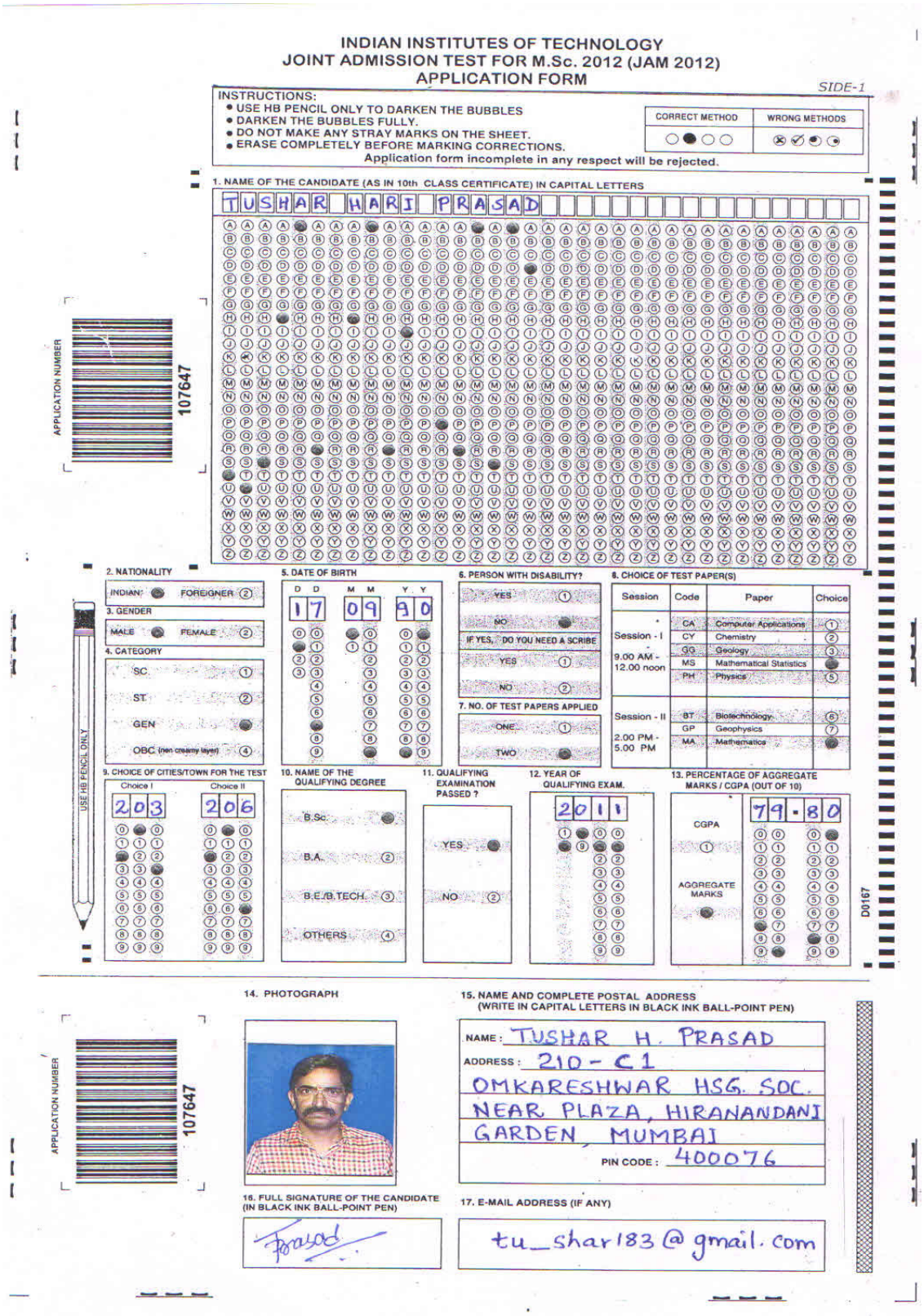
Item 25: Check List

The candidate should tick the options in the check list.

Item 26: List of Enclosures

The candidate should tick against the documents enclosed with the Application Form.
For any correspondence with the JAM office of any IIT, please quote your Application Form Number until the Admit Card is received.

Sample of filled in application form



INDIAN INSTITUTES OF TECHNOLOGY
JOINT ADMISSION TEST FOR M.Sc. 2012 (JAM 2012)
APPLICATION FORM

SIDE-1

INSTRUCTIONS:
- USE HB PENCIL ONLY TO DARKEN THE BUBBLES
- DARKEN THE BUBBLES FULLY.
- DO NOT MAKE ANY STRAY MARKS ON THE SHEET.
- ERASE COMPLETELY BEFORE MARKING CORRECTIONS.

Application form incomplete in any respect will be rejected.

CORRECT METHOD	WRONG METHODS
○ ● ○ ○	⊗ ✓ ◐ ⊙

1. NAME OF THE CANDIDATE (AS IN 10th CLASS CERTIFICATE) IN CAPITAL LETTERS: TUSHAR HARI PRASAD

APPLICATION NUMBER: 107647

2. NATIONALITY: INDIAN ● FOREIGNER (2)

3. GENDER: MALE ● FEMALE (2)

4. CATEGORY: SC (1) ST (2) GEN ● OBC (non creamy layer) (4)

5. DATE OF BIRTH: D D: 1 7; M M: 0 9; Y Y: 8 0

6. PERSON WITH DISABILITY? YES (1) NO ●

IF YES, DO YOU NEED A SCRIBE: YES (1) NO (2)

7. NO. OF TEST PAPERS APPLIED: ONE (1) TWO ●

8. CHOICE OF TEST PAPER(S)

Session	Code	Paper	Choice
Session - I 9.00 AM - 12.00 noon	CA	Computer Applications	(1)
	CY	Chemistry	(2)
	GG	Geology	(3)
	MS	Mathematical Statistics	●
	PH	Physics	(5)
Session - II 2.00 PM - 5.00 PM	BT	Biotechnology	(6)
	GP	Geophysics	(7)
	MA	Mathematics	●

9. CHOICE OF CITIES/TOWN FOR THE TEST: Choice I: 2 0 3; Choice II: 2 0 6

10. NAME OF THE QUALIFYING DEGREE: B.Sc. ● B.A. (2) B.E./B.TECH. (3) OTHERS (4)

11. QUALIFYING EXAMINATION PASSED ?: YES ● NO (2)

12. YEAR OF QUALIFYING EXAM.: 2 0 1 1

13. PERCENTAGE OF AGGREGATE MARKS / CGPA (OUT OF 10): CGPA (1) AGGREGATE MARKS ●: 7 9 . 8 0

USE HB PENCIL ONLY

D0167

APPLICATION NUMBER: 107647

14. PHOTOGRAPH

15. NAME AND COMPLETE POSTAL ADDRESS (WRITE IN CAPITAL LETTERS IN BLACK INK BALL-POINT PEN)

NAME : TUSHAR H. PRASAD
ADDRESS : 210 - C1
OMKARESHWAR HSG. SOC.
NEAR PLAZA, HIRANANDANI
GARDEN, MUMBAI
PIN CODE : 400076

16. FULL SIGNATURE OF THE CANDIDATE (IN BLACK INK BALL-POINT PEN)

Prasad

17. E-MAIL ADDRESS (IF ANY)

tu_shar183@gmail.com

SIDE-2

18. NAME OF THE PARENT / GUARDIAN (IN CAPITAL LETTERS)

HARI PRASAD DAYAL

19. RELATIONSHIP OF PARENT / GUARDIAN TO THE CANDIDATE

FATHER ●
MOTHER ②
GUARDIAN ③

20. DETAILS OF THE DEMAND DRAFT ENCLOSED (IF APPLICABLE)

DEMAND DRAFT NUMBER: 445561

DATE OF DEMAND DRAFT: D D 26, M M 09, Y Y 11

21. AMOUNT (₹) OF ADDITIONAL FEE PAID (IF APPLICABLE)

150/- ①
300/-

22. LANDLINE PHONE NO WITH STD CODE

0 22 25 76 59 24

23. MOBILE NUMBER

09 91 98 64 56 88

24. DECLARATION BY THE CANDIDATE :

I hereby declare that all the particulars stated in this Application form are true to the best of my knowledge and belief. I have read the Information Brochure and I shall abide by the terms and conditions therein. In the event of suppression or distortion of any fact made in this application form, I understand that I will be denied the opportunity to appear in the JAM 2012, and if already appeared/secelected/admitted, my admission/degree acquired is liable to cancllation.

Place : Mumbai

Date : 26-09-2011

Prasad

FULL SIGNATURE OF THE CANDIDATE
(IN BLANK INK BALL POINT PEN)

25. CHECK LIST (PLEASE TICK)

	YES	NO
a. Filled-in all the items 1-23 completely?	✓	
b. Written (with black ink ball point pen) the address for correspondence under item 15 ?	✓	
c. Pasted a recent Photograph in the box under item-14 ?	✓	
d. Signed with black ink ball point pen in the box under item 16 ?	✓	
e. Signed with black ink ball point pen the declaration under item 24 ?	✓	
f. Filled-in the code of the first choice of test city on application envelope ?	✓	
g. Filled-in the chosen JAM Paper Code (s) on the application envelope ?	✓	
h. Kept a photocopy of the filled application form for your own records ?	✓	

26. LIST OF ENCLOSURES (PLEASE TICK)

	YES	NO
a. Bank pay-in-slip / receipt from JAM Office.	✓	
b. Attested copy of SC/ST certificate (if applicable)		✓
c. Attested copy of PD certificate (if applicable)		✓
d. Attested copy of the affidavit for change of name/surname (if applicable)		✓
e. Demand draft for the second test paper (if applicable)	✓	

13. RANK AND MERIT LIST

13.1. Rank List

For each test paper in JAM 2012, separate rank lists, on the basis of written test, will be prepared for candidates in General, OBC (non-creamy layer), SC, ST and PD categories.

NOTE TO OBC (Non-creamy layer) CANDIDATES

OBC (non-creamy layer) candidates need not submit any category certificate along with the application form. The category rank in a JAM paper will be prepared based on the category declaration by the candidate in his/her application form. **The relevant certificate will not be accepted after 30 April 2012 under any circumstances.** The final seat allotment will be done based on the OBC certificate (in the prescribed format) submitted along with application form for admission. **The candidate will be considered in the General Category in case of non-compliance of OBC non-creamy layer certificate with the prescribed format.**

Tie-Breaking: The tie-breaking criterion for awarding the ranks to candidates scoring the same aggregate marks in a test paper will be as follows:

(a) For Fully Objective Type Test Papers:

The candidate with higher ratio of positive marks to negative marks will be given a higher rank. If this criterion fails to break ties, the candidates concerned will be awarded the same rank.

(b) For Objective-cum-Subjective Type Test Papers:

The candidate having higher score in the subjective questions of the test paper shall be given a higher rank. If this criterion fails to break ties, the candidates concerned will be awarded the same rank.

13.2. Merit List

The results (merit lists) will be declared at 17:00 hours on **10 April 2012**. The results will be available on the website: **http://www.iitb.ac.in/jam.**

For each test paper, an All India merit list will be prepared. Separate merit lists will be prepared for OBC (non-creamy layer), SC, ST and PD category candidates. The number of candidates included in the All India Merit List will depend on the total number of seats available in a given subject.

These candidates (henceforth called qualified candidates) are eligible to apply for admission to any of the corresponding academic programmes available (Table 1) at different IITs.

The Score Card (indicating the All India Rank(s) and the mark(s) obtained by the Candidate) will be sent to the candidates appearing in merit lists.

14. ADMISSION PROCEDURE

Only the candidates who **qualify** in JAM 2012 (whose names appear in the merit list) will be eligible to apply for admission to any of the corresponding academic programmes available at different IITs (refer Tables 1 and 2 of this Information Brochure). Candidates are advised, in their own interest, to refer to the brief profiles of the admitting institutes and departments included in this Information Brochure. Applicants should note that they have to apply for admission by sending an Application Form for Admission (henceforth called Admission Form) only to the Organizing Institute (IIT Bombay).

An applicant can apply to one or more academic programmes corresponding to the test paper(s) in which he/she has qualified, subject to fulfillment of the minimum educational qualifications and the eligibility requirements of the Admitting Institute(s). For the academic session 2012-13, the following admission procedure shall be followed for all the programmes at the IITs covered under JAM 2012.

(i) After JAM 2012 results are announced, a qualified candidate will have to apply on the prescribed Admission Form to the Organizing Institute (IIT Bombay) only, irrespective of the IIT(s) where he/she desires to seek admission. The application form(s) for admission will be sent along with the Score Card to the qualified candidates and can also be downloaded from the website of the Organizing Institute.

(ii) Irrespective of whether a candidate has qualified in one or two test papers, he/she needs to send **only one** duly completed Admission Form listing all the programmes at the IITs (along with the order of preferences) to which the admission is sought.

(iii) The duly completed application form for admission along with the required enclosures must be sent by the applicant to the Organizing Chairman, JAM 2012, IIT Bombay, Powai, Mumbai – 400 076**,** along with an Account Payee Demand Draft of Rs. 300/- (Rupees three hundred only), drawn in favour of "Chairman, JAM, IIT Bombay", payable at Mumbai, as a non-refundable processing fee. The application form for admission will not be considered if it is found incomplete in any respect or if it is not accompanied by a Demand Draft of Rs. 300 and the candidate will not be considered for admission irrespective of his/her eligibility for any programme(s) for which application form for admission has been submitted. Also, a candidate will be considered for admission only to the programme(s), given in his/her Admission Form. **The last date for receiving the completed application form(s) for admission along with Demand Draft of Rs. 300 at the Organizing Institute (IIT Bombay) is 30 April 2012**.

(iv) Taking into consideration the order of preference as given in the Admission Form and corresponding rank(s) in the merit list, the first Admission List for each programme under JAM 2012 will be prepared by the Organizing Institute and will be announced at 17:00 hours on **25 May 2012**.

(v) After the declaration of the first Admission List, admission offers will be sent by the respective Admitting Institute(s) to the candidates concerned on **26 May 2012**. Last date for conveying the acceptance of the offer by the candidates to the Organizing Chairman, JAM 2012, IIT Bombay, is **5 June 2012**. Along with the acceptance of offer, these candidates will also have to send an advance fee of Rs. 5000/- to the Organizing Chairman through a demand draft in favour of the "**Chairman**, **JAM, IIT Bombay**", payable at Mumbai. This amount will be transferred to the Admitting Institute and this will be adjusted at the time of registration.

(vi) If seats remain vacant after the admission process is over based on the first Admission List, the Organizing Institute will prepare additional admission lists. These lists will be announced by the Organizing Institute and admission offers based on these lists, if any, will be sent by the Admitting Institute(s) to the candidates concerned. The candidates offered admission through the additional lists must report directly to the **admitting institute** on the date of semester registration. **With that the admission process based on JAM 2012 will come to an end.**

(vii) If a candidate is allotted a seat through the first admission list and if he/she accepts the offer of admission, his/her lower preferences, if any, will be automatically cancelled. However, he/she will remain on the waiting list for all of his/her higher preferences, if any, in the next two rounds of admissions. Eligible candidates, who are not allotted any seat in the First Admission List, will remain on the waiting list in the next two rounds of admissions. Candidates, who do not want to be considered for higher preference programme(s) in the subsequent rounds of admissions, will have to indicate this in the prescribed form at the time of acceptance of the admission offer. If a candidate fails to accept an admission offer, he/she will not be considered further in the admission process.

Note:

(a) Verification of minimum educational qualifications and the eligibility criteria for admission is the prerogative of the Admitting Institute(s) only and the Organizing Institute will not respond to any queries in this regard.

(b) The offer of admission to a candidate will be provisional, subject to the fulfillment of all the requirements by the dates specified.

(c) Candidates should note that being in the merit list of any Test Paper neither guarantees nor provides any automatic entitlement for admission. Admissions shall be made in order of merit and depending on the number of seats available at the Admitting Institute(s).

15. BRIEF PROFILES OF IITs AND THEIR PARTICIPATING DEPARTMENTS

INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

IIT Bombay was established in the year 1958 with the co-operation and participation of the then Government of USSR under UNESCO's technical assistance programme. Today the Institute is recognized as a centre of academic excellence offering engineering and science education at par with the best in the world.

Located at Powai, on the outskirts of Mumbai, the IIT campus extends over 500 acres of green wooded land with Powai and Vihar Lakes on either side. The campus is conveniently connected to the city centre by buses and local trains.

IIT Bombay offers a large number of undergraduate and post-graduate programmes in engineering and sciences. The teaching programmes follow a semester system and are characterized by their flexibility and informality. An academic year (July-April) consists of two semesters, each of approximately 16 weeks duration. The departments, schools, centres and interdisciplinary groups constitute the academic fabric of the Institute.

All the departments of the Institute have well-equipped research laboratories and related infrastructure. The Department of Science and Technology (DST), Government of India has sponsored a Sophisticated Analytical Instrumentation Facility (SAIF) at IIT Bombay to provide a wide range of modern analytical instruments for use in advanced research such as Electron microscopy, X-ray Fluorescence, NMR etc. There are also a number of central facilities such as the Computer Centre, Workshops, as well as one of the finest technical libraries in the country, which houses over 3 lakh books and a large collection of periodicals and reference material. The library subscribes to over 1500 current journals in Science and Engineering and has access to all major journals through SciFinder, Chemical Abstract etc. The Computer Centre provides high-end computing facilities to the Institute. It has several high performance computing machines.

The close proximity of IIT Bombay to Bhabha Atomic Research Centre and The Tata Institute of Fundamental Research as well as major industrial establishments, offers excellent opportunities for interaction and collaborative research. A large number of projects at IIT Bombay are sponsored by organizations such as DST, DAE, DBT, ISRO and CSIR as well as by industries. The Institute also actively collaborates with several organizations of other countries on a bilateral basis.

IIT Bombay is fully residential and has 13 hostels for students. Each hostel is an independent entity with its own mess facilities and recreational areas, etc. Each student hostel has a computer room with several PCs, which can directly access any server in the Institute through the Institute network. There are excellent facilities for sports, which include a swimming pool, tennis, badminton and squash courts and vast playgrounds for field games. Wildlife camps and trekking are popular off campus activities. The facilities for sports are matched by the cultural activities on the campus: there are classical music societies, debating and drama clubs and a hobbies club. There are also several associations, which organize social and cultural functions. The IIT Bombay campus offers a full and rich life characterized by the strong faculty-student interaction on the residential campus.

2 Years Master of Science Programmes

The Institute offers two-year M.Sc. programmes in Biotechnology, Chemistry, Applied Geology, Applied Geophysics, Mathematics, Physics and Applied Statistics and Informatics. Notable features of the M.Sc. programmes at this Institute are, a broad-based curriculum and course-credit system. Each course is designed as one semester course, carrying certain credits. The evaluation is based on continuous assessment throughout the semester by means of tests and quizzes. The semester-end examination is comprehensive, covering the entire course.

At the beginning of the second year, each student is assigned a two-semester project. The student is required to survey the available literature and carry out experimental/ theoretical/ computational / field work on a research level problem and submit reports in two stages. Another feature of the curriculum is the availability of courses in Engineering disciplines (including Computer Science and Engineering) and Humanities and Social Sciences. Outlines of the M.Sc. Curricula are given under the section on respective departments.

4 Years M.Sc. (Physics) - M.Tech. (Materials Science) Dual Degree Programme.

From the academic year 2012, IIT Bombay offers a new four year dual degree programme in M.Sc. (Physics) – M.Tech. (Materials Science) with specialization in Nano-Science and Technology, undertaken jointly by the Department of Physics and the Department of Metallurgical Engineering and Materials Science. During the 4 year

course, students will take all core courses of MSc. (Physics) and M.Tech (Materials Science programmes, as well as specialized courses in Nano-Science and Technology. Course curriculum also includes a M.Tech. project in exciting areas of Nano-Technology. This programme is the first joint venture by two departments in IIT Bombay, and perhaps, the first of its kind in India and would serve the immediate need of Materials Engineers with a strong background in Physics and appropriate knowledge in Nano-Science and Technology for employment at the CSIR, DRDO, DAE, ISRO and other Govt. research Organizations, Universities, Engineering Colleges, several new IITs, and the R & D wings of various Industries.

M.Sc. - Ph.D. Dual Degree Programme

The Institute also offers 6 year M.Sc.- Ph.D dual degree programmes in Biotechnology, Chemistry, Earth Sciences, Energy, Environmental Science & Engineering, Operations Research and Physics.

Scholarships

Financial Support for M.Sc.-Ph.D Dual Degree: Teaching Assistantship (TAship) will be provided subject to the fulfillment of academic criteria and satisfactory research progress. TAship will be provided for a maximum period of 6 years as follows:

1. Rs.6000/- pm from the date of joining till the date of confirmation of Ph.D. registration.

2. Rs.12000/- pm for one year after confirmation of Ph.D. registration.

3. Rs.14000/- pm for the subsequent two years.

4. Rs.15000/- pm for the remaining period of the duration of the TAship.

Students who qualify the national level JRF exams conducted by UGC, CSIR, GATE, DBT and ICMR can avail of these fellowships from the commencement of Semester V.

The merit-cum-means scholarships of Rs.1000/- per month along with the benefit of free tuition are awarded every year by the Institute to a maximum of 25% of students of the B.Tech., Dual Degree, five-year Integrated M.Sc. and two-year M.Sc. programmes. Another 10% of these students get the benefit of free tuition.

In addition to the above, there are several scholarships available to students joining the 2-year M.Sc. programme, on the basis of merit and merit-cum-means, instituted by private trusts and various government and semi-government organizations. The details are given in the section on respective departments.

Free mess facilities for Scheduled Caste/ Scheduled Tribe students: The facilities of free mess (only basic menu) and a pocket allowance of Rs.250/- per month will be granted to eligible SC/ST students of this Institute pursuing 2-year M.Sc. programme applying 'Means test' (income test), subject to certain conditions.

For more information and details about scholarships, see website, **http://www.iitb.ac.in**

Department of Biosciences and Bioengineering

Path-breaking developments in the application of engineering and technology to the biological and biomedical sciences, through Biotechnology and Biomedical engineering prompted the Institute to look for new initiatives that will further strengthen the bio-related activities in the Institute. A Senate committee addressed this issue and suggested the setting up of a School of Biosciences and Bioengineering for consolidating bio-related activities being pursued in various Science and Engineering departments in the institute. As a result of these initiatives, the School of Biosciences and Bioengineering was formally launched on March 26th 2001. The School was given the status of a Department in June 2009.

The vision of the Department is to be hailed as a Centre of Excellence with an intense focus on teaching and research in the areas of molecular, structural, computational biology, biomedical engineering and bioprocess technology towards making an impact on healthcare through New Knowledge, Processes, Products and Protocols.

The programmes offered by the school are (a) M.Sc. in Biotechnology (with financial support from DBT), (b) M.Tech in Biomedical Engineering, and (c) M.Sc.-Ph.D. Dual Degree in Biotechnology, (d) Ph.D. and (e) Postdoctoral programmes. Some of the major facilities for teaching and research in Biotechnology include-Animal Cell culture facility, Radiotracer facility, HPLC, FPLC, Spectrophotometer, CD Spectrometer, Fluorimeter, PCR thermocycler, High speed and Ultracentrifuge and facilities for Biochemistry and Molecular Biology Research.

The Masters programme consists of four semesters and is structured such that students have course work for all four semesters and the M.Sc. research project in the last two semesters. Prospective M.Sc.- Ph.D. Dual Degree students will take a comprehensive exam after their fourth semester to decide their suitability for the Ph.D. programme. All the students admitted to M.Sc. Biotechnology programme are given a scholarship of Rs. 1200/- p.m. by the Department of Biotechnology, Government of India.

For more information, see **www.bio.iitb.ac.in**

Department of Chemistry

The Department of Chemistry offers academic programmes leading to M.Sc. (2-year, post-B.Sc.), Integrated M. Sc. (5-year, admissions through JEE) and Ph. D. degrees. The department has 30 Faculty members, 160 Ph.D students and 110 M Sc. Students. The areas of research include: Single molecule imaging and dynamics, Structural biochemistry, Design, Synthesis and targeting of novel gene-targeting drugs, Asymmetric synthesis and catalysis, new synthetic routes and novel applications for organometallic/co-ordination compounds for semiconducting, catalytic, medicinal and material applications, new bio-inorganic compounds with unconventional and phototherapeutic attributes, polymers and biomaterials for optoelectronic and electrochemical sensing applications, biologically active organic compounds with varied medicinal applications as also of novel materials with superconducting, photofunctional, catalytic and photosensing properties. Biomolecular chemistry of membranes, peptides, photosensory biology, photomedicine, organized thin films, theoretical/ computational investigation of structure and dynamics of liquids, electron transfer processes in green plant photosynthesis and photodynamic control of chemical reactions, biomolecular thermodynamics, protein folding and ultrafast spectroscopy/dynamics are other areas of active research.

Findings from the investigations in the above mentioned areas are reported in about 125 publications per year in most prestigious journals and have been recognized through

many fellowships of INSA, IASc., NASI and SS Bhatnagar, Swarna Jayanti and other awards.

The research facilities available in the department include: several FTIR and UV Spectrophotometers, GC and HPLCs; C,H,N analyser, spectropolarimeter, spectrofluorimeter, TGA/DTA, cyclic voltameter, Faraday magnetic susceptibility balance, powder and single crystal X-Ray diffractometers, 400 MHz NMR facility, Femtosecond fluorescence upconversion facility, QTOF mass spectrometer, peptide sequencer, nano-second / pico-second time resolved ultra-fast setup. PC's and high end workstations with GAUSSIAN, SPARTAN, HYPERCHEM, GAMESS and GROMOS packages are also available within the department.

In addition to institute Scholarships, two Dr. Burjor Godrej Merit Scholarships of Rs. 5000 per month, six Dr. Burjor Godrej Merit cum Means Scholarships of Rs. 2000 per month and ten Prof. M V Pandya Merit cum Means Scholarships of Rs. 1000 per month are available to students admitted to M. Sc. Chemistry programmes at IIT Bombay.

For more information, see **www.chem.iitb.ac.in**

Department of Earth Sciences

The Department of Earth Sciences offers academic programmes leading to M.Sc. (Applied Geology), M.Sc. (Applied Geophysics), M.Sc.-Ph.D. Dual Degree (Applied Geology), M.Sc.-Ph.D. Dual Degree (Applied Geophysics), M.Tech. (Geoexploration), M. Tech (Petroleum Geoscience) and Doctoral degrees. The Department annually admits 25 to 30 students in its M.Sc. programmes, 10 students in its M.Tech. programmes and about 10 students for the doctoral programme. Currently the Department has 18 faculty members, 25 research scholars, 45 M.Tech. students and 55 M.Sc. students.

The two year M.Sc. programmes in Applied Geology and Applied Geophysics build a strong theoretical and practical framework in Earth Sciences to enable students to tackle routine work in industry as well as to take up research in challenging new areas.

The Applied Geology programme involves advanced courses in several fields of applied geosciences such as economic geology, geological and geochemical exploration, geochemistry, engineering geology, environmental geology, climate geology, mineralogy, mining geology, petrology, palaeontology, petroleum geology, ore petrology, remote sensing, sedimentology, structural geology, etc. Equal emphasis is placed on practical training in field-based skills and laboratory studies. There are two educational field programmes in the 2nd and 4th semesters, respectively, apart from the practical industry training in mining and petroleum related industries at the end of the 2nd semester. A home paper project in the last semester provides an opportunity to students to explore their research capabilities.

The Applied Geophysics programme offers students with a strong background in Physics and Mathematics an opportunity to study the physics, structure and composition of the earth and explore its natural resources. The programme offers an advanced and specialized training for professional work in exploration, research and education.

The programme is designed to build theoretical knowledge in Geophysical fields, provide strong foundation in basic geology, develop mathematical modeling and interpretational skills through applied work in laboratories and develop the ability to carry out independent field measurements. The programme offers a blend of courses on Exploration for Petroleum, Mineral and Groundwater resources and Solid Earth Geophysics including Earthquake Seismology, Exploration Seismology, Gravity, Magnetic, Electrical and Electromagnetic methods apart from supplementary subjects such as Geophysical Signal Processing, Mathematical Physics, Programming and Geology. The programme includes a two-week geological field training and a two-week visit to ONGC for training in 3-D seismic data acquisition, processing and interpretation. On completion of the programme, students can either go for higher studies or get placements in the leading industries/ organizations in the petroleum, applications software, mining and groundwater sectors. The students have been recruited by the organizations viz., Shell India Pvt. Ltd., British Gas India Pvt. Ltd., Reliance Industries Ltd, Cairn Energy India Pvt. Ltd., Schlumberger Services India Ltd, UCIL, ONGC, GSI, GSWB and ACC.

The major areas of research in the Department include Active tectonics, Fluid and melt inclusion research, Earthquake Seismology, Electromagnetism, Geochemistry, Geomagnetism, Geothermics, Geostatistics, Gravity and Magnetics, Geodynamics, Geochronology, Igneous petrology, Isotope geology, Metamorphic petrology, Micropaleontology, Mineralogy, Ore petrology, Organic Geochemistry, Petroleum geology, Remote sensing, Rock engineering, Sedimentology, Structural Geology and Volcanology. Research work carried out in the Department leads to about 25-30 research publications per year in reputed journals.

The Department supports well-equipped laboratories that aid in teaching and research activities. Some of the major research facilities available are X-ray diffractometer, SEM-EDAX, UV-Visible spectrophotometer, ICP-AES, AAS, Transmitted and reflected microscopes, Cathodo-luminescence microscope, Heating and freezing stage for fluid inclusion study, Triaxial, tensile and shear strength equipments, Blast vibration monitors, Tape extensiometer, Magnetic susceptibility systems, Sandbox deformation rigs, Raman spectrometer, Noble gas mass spectrometer, Broadband seismographs, Fluxgate and Proton precession magnetometers, Gravity meter, Electrical resistivity and VLF-EM equipments, Computational facilities, Softwares for data processing, Modeling and interpretation, 3D seismic and well log data sets.

Besides the departmental infrastructure, students and faculty have access to various facilities of other departments and centres.

For more information, see **www.geos.iitb.ac.in**

Department of Mathematics

The Department of Mathematics offers two Masters programmes - M.Sc. in Mathematics and M.Sc. in Applied Statistics and Informatics. Both programmes offer students considerable freedom in their choice of courses in their second year with elective courses in pure and applied mathematics and statistics as options.

The M.Sc. Mathematics programme allows students to acquire a broad mathematical education, especially suitable for careers in research and teaching. More recently, graduating students have also been increasingly absorbed in the industrial and service sectors as the demand for mathematical skills rises.

The M.Sc. Applied Statistics and Informatics programme has been specially designed for students aspiring to professions that demand skills and techniques in Statistics

and Computer Science. The course structure offers a unique blend of courses in computer science, statistics and mathematics. The programme has been highly successful in placing its graduating students in prestigious Indian and multinational companies.

Students may also benefit from exposure to the active research pursued in many areas of mathematics and statistics in the department, and also from the individual and institutional contacts between the department and other educational, research and industrial organizations, both within and outside the country.

In addition to the merit-cum-means and other scholarships given by the Institute, the top two students in the Applied Statistics and Informatics programme are given a scholarship of Rs. 1,200/- a month by Pfizer Limited.

For more information see **www.math.iitb.ac.in**

Department of Physics

The Department consists of about 26 faculty members. It offers a 4-year B.Tech. programme in Engineering Physics and a 5 year B.Tech.-M.Tech. Dual Degree in Engineering Physics with specialization in nanoscience. The Department also offers a 2-year M.Sc. programme. From the academic year 2012, a new 4 year dual degree programme in M.Sc. (Physics)-M.Tech. (Material Science) with a specialization in Nano-Science and technology is offered jointly by the Department of Physics and the Department of Metallurgical Engineering and Material Science and a 6 year M.Sc.-Ph.D. dual degree programme in Physics. A very vibrant and active Ph.D. programme, in which 68 research students are currently enrolled, is a highlight of the department.

The Department has a dynamic research programme in the frontiers of condensed matter physics, statistical physics, photonics, nuclear physics and high energy physics both in theory as well as experiments. It has well equipped laboratories to carry out experimental research in various thrust areas such as magnetic and superconducting materials, semiconductor thin films, multilayers and nanostructures, ultrafast processes and nonlinear optics and nuclear structure and reaction studies. Some of the major facilities of the department include sputtering, laser ablation and Langmuir-Blodgett facilities for thin film preparation, low temperature measurements and femto and nano second lasers. In view of the current interest of the Department in nano-science and technology, state of the art facilities such as high resolution x-ray diffractometer, low energy electron diffraction and scanning probe microscope have been setup. A versatile Surface Analysis Instrument consisting of Electron Spectroscopy for Chemical Analysis-Scanning Auger Nanoprobe has been setup in the department as a central facility of the institute. The department has presently undertaken over 20 R & D projects from various sponsoring agencies. It is also involved in several international collaborations and industrial consultancy projects. The research work carried out in the department appears in the form of over 50 research publications per year in reputed journals and in a large number of presentations by the faculty and Ph.D. students at national and international forums.

The M.Sc. programme has been designed to make the foundations of Physics strong in our students. The 6 year dual degree programme of M.Sc. and Ph.D. in Physics is essentially an extension of the existing M.Sc. programme leading to a Ph.D. degree. The curriculum includes substantial basic preparation in Mathematical Physics, Classical, Quantum and Statistical Mechanics, Electromagnetic theory as also courses in Atomic and Molecular Physics, Condensed Matter Physics, Nuclear Physics and Quantum Electronics. This is complemented by intensive laboratory programme, including laboratory courses in Electronics and Computer Programming. Specialization in specific areas of Physics is offered through elective courses such as Elementary Particle Physics, Applied Solid State Physics, Applied Nuclear Physics and Photonics. An avenue into contemporary research is provided through a year long M.Sc. Project with individual supervision. Our research laboratories and computational facilities help in acquainting the students with methodologies of modern day research and play a very crucial role in shaping them as future scientists. Efforts are also made to continuously review the scope and content of our teaching programme to keep it on tune with the modern developments both in experimental as well as theoretical physics. Some of the recent additions to the M.Sc. curricula are Methods in analytical techniques, Methods in experimental nuclear and particle physics, Nonlinear dynamics, Nanophysics and advanced simulation techniques in Physics.

For more information, see **www.phy.iitb.ac.in**

Department of Energy Science & Engineering

The energy sector provides significant research challenges in the development of new materials, devices and energy systems. Fundamental research contributions are required for the development of cost-effective and sustainable energy systems. Energy Systems Engineering (ESE) was founded in 1981 as an inter-disciplinary group at IIT Bombay offering M.Tech. and Ph.D. programmes. ESE has graduated about 388 M. Tech. and 64 Ph.Ds since its inception and currently has an output of 25-30 postgraduate (M. Tech., Ph.D.) each year. The new Department is expected to provide critical manpower and research inputs that are critical for the growth of India's energy sector and provide innovative energy technologies and systems to mitigate the global problem of climate change. This is the first such department in the IIT system. It is also unique since it combines science and engineering.

DESE has started an integrated M.Sc.- Ph.D. programme in Energy from 2007 and a Dual Degree B.Tech (Energy Engineering) and M.Tech. (Energy Systems Engineering) programme in 2008. The Department currently has 15 core faculty and about 30 associated faculty from across the Institute. The projected student strength of the Department is about 300 (in 2013) with a core faculty of 20-25 and another 30-40 associated from other departments in the Institute. DESE has significant industry linkages with industry sponsored labs (Cummins Engines Lab, ONGC Underground Coal Gasification Facility, Forbes Marshall Energy Efficiency Lab), industry sponsored projects (Applied Materials, Cummins, Forbes Marshall), Continuing Education Programmes for industry and several industry sponsored student fellowships.

The Dual Degree M.Sc.- Ph.D. programme plans to develop researchers who can provide fundamental inputs required to meet the challenges of the energy sector. The intake is to be through JAM (a total of 18 seats with 7 from JAM- Physics, 7 from JAM- Chemistry and 3 from JAM- Mathematics and 1 open for ST candidates from Physics / Chemistry / Mathematics).

The core course will provide a background of analytical and laboratory techniques as well as courses related to understanding energy systems. Several electives are

provided in the curriculum to enable the student to specialise in their area of interest.

The problems of finite fossil fuel reserves and global warming require fundamental breakthroughs in energy extraction, processing, conversion and utilisation. For instance, recent advances in nanoscience and nano-technology have already resulted in potential applications for new materials in hydrogen energy storage, improved batteries, super capacitors, fuel cells. Several innovative research solutions are required to shape the sustainable energy systems of the future. The possible research areas could be Nano materials for energy, Hydrogen storage and fuel cells, Advanced solar photovoltaic, Energy systems modeling and optimization, Biomass gasification and pyrolysis, 2nd and 3rd generation biofule, Solar thermal and wind energy systems, Nuclear energy. We expect that there will be several challenging research careers in industry and academics for the Dual-Degree graduates in Energy. The Institute fellowship will be available for all selected students.

The department is leading a consortium to build a MW scale solar thermal power plant as a national testing cum research facility. Also department is jointly setting up a National Centre in PV ie. National Centre for Photovoltaic Research and Education (NCPRE) with support from Ministry for New and Renewable Energy (MNRE). The Department will have a new building (approx 100,000ft^2 of built up area) as a zero energy building using passive solar, building integrated PV, daylighting. Specialised laboratories being planned are the Efficiency laboratory, Solar PV laboratory, Fuel cells and Hydrogen laboratory, Energy Innovation Laboratory, Alternative fuels laboratory apart from the existing Solar and Energy Systems Laboratories, Bioenergy Laboratory.

For more information please see **www.ese.iitb.ac.in**

Industrial Engineering and Operations Research (IEOR)

IEOR at IIT Bombay has been offering Ph.D, programmes for B.Tech, M.Tech and M.Sc. (Operations Research/Statistics/Mathematics) students. It also offers M.Tech programme for B.Tech students. The dual degree M.Sc.-Ph.D. in Operations Research was introduced in July 2009 for admission through JAM exam (MA or MS papers). The minimum educational qualification for admission to the dual degree M.Sc.-Ph.D. Operations Research programme is Bachelor's degree with either Mathematics or Statistics as a subject for at least two years or four semesters.

Students in the dual degree in M.Sc.-Ph.D. programme will have an opportunity to work in interdisciplinary areas including engineering, computing and analysis, with an exposure to a range of application areas. The programme offers a direct entry to doctoral studies, and students will typically get an early start to research and can expect a quicker finish to a doctoral degree. The professional prospects for doctoral graduates are growing in a variety of areas including academia, research labs and industry.

The course-work in the dual degree M.Sc.-Ph.D. programme includes compulsory courses that are exclusive to this programme. The first year courses emphasize introduction to various models and their computational aspects along with exposure to various decision making paradigms and concepts of IEOR, including engineering and service systems. In their second year students will build on the first year course work. Laboratory courses to strengthen the computational and computer-based modeling skills are an integral part of the curriculum. The first 2 years of course work is towards M.Sc. (Operations Research) degree, followed by research work of minimum 3 years towards the Ph.D. degree. As part of Ph.D. requirements, students need to do an IEOR Ph.D. level course and a project before starting work on their Ph.D. thesis. Students need to take their Ph.D. Qualifying exam during their third year.

The discipline of Industrial Engineering and Operations Research (IEOR) essentially deals with the efficient operation of systems and optimal utilization of resources. Concepts and results from the discipline are becoming increasingly important these days in almost all sectors of the economy viz., industrial, transport, service, agriculture, education, communication, etc. With present day technology, various types of data, including the transactional type, are available relatively easily and designing appropriate decision making algorithms is becoming a realistic goal, sought by competitive and forward looking organizations in both private and public sector. Also, the role of theory to provide some insight into the tradeoffs involved in decision making becomes significant. There is an opportunity to work on interesting problems that involve modeling, analysis and computation.

IEOR at IIT Bombay conducts research in a unique and insightful manner in today's economic context. IEOR offers a blend of theory, modeling and application, drawing from traditional as well as modern areas of operations research, together with a systems view derived from long-standing principles of industrial engineering. IEOR is unique in its contemporary flavor, with specialized courses in Integer Programming, Game Theory, Markov Decision Processes, Services Management, Supply Chain Management, Financial Engineering, Knowledge-based systems, Neural Networks, System Dynamics to name a few. Also, it is equally strong in background building with updated courses in Optimization Techniques, Stochastic Models and Simulation. Broad areas of application are in manufacturing systems, supply chains, logistics, transport including railways, finance, communication networks, services, infrastructure 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 website **http://www.ieor.iitb.ac.in/** has details on the faculty members, students, research, teaching, academics, admissions, and other activities of IEOR.

Centre for Environmental Science and Engineering

The Centre for Environmental Science and Engineering (CESE) at Bombay was established in 1977. Since inception, the Centre has been offering M. Tech and Ph.D. programmes that are truly interdisciplinary in nature, and consist of course work followed by a research project. CESE is currently comprised of eleven faculty members with multi-disciplinary backgrounds and a strong focus on teaching and research. Approximately 275 M.Tech and 75 Ph.D. students have graduated from CESE.

The Centre has ongoing research in the fields of Aerosols and Air Quality, Water and Wastewater Treatment; Environmental Biotechnology; Clean Technology; Environmental Systems Modeling and Optimization; Environmental Impact Assessment, Statistical Modeling, Climate Change Impact Assessment, Municipal/Industrial/Hazardous Waste Management. CESE has strong links established with leading industries,

academic institutions and national and international agencies through sponsored research projects, consultancy and collaborations. Research projects are currently funded by renowned agencies such as DST (Department of Science and Technology), DBT (Department of Biotechnology), AERB (Atomic Energy Regulatory Board), Central pollution Control Board (CPCB), MOEF (Ministry of Environment and Forests), MNRE (Ministry of New and Renewable Energy), World Bank, European Union and SIDA. The research activities of CESE are supported by excellent experimental and computational facilities, competent and dedicated technical staff and high quality students. The centre is also actively engaged in a variety of outreach programmes including organizing workshops, conferences and Continuing Education Programmes (CEP) courses, which regularly attract participants from academia, industries and governmental and non-governmental sectors.

The mandate of the centre is to provide adequate manpower trained in addressing environmental issues at the national and international levels by encouraging research activities focused on developing innovative technologies for mitigating environmental problems and adopting unique approaches for environmental monitoring to facilitate sustainable economic growth of India. CESE is starting a dual degree MSc-PhD programme from July 2010 for admitting students with a degree of Bachelor of Science. The core theory and laboratory courses will provide a holistic to specialize in the area of their choice. Dual degree M.Sc.-Ph.D. programme aims at importing strong foundation and research skills to dedicated, bright and talented science graduates. The graduating students will also have excellent job opportunities in industries, regulatory agencies, regulatory agencies, banking and commercial establishments as well as developmental agencies and consultancy firms. The institute teaching assistantship will be available for all selected students

In response to the recent directive of HRD Ministry to IITs to expand their base by offering advanced programmes to non-engineering students, CESE has proposed the above mentioned programme for admitting students with science background. At present, CESE offers entry to students with M.Sc. degree. In this new programme, interested students with B.Sc. degree can join the environmental science and engineering programme earlier and undergo a longer period of training in the subject. Thus, we can motivate the students at a relatively younger age.

Moreover, this programme is essential because every university and institution will be teaching a compulsory course on "Environment Studies" and will need dedicated professors to teach in their *Environmental Science* departments. The graduating students will also have an excellent job opportunity in industry, regulatory agencies, banks and commercial establishments as well as developmental agencies and consultancy firms.

For further information, visit **www.cese.iitb.ac.in**

Fees, Deposits and Hostel Rent

S. No.	Fee	Amount (in Rs.)	
		With Hostel	Without Hostel
1	Admission Fee and other one-time payments	3400	3400
2	Tuition Fee and other semester Fees	16550	7050
3	Deposits	3000	2000
4	Annual Fee	126	126
	Total	23076	12576

SC/ST students are eligible for a tuition fee waiver.

In addition to the above, students are required to pay a semester mess advance of Rs 10000 and a refundable mess advance of Rs 2000.

INDIAN INSTITUTE OF TECHNOLOGY DELHI

IIT Delhi is situated at Hauz Khas in South Delhi, bounded by Sri Aurobindo Marg on the east, Jawaharlal Nehru University complex on the west, National Council of Educational Research and Training on the south, and the Outer Ring Road on the north. The institute campus is about 20 km from Indira Gandhi International Airport, 10 km from domestic terminal of the airport, 19 km from Delhi main Railway Station and 14 km from New Delhi Railway Station. The nearest Metro station is Hauz Khas.

The institute campus extends over an area of 320 acres with many topographical features, imaginatively laid out with picturesque landscape. With clean and wide roads, and lot of greenery around, the campus presents a spectacle of harmony in architectural and natural beauty. Most of the students, faculty and staff reside on the campus. The main academic building houses various teaching and research facilities. Although each department is a separate entity, all the departments together constitute an integrated complex.

Each academic year consists of two semesters and a summer term. The education system is organised around a credit system, which ensures continuous evaluation of student's performance and provides flexibility to choose courses so as to facilitate progress at an optimum pace suited to one's ability or convenience. Each course is assigned certain number of credits depending upon the class contact hours. A minimum number of credits are to be completed in order to qualify for the award of a degree. A minimum level of performance is necessary for satisfactory progress/ completion. IIT Delhi has revised its M. Sc. curriculum with effect from academic session 2005-2006.

The revised curriculum emphasises on self-learning, project activity and laboratory work and leaves sufficient time for a student to take part in other activities like sports and recreation as well as to think and be creative and innovative.

The Students Activity Centre provides a number of facilities for student's extracurricular activities and physical development. It has a central two-storied block with a swimming pool and a gymnasium hall with amenities such as squash courts, hobbies workshop, seminar rooms, music rooms and other multipurpose rooms for reading and indoor games. The amphitheater constructed in modern style is an added amenity to the centre. The campus also provides other amenities such as staff club, hospital, shopping centre, banks, post office, community centre, stadium and playing fields.

Credit System

The prominent features of the credit system are the process of continuous evaluation of a student's performance, the absence of pass or fail on annual basis and the flexibility to allow a student to progress at the pace suited to his/her

individual ability and convenience subject to the regulations of the credit requirements.

Each course, except for a few special courses, has a certain number of credits assigned to it depending on its lecture, tutorial and laboratory contact hours in a week. Each course is coordinated by a member of the faculty called the course coordinator. He/she has the full responsibility for coordinating the course, coordinating the work of other members of the faculty involved in the course, holding tests and awarding grades. In case of any difficulty, students are expected to approach the course coordinator for advice and clarification.

A letter grade with a specified number of grade points is awarded in each course for which a student is registered. A student's performance is measured by the number of credits that he/she has earned and by the weighted grade point average maintained by him/her. A minimum number of credits and a minimum grade point average are necessary in order to qualify for a degree.

Department of Chemistry

The Department of Chemistry, IIT Delhi, features amongst the top centres for higher education in chemistry in the country. It has academic programmes leading towards the Ph. D., M. Tech., and M. Sc. degrees. Almost 25 faculty members, 100 odd doctoral and post-doctoral researchers, about 10 M. Tech. students, and over 85 M. Sc. students contribute towards the vibrant academic environment.

The unique feature of the M. Sc. curriculum of the department is that biochemistry is treated on an equal footing with the traditional chemistry sub-disciplines: inorganic, organic, and physical. In addition to basic courses in these four sub-disciplines students are exposed to the state-of-the-art of various research fields in elective courses. They learn design and synthetic principles, use analytical instruments, and sharpen their writing skills during a year-long project work on cutting-edge research problems priming them for a career in modern day chemistry research and development. Recent alumni of the M. Sc. programme have gone on to do doctoral work in top class institutes and universities around the globe or have found employment in major chemical companies.

The M. Tech. program in "Molecular Engineering: Chemical Synthesis and Analysis" is one of a kind program to be offered by any Chemistry department in all the IITs. It is a two-year post-M. Sc. program started in 2010-11 with the intention of training and preparing students for a career in the chemical industry in India.

Doctoral and post-doctoral research is carried out in a number of thrust areas of national and international importance in all the chemistry sub-disciplines. The research is generously supported by all the national funding agencies and the research findings have yielded several patents and numerous publications in journals of high impact and even start-up companies. A number of faculty members also take up consultancy projects from chemical and pharmaceutical industries within the country. Details of the faculty research interests and the active research projects may be obtained by visiting **http://www.chemistry.iitd.ac.in.**

Modern day chemistry research is instrument intensive. The department has well equipped laboratories with sophisticated instruments like a powder and a single Crystal X-ray diffractometer, two NMR spectrometers in addition to a host of other instruments for chemical analysis. Researchers also have access to other instrumental facilities, for example electron and force microscopes, from the institute network of sophisticated equipments. A Glass Blowing Workshop and a Supercomputing facility for Bioinformatics and Computational Biology are also available in-house. Students benefit immensely from having unrestricted and unlimited access to all these analytical instruments and facilities. Chemistry Department of IIT Delhi is an attractive destination today for students, researchers and faculty.

Department of Mathematics

The Department of Mathematics is actively engaged in teaching and research in the areas of Pure Mathematics, Applied Mathematics, Statistics, Operations Research, and Computer Science and Applications. The department has well established and widely recognized research activities. Both fundamental and applied research is being carried out in many important areas recognized at national and international levels. Research contributions of the department are published in international journals of repute.

The department offers various academic programs. Besides offering the Ph.D. program in various specializations, the department runs a 5-year Integrated M. Tech. program in Mathematics and Computing (admission through JEE) and a 2-year M.Sc. program in Mathematics.

The department also runs a 2-year Interdisciplinary M. Tech. program in Computer Applications, in collaboration with some other departments.

The two year M.Sc. program in Mathematics covers, courses in the area of Pure and Applied Mathematics, Statistics and Operations Research, and Computer Science and Applications. The department has well equipped computing Labs and has most of the standard Mathematical Softwares. All students are required to do Major Projects of one-year duration in the area of their choice in the second year.

Department of Physics

The Department of Physics is one of the largest departments in the Institute. There are a number of teaching and research laboratories in the Department. The department runs a four year B. Tech. program in Engineering Physics, a two-year M.Sc. program in Physics, 2 year M. Tech. program in Solid State Materials, Applied Optics, and also a 2 year interdisciplinary M. Tech. program in Optoelectronics and Optical Communications run jointly with the Department of Electrical Engineering.

Major research activities in the department include areas such as (1) Condensed Matter Physics with emphasis on Thin Film Technology, Nanomaterials, Modern Magnetic Materials like Magnetic Quasicrystals and Shape-Memory Alloys, Multiferroics, Magnetic Semiconductors for Spintronics applications, high frequency nanomagnetic materials and Ultra-fast magneto-optical Kerr microscopy; (2) Applied Optics and Optoelectronics like Holography, Photonic bandgap Structures and Structures with Negative Refraction, High Density Data Storage, Optical Information Security and Processing, Singular Optics, Quantum Optics, Fiber and Integrated Optics with emphasis on periodic waveguides like Bragg reflection waveguides, microstructured optical fibers, fiber optic components, fiber amplifiers and fiber optic sensors, Nanophotonics like photonic crystal, ultra fast processing, Laser Spectroscopy; (3) Plasma Physics like studies on Laser Plasma Interaction, Instabilities, Solitons, Harmonic Generation, Microwave and Plasma Interaction, Space Related Relativistic Plasmas, Semiconductor Plasmas, THz Generation, High Power

Microwave Transmission through waveguides; (4) Theoretical Physics with specific interests in Quantum Hall systems, Bose Einstein condensation of ultra cold atoms with long range interaction, optical lattice potential and disorder, Transport in Graphene sheets with and without magnetic field & quantum information processing in these systems, High-Energy Physics. Several state-of-the- art facilities for carrying out both fundamental and applied research are available in these areas.

The department has the unique distinction of having six of its faculty (past & present) members as recipients of the prestigious Shanti Swarup Bhatnagar Awards of CSIR and majority of the faculty members have been recognized through several international and national level awards for their research contributions. Being an Institute of technology, the M. Sc. Physics program is designed to impart education and training with an emphasis on applied topics. In addition to the core courses, students have the freedom to opt for a variety of courses of advanced level available in the institute as electives, and thus broaden their learning horizon. Students also gain considerable hands-on-experience and opportunities to participate on the ongoing research problems through their Major Project dissertation etc., which help them, learn design principles, analytical techniques and sharpen their scientific skills.

State-of-the-art analytical facilities for research on materials science like SQUID Magnetometer, HRTEM, AFM, SEM, GAXRD, ESCA/AES, optical spectrum analyzer, variety of gas and semiconductor lasers, Raman spectrometer, optical fiber splicer, OTDR, etc are available to benefit the students.

Scholarships Merit-cum-Means Scholarship:

Merit-cum-means scholarship of Rs.1000/- per month and free tuition are permissible to M. Sc. students to the extent of 25% of the approved strength subject to a maximum of twelve in each department as per institute rules. Only those students are eligible whose parents' gross income is less than Rs.4.50 lakh per annum for all categories of students, including SC/ST students. The terms and conditions of the award of scholarship including conditions for continuation are laid down in the Rules and Regulations and are subject to change from time to time.

Apart from above, the following scholarships instituted by outside organizations/individuals are also available for M.Sc. students:

(a) The **National Board of Higher Mathematics** conducts examinations and offers scholarships to successful candidates for pursuing the M.Sc. Program in the department of Mathematics.

(b) Prof. Prem Kumar Merit Scholarship in the Deptt. of Mathematics : One Scholarship of the value of Rs.1000/- per month will be given for a period of 10 months to 2nd year student based on Merit.

(c) Amarchand Memorial Scholarship in the Deptt. of Mathematics : Two merit scholarships of the value of Rs.400/- p.m. (each) to be awarded to a first year and a second year student of M. Sc. (Mathematics) for ten months.

(d) Dr. R.S. Narayanan Memorial Scholarship in the Deptt. of Physics: Four Merit-cum-Means Scholarships, each of the value of Rs.300/- p.m. will be given to the meritorious M. Sc. (Physics) students of each year.

(e) Prof. Vidhya Bhushan Anand Memorial Scholarship in the Deptt. of Physics : A scholarship of Rs.1500/-per month will be given to an M. Sc. (Physics) final year student who secures the highest CGPA (minimum 8.0) at the end of 1st year.

(f) Mr. Biman Behari Sen Memorial Scholarship: A Scholarship of Rs.1500 p.m. will be given for a duration of 10 months to the best students in M.Sc.(Final) Physics Deptt. securing highest CGPA.

(g) Asha Devi Ram Kishkore Jaiswal Scholarship in the Deptt. Of Physics: A scholarship of Rs.1500/- P.M. will be given for a period of 10 months to the best student in M.Sc. (Final) Physics Deptt. securing highest CGPA in M.Sc. 1st year (i.e. at the end of 2nd semester).

(h) Madan Lal Parliwala Memorial Loan Scholarship: This Loan scholarship is available for 3 full-time M.Sc. Students (one each in Chemistry, Mathematics and Physics) at 1st year level, and continues till the successful completion of the program.

(i) Suman Gupta Memorial Scholarship: Scholarship of Rs.1000/- p.m. is awarded to a student of 1st year M.Sc. Mathematics for a period of 10 months in academic session on the basis of Merit-cum-Means.

Fees and other Payment*

(a) Institute's fees payable at the time of admission:
Rs.8985/- for General candidates if allotted hostel (Rs.8185/- for non-hostel).
Rs.6485/- for SC/ST candidates if allotted hostel (Rs.5685/- for non-hostel).

(b) Mess dues payable: Rs.20500/- (Rs.19500/- for girls) – if hostel accommodation allotted.

* Tentative and subject to change

INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI

Indian Institute of Technology Guwahati has eleven departments covering all the major engineering and science disciplines, offering B.Tech., B.Des., M.A., M.Sc., M.Tech., M.Des., and Ph.D. programmes. Also there are, three interdisciplinary academic centres offering Ph.D. programmes. With a calm and quiet campus tucked away from the city in a beautiful natural setting, the Institute provides an ideal environment for learning and research. Within a relatively short period of time, IITG has built up world class facilities for carrying out advanced research.

IIT Guwahati is situated on a sprawling campus on the bank of the river Brahmaputra around 17 km away from the heart of the city by road. With hillocks, ponds and lush greenery, the campus qualifies as one of the most beautiful educational campuses in the country. The campus has all the amenities required for residents *viz.* market, restaurants, hospital, banks, post office, Internet facilities at hostels and quarters, gymnasium, indoor and outdoor sport facilities, and swimming pool. The students have several clubs to nurture their hobbies.

The Institute has a well-stocked library with on-line subscriptions of many journals.

The Institute has a Central Instruments Facility, which have instruments such as Nuclear Magnetic Resonance (NMR)

Spectrometer (400 MHz), Scanning Electron Microscope (SEM), X-Ray Photoelectron Spectrometer, DSC-Thermogravimetric Analyzer, FE-Scanning Electron Microscope, Liquid Helium Plant, Field Emission Scanning Electron Microscope etc. for use by all the departments.

Department of Chemistry

Department of Chemistry is a vibrant centre for research in the cutting edge areas of chemical sciences. The 2-year M.Sc. programme offered by the department of Chemistry has no specialization. The core curriculum emphasizes to provide a comprehensive learning of all branches of Chemistry and related multidisciplinary sciences. In addition, several electives are offered in the 4th semester to enable the students to develop skills in their respective areas of interest. The final semester also includes a research project where students will be working on multifaceted areas of contemporary chemistry involving not only fundamental and applied chemistry but also interdisciplinary chemistry. At the end of the programme, students will have a sound knowledge and expertise in the emerging areas of chemistry, which will facilitate them to craft their careers in industry, research laboratories and academics. In the year 2006, the department also introduced a B. Tech. programme in Chemical Science and Technology for which the admission is through JEE.

The research laboratories of the department are equipped with state-of-the-art instruments to carry out both experimental research and advanced computational calculations. Single crystal X-Ray crystallography machine, powder x-ray diffractometer, FTIR spectrometer, UV-vis-NIR spectrophotometer, Gas chromatograph, High-pressure and medium-pressure liquid chromatography systems, GC Mass and High Resolution Mass spectrometer (HRMS), UV-visible and fluorescence spectrophotometers, Time-resolved fluorescence spectrophotometer, Langmuir-Blodgett film maker, Magnetic balance, differential scanning calorimeter, ion meter, electrochemical analyzer, elemental analyzer, thermogravimetric analyzer, cryocoolers and several other commonly used instruments. Students can also avail the infrastructure and equipment facilities available at Central Instruments Facility of the institute.

The department is acknowledged nationally and internationally for its achievements in teaching and research. Funding agencies like the Department of Science and Technology (DST), Council of Scientific and Industrial Research (CSIR) support research projects of the department. Academic-industrial joint ventures are also being pursued by the department.

Department of Mathematics

The Department of Mathematics at Indian Institute of Technology Guwahati offers a 2-year M.Sc. programme in Mathematics and Computing. This programme blends relevant mathematics and computer science courses covering theoretical, computational and practical aspects. The laboratory based courses give students the exposure and training in application-oriented practical subjects. Students are exposed to advanced research topics through a mandatory one-semester project work.

At the end of the programme, students acquire sound analytical and practical knowledge to formulate and solve challenging problems and are well prepared to take up jobs in software industries or to pursue higher studies. Round the-clock access to computer labs and a large up-to-date library help students to supplement their knowledge. The department has a state-of-the-art computing laboratory equipped with several PCs and servers, which are connected to the cluster supercomputer of the institute. Regional Library of the National Board for Higher Mathematics is also housed at lIT Guwahati.

Besides the 2-year M.Sc. programme in Mathematics and Computing and a Ph.D. programme, the department also offers a B.Tech. programme in Mathematics and Computing for which admission is made through JEE.

Department of Physics

The Department of Physics offers a 2-year MSc, four year B. Tech. Engineering Physics and PhD programs. The Department is engaged in carrying out research in pure and applied areas of Physics and strives to train students to make them competent and motivated physicists, scientists and engineers. The department has several state-of-the-art teaching and research laboratories and they are upgraded regularly.

In addition to the regular core and utility courses, the MSc programme offers advanced elective courses in the chosen area of specialization. The advanced physics and electronics laboratories are equipped with modern equipments to train the students in various experimental skills. Two semester project work in experimental and theoretical areas gives great exposure to the current research in physics and allied areas.

A state-of-the-art numerical and computing laboratory of the department provides extensive exposure to various aspects of computer applications and numerical analysis.

Intense research activities are going on in the areas of Condensed matter Physics (colossal magnetoresistance materials, defects in ionic materials, electronic structure theory, magnetic materials, nanoparticles, quantum computation, semiconductors, photovolatic materials and devices, shape- memory alloys, superconductors, etc), Laser and Photonics (fiber and integrated optics, laser matter interactions, interferometry, nanophotonics, photonic glasses, nanolithography, non linear optics etc), and Theoretical Physics (higher dimensional bosonization, high energy physics phenomenology, correlated electrons and statistical physics, string theory, etc).

The faculty members of the department are involved in several sponsored research projects and the research laboratories are equipped with several state-of-the art and sophisticated equipments. The department has received several major projects including the grant under DST-FIST programme.

Major research facilities available in the department are - A.C. Susceptibility Set up, Atomic Force Microscope, Ball Milling set-up, Closed Cycle He Refrigerators, Computational Laboratory, Differential Scanning Calorimeter, Fibre Optics Communication Set-up, Fiber Fusion Splicer, FT-IR Spectrometer, High Temperature Furnaces, Hot Press, Rotary and Planetary Ball Mills, Laser Ablation Set up, Laser Raman Set up, Low Temperature Resistivity Set-up, Monochromator and CCD, Multiple Beam, Interferometry Set-up, Optical Spectrum Analyzer, Photoacoustic Spectrometer, Photo-luminescence Fluorescence Spectrometer, Prism Coupler, Powder X-ray Diffractometer, Q Switched High Power Nd:Y AG Laser, Sophisticated Test and Measurement Equipments, Stylus profilometer, Various thin Film Coating Units and Stylus Profilometer, Ultraviolet- Visible-Near Infrared Spectrophotometer, vibrating sample magnetometer.

Scholarships:

The institute offers three kinds of scholarships:

(1) Merit Scholarship: Given to one candidate starting from his/her second year who secures highest CPI in his/her first year. The candidate gets Rs. 500 per month and Tuition Fee is waived.

(2) Merit-cum-Means: Given to candidates with family income less than Rs. 4,50,000/- and with a CPI of 6.5 (or 60%) or above in his/her B.Sc. For general candidates the stipend is Rs.1000/- per month and Tuition fee is waived. For SC/ST candidates, they get Rs.250/- per month as pocket allowance and the Mess bill is also waived.

(3) Based on the first year's performance, female students may be selected for a stipend from Indian Women's Association, Bonn (IWAB). The scholarship amount is one-time and currently fixed at Rs.15,000/-.

Career Opportunities:

The Placement Cell of IIT Guwahati assists students to secure suitable jobs during campus recruitment. Most of the students secure jobs in reputed companies through campus recruitment. Many students opt to undertake research studies and join PhD programmes in the IITs and universities in India and abroad.

Fees and Payment for the first semester*:

Sl. No.	Fee	Amount	
		General/ OBC	SC/ST
1	Tuition and Admission Fee	5800/-	2800/-
2	Mess Related Charges (for Hostellers)	3330/-	3330/-
3	Refundable Deposit	4930/-	4930/-
	TOTAL	14060/-	11060/-

* Subject to change.

INDIAN INSTITUTE OF TECHNOLOGY HYDERABAD

Inventions and innovations are key words on which the foundation of IIT Hyderabad is based. These are also key drivers for the vision of IIT Hyderabad. Our endeavor is to create an institute that will provide a space for free and uninhibited thinking, a space where faculty and students can experiment with novel ideas without the fear of failure. It is our firm belief that such an ambience will foster highest level of research: blue sky research as well as developmental research leading to proof of concepts and prototypes.

IIT Hyderabad started functioning from August 2008 form its temporary campus located in Ordnance Factory, Medak district. In its first year IITH had B.Tech. programs in Computer Science and Engineering, Electrical Engineering and Mechanical Engineering; with total student strength of 111. Keeping its thrust on research, the Ph.D. program was started in January 2009, M.Tech. program in August 2009 and the M.Sc program in August 2010. Since 2009, our maximum effort has targeted capacity building – particularly faculty recruitment. In August 2011, had 68 faculty members in 11 departments – more are likely to join soon and the number will grow rapidly.

IIT Hyderabad has active collaboration with Japan. This involves joint research projects, exchange of faculty and students, and in future some infrastructure development on the main campus. In its endeavor to have global collaborations IITH has MoUs with University of Illinois at Urbana-Champaign and Georgia Institute of Technology - Atlanta. We are in the process of signing MoUs with several other universities in US and Japan.

JENESYS (Japan - East Asia Network of Exchange for Students and Youths), is a government of Japan initiative, with an aim to deepen the mutual understanding among the youth of the East Asian countries who will be the leaders of the next generation. IITH was included in the JENESYS 2009 -2010 program. From the 35 students who applied for the summer internship, 4 undergraduates and 1 Ph.D. student were shortlisted and were asked to make presentations on their respective research proposals. As part of the collaboration with the Japanese Government and IIT Hyderabad, the University of Tokyo in association with Mori Seki Company Limited, Japan, offered the prestigious TODAI Scholarships to undergraduate students of IIT Hyderabad. As part of the agreement, in this academic year 2008-09, ten IITH students who joined the Institute in August 2008 received these scholarships (each of about Rs.1, 00,000). As a special gesture, the ten scholarships will continue for this FIRST batch of undergraduate students, throughout their four years of the BTech program. The mission of IIT Hyderabad's Student Activities Program is to complement the Institute's academic programs and to enhance the overall educational experiences of students through development of, exposure to, and participation in social, multicultural, intellectual, recreational, and other leadership activities.

IIT Hyderabad will always strive to offer an innovative environment to realize the dreams of its faculty and students for higher knowledge, dreams for scientific discovery, and for technology creation. To be recognized as ideators and leaders in higher education and research, and to develop human power with creativity, technology and passion for the betterment of India and humankind.

2 years M.Sc. programme in Chemistry and Physics

Department of Chemistry

The Department of Chemistry is actively conducting research in cutting-edge areas of Organic, Inorganic and Physical Chemistry, as well as fulfilling the needs of the undergraduate program of IIT Hyderabad. At present, there are twenty two research scholars in the department, pursuing PhD, and seven students who are enrolled in the two year MSc program; they are mentored by six faculty members. The department also has several sponsored projects in diverse areas of Chemistry.

The Department, has state of the art research facilities that include, a 400 MHz NMR, a BET analyser, TOC- & CHN-analysers, UV-Visible, FTIR, Fluorescence/lifetime and Raman spectrometers, Differential Scanning Calorimetry, Atomic Force Microscopy (with conductive, electrostatic force, magnetic force, surface potential, nanolithography modes), Differential Thermal Analysis & Thermo Gravimetric Analysis, Gas Chromatography-Mass Spectrometer, HPLC, Glove Boxes, Photocatalytic Reactor, Chemisorption Apparatus, Microwave Synthesizer, Spectroelectrochemical Workstation, High Temperature Furnaces and many such sophisticated set-ups. The

department is also equipped with necessary infrastructure, for carrying out wet chemical syntheses or related experimentation, at both undergraduate and postgraduate level.

The curriculum of the M.Sc. Chemistry program includes a mix of core courses and elective courses in advanced subjects. The courses have been drafted in such a manner, that they imbibe the best of fundamental and advanced areas of chemistry. M.Sc. students have laboratory courses in Organic, Inorganic and Physical Chemistry in the first two semesters. In third and fourth semesters, the MSc students will undertake mandatory research project, and they will be exposed to latest instrumentation methods and synthetic approaches, which will enable them to adapt to any innovative research or educational program with considerable ease and dexterity. Our aim is to produce highly sought after and knowledgeable graduates for pursuing careers with academia, industry and government.

Department of Physics

The Department of Physics currently has six faculty members. Two more members are expected to join by the end of 2011. At present, the department offers a 4 semester M. Sc course in Physics and has vibrant Ph. D program. Currently the active research areas of the department include theoretical and experimental research in Condensed Matter Physics, Particle Physics, Statistical Mechanics, Bio-Physics. Computational Material Science, Superconductivity, Functional Materials, MEMS, Sensors, Flavour Physics, Astro-Particle Physics, Non-equilibrium Statistical Mechanics are some of the areas of expertise available at the Department. Though young the department already has a fully functional Advanced Functional Materials Laboratory (AFML) and MEMS & Micro-Nanosystem Laboratory (MMNL), apart from excellent Laboratories for B. Tech and M. Sc. Physics (for both teaching and research). Currently there are 5 students pursuing their Ph.D. degree in different areas. The Department's vision is to have active research groups in all the fundamental, applied and inter-disciplinary research areas in Physics and have a teaching program with significant research component.

Fee Structure

Sr. No.	Fees	Amount
1	One time Fees	1900/-
2	Deposits (refundable)	5500/-
3	Semester Fee	10000/-(GE/OBC) 5000/- (SC/ST)
4	Hostel Fee	17000/-
5	Medical Insurance	600/- (p. a.)

For more information see http:/www.iith.ac.in

INDIAN INSTITUTE OF TECHNOLOGY KANPUR

Indian Institute of Technology Kanpur is engaged in carrying out original research of significance and technology development at the cutting edge. It imparts training to students so that they become competent and motivated engineers and scientists. The institute celebrates freedom of thought, cultivates vision and encourages growth, but also inculcates human values and concern for the environment and the society.

IIT Kanpur is located on the historic Grand Trunk Road, 15 km west of Kanpur City and is spread over an area of over 420 hectares. This land was gifted by the Government of Uttar Pradesh in 1960 and by March 1963 the institute had moved to its current location. If someone had visited it then, he/she would have seen a standing crop, acacia woods, long winding rows of stately mango trees, flocks of peafowl and a conventional countryside scene of India. The residential campus is planned and landscaped with a lot of environmental concern. Halls of residence, faculty and staff houses and community buildings surround the central academic area to provide easy movement and communication. The rich cultural diversity of India is reflected in the campus activities of IIT-Kanpur as well.

The institute awards Bachelors, Masters and Doctoral degrees in various branches of technology, science, humanities and management. There are about 3150 undergraduate and 1750 postgraduate students, 340 faculty, and, more than 670 supporting staff. It has one of the finest scientific and technological libraries with an online information retrieval system over the campus LAN. In addition to offering formal Undergraduate and Post-graduate programmes, the institute is involved in Continuing Education and Research and Development in areas of value to the Industry, the Government and the academia.

From its very inception, IIT Kanpur has been striving to develop itself into an institution of excellence in education and research in consonance with the contemporary and future needs of India. In meeting this challenge, the institute has been making special efforts to recruit talented faculty on a world-wide basis and to admit brilliant students from all over the country through a careful selection process. Continuous efforts have been made to provide the faculty with well-equipped facilities to enable them to participate in national endeavors in Science and Technology in a major way. In a very short span, the institute has attained recognition as a major centre of learning in Engineering, Science and several Inter-disciplinary areas. The institute has been served by illustrious Directors. Not only has the institute acted as the breeding ground for ideas and talent, it also has recognized and honoured scholars of distinction.
The combined record of its past and present faculty and students along with the alumni spread across the world is awe-inspiring. With path-breaking innovations in both its curriculum and research, the institute is rapidly gaining a legendary reputation.

CAMPUS

The IIT Kanpur campus is a residential campus offering accommodation to the entire faculty, about 700 support staff, and students. The campus has all the amenities for developing the personal, social and academic skills of the community.

Campus Amenities:

- Health Centre (HC) equipped with pharmacy, clinical Laboratory and a 30-bed Indoor Ward. Emergency care is provided round-the-clock.
- Well planned shopping centre which also has branches and ATMs of the State Bank of India and Union Bank of India and Post and Telecom Office.

- Transport facilities to specific locations in city including the railway station.
- Outdoor Courts for Basket Ball, Volley Ball, Tennis and Indoor Courts for Badminton and Squash, Fields for Hockey, Football and Cricket, Gymnastics, Indoor Gymnasium and Olympic-size 8-lane Swimming pool.
- Gliding and Soaring Centre provides an opportunity for learning gliding. Facilities are offered for obtaining glider pilot's license.
- Language Laboratory with computer controlled audio and video components, offers courses in foreign languages like French, German, and Japanese.
- Students Activities Centre (SAC) housing various Hobby Clubs viz., Fine Arts, Photography, Astronomy, Electronics, Debate, Indian Music, Theatre Workshop, Aero-modeling.
- Visitors' Hostel (Guest House with 120 rooms).
- Ten boys' hostels, two girls' hostels and two RA hostels.
- A 1200 capacity Auditorium.
- Parks and green sanctuary areas.

SCIENCE DEPARTMENTS

Department of Chemistry

The department of Chemistry at IIT Kanpur is one of the premier departments in the country today. The strength of the department has been and continues to be - excellence in research and teaching. The faculty of the department is extremely motivated with a strong commitment to teaching and research. On an average the number of papers published by our faculty is 125 per year in journals of high impact factor. The citation index of our publications is also second to none. The faculty has been recognized both nationally and internationally for their contribution in research and teaching. Some of the awards that our faculty members have got include: DST's J.C. Bose Fellowships, Ramanna Fellowships and Swarnajayanti Fellowships; INSA Young Scientist Medals, S.S. Bhatnagar Awards, Associateships and Fellowships of National and International Academies, the Wellcome trust fellowship, etc. The department also attracts funding in the form of projects from various national and international sources such as DST, DAE, DOD, CSIR, Wellcome Trust, etc. The department also conducts consultancy projects with the industries in India and abroad. The alumni of this department occupy high positions in industry and academia both in India and abroad. Their accomplishments have been reflected on the high quality training imparted to the students both at the undergraduate and post graduate level.

The department has well equipped laboratories with Laser induced Fluorescence and Mössbauer Spectrometers, Nanosecond Single Photon Counting Fluorimeter, CCD-X-Ray, State-of-the-Art NMR (400 and 500 MHz) and EPR Spectrometers, ESI Mass Spectrometer, FT-IR Spectrometer, electrochemistry equipment, etc.

Department of Mathematics and Statistics

The department, which started as the Department of Mathematics in 1960, got its new name as the Department of Mathematics and Statistics in 2004. The Department of Mathematics and Statistics shares the vision of the institute in striving for excellence in research and teaching activities. The department has succeeded in this endeavor to a large extent. Over the years, the department has evolved as one of the premier departments in the country providing excellent teaching and research in Mathematics and Statistics. The department takes pride in having produced highly qualified and motivated mathematicians who are providing leadership in different educational institutions and R & D organizations in India and abroad. The vibrant academic environment of the department is nurtured by strongly motivated faculty and students. Contributions by the faculty in research and teaching have won them many recognitions from the scientific community including the prestigious S.S. Bhatnagar award, Meghnad Saha Award, Chandna Award, C.R. Rao Young Statistician Award, Mahalanobis Memorial Medal, INSA Young Scientist Medal and Fellowships of National and International Academies. The department has a number of sponsored projects funded by agencies like NBHM, DST.

The current pace of advancement of technology needs a coherent back up of basic science education and research. The vibrant academic ambience and research infrastructure of IIT Kanpur provides an opportunity to pursue teaching and research in the front line areas of basic sciences as well as in interdisciplinary areas of science and technology. The department encourages interdisciplinary trends with the help of the expertise available at this institute.

The department has a well-equipped PC lab, providing computing and remote access facilities exclusively to the department students. It also has a Parallel Computing Lab and its own computer server. The department has a well stocked departmental library. The P. K. Kelkar library of the institute has been identified as a Regional Library for Mathematics by the National Board for Higher Mathematics (NBHM), thereby catering to the needs of mathematicians in the geographical area.

Department of Physics

The Department of Physics at IIT Kanpur has evolved into India's premier physics department and has made significant contributions to research and development of science in India. IITK alumni may be found among the Faculty of most of the research institutes in India, and some are among the best scientists, teachers and researchers not only in India, but also abroad. The department has at present strength of 34 faculty members, 100 doctoral students and a team of scientific officers, research associates and post-doctoral fellows. The Department of Physics conducts cutting-edge research in a wide range of theoretical and experimental areas. In particular, there are very active groups in Condensed Matter Physics, Theoretical High Energy Physics, Lasers and Quantum Optics, Ion beam Physics and Nuclear Techniques, Nanoscience and Nanotechnology. Many of the faculty also conduct research in cross-disciplinary and converging areas and participate in the activities of interdisciplinary research centres at the Institute.

The department has one of the best low temperature and laser facilities in the country including a liquid Nitrogen Plant and a Liquid Helium Plant. These facilities are further augmented by excellent machine shops and central laboratories for SQUID, High magnetic fields, Laser processing of thin films, EPR, NMR, single-crystal X-ray Diffraction and Electron Microscopy. The department also has acquired modern equipments such as Scanning Tunneling Microscope, Focused Ion Beam, and a tandentron with microbeam facilities. The department has extensive computational facilities, and a reasonably well-stocked library. The Department encourages students to participate in research during their programme through degree projects.

FINANCIAL ASSISTANCE

Merit-cum-means scholarship of Rs.1000/- p.m. plus free tuition is available for up to 25% of the students.

Two Scholarship each of Rs.5000/- p.m. along with a contingency grant of Rs.3000/- per annum per candidate, given by Associated Cement Company, are available for the M.Sc. Students in Chemistry.

M.Sc., Ph.D. (Dual Degree) Students in Physics having good academic performance are entitled to scholarship of Rs.3000/- p.m. (to be revised shortly) for semesters I-IV and they are paid as per approved norms for Ph.D. students from semester V onwards.

FEE CONCESSION

A 50% waiver in tuition fee may be given to some students on case-to-case basis based on their performance in the first semester.

CONCESSION TO SC/ST/OBC CANDIDATES FOR 2010-11 SESSION

In each discipline, 15% seats are reserved for SC, 7.5% seats are reserved for ST, and 27% for OBC (non creamy layer) category candidates. Such candidates must also satisfy the minimum prescribed qualifications. However, admission offers are made to only those who are found suitable through the written test without compromising with candidates of other categories. Railway fare is paid to all SC/ST candidates for joining the institute after selection.

They are given 100% waiver in tuition fee. Also no hostel seat rent is charged if the annual income of their respective parent/guardian is less than Rs. 4,50,000/-.

FEES AND PAYMENT (in Rupees)*:

	GN	**SC/ST**
(a) Semester Fee:	13192/-	10192/-
(b) Refundable Security Deposit:	7000/-	7000/-
(c) One time Admission fee	2750/-	2750/-**
Total	22,942/-	19,942/-

* Tentative and subject to change

**Includes Rs. 550/- as hostel seat rent. SC/ST candidates whose parental income is less than Rs 4.5 lakhs per annum, hostel seat rent of Rs. 550/- shall be waived.

INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR

The Indian Institute of Technology Kharagpur, the first of fifteen IITs set up by the Government of India, is celebrating its diamond jubilee during 2011-12. It is located at Hijli near Kharagpur in the Midnapore (West) district of West Bengal. The institute campus grew around the once infamous Detention Camp of Hijli and sprawls over an area of 2100 acres of land. The student population has increased from 224 in 1951 to about 10,000 in 2011, the faculty strength from 42 to about 550. The institute is completely residential. There are twenty halls of residence for students, including four for girls. There are two outdoor stadiums, a swimming pool, a student centre with a gymnasium, an indoor stadium and six canteens catering food from all regions of India, a large open air theater and two spacious air conditioned auditoriums, a hospital and a shopping centre. The Technology Students' Gymkhana coordinates sports, games and cultural activities to cultivate the spirit of constructive cooperation, leadership qualities and organizational abilities among the students.

The Central library of IIT Kharagpur is one of the largest libraries in science, technology, medical science and management in Asia, having an excellent collection of 3.8 lakh documents, and subscribing to 1250 print journals, 40,000 e-books, and providing online full text access to 10,000 e-journals of the major publishers. The library has access to all Springer e-books published during the year 2005, 2006 and 2007. It is accessible for fourteen hours a day.

The institute provides instruction leading to degrees in various branches of science, technology, medicine, management, architecture and law. It awards graduate, postgraduate and research degrees in various branches covering the above spectrum. It also provides short-term professional courses for executives and technologists from industries and various Government departments.

The objective of the institute is to foster in its students a spirit of free and objective enquiry, to instill into the minds of young learners a sense of purpose and to help them develop a balanced and integrated personality. The postgraduate courses train students for careers in research and development. The research programmes of the institute encompass a wide spectrum ranging from applied industrial problems to those of fundamental nature. Special emphasis is laid on inter-disciplinary programmes. Deep involvement of IIT Kharagpur in research is evident from the fact that the faculty is publishing around 1800 papers per year in international journals. Additionally, around 1000-1200 papers are presented annually in national and international conferences. Yearly the institute is awarded around 150 sponsored research projects valued around Rs.150 crore.

Apart from formal lectures, there is adequate provision for fieldwork, seminars, tutorials, and guided studies to promote a habit of independent thinking. Regular tests/examinations are conducted to monitor student's academic progress as well as overall carrier development.

The Training and Placement section of the institute is very vibrant and it coordinates with the individual departments so that the students are suitably placed at reputed companies / organizations.

From the session 2009-10 IIT Kharagpur has introduced Joint M.Sc.-Ph.D. programmes in Chemistry, Geology, Geophysics (currently in abeyance), Mathematics and Physics instead of M.Sc. Two Year programmes. The admissions to these programmes in 2012 will be through JAM-2012. A student admitted to a Joint M.Sc.-Ph.D. programme will be eligible for consideration to take admission in to Ph.D. programme provided the student obtains a certain minimum CGPA at the end of the fourth semester. Otherwise the student will have to leave with a M.Sc. degree. A student may also on his/her own, decide not to continue with the Ph.D. programme and leave with a M.Sc. degree after successful completion of all the academic requirements for the first four semesters.

Department of Chemistry

The Department of Chemistry with its multifaceted research activities and excellent facilities provides one of the best academic environments in the country. The department is pursuing research in both basic and applied areas of Chemistry. Over 120 students are currently enrolled in the

Ph.D. programme and about 80 students are pursuing their Masters degrees. The average number of publications in highly reputed international journals from the department exceeds 150 per year. The faculty members are engaged in a large number of sponsored research grants from extramural agencies. The department is equipped with state of the art instruments inclusive of single crystal X-ray diffractometer, high resolution NMR, micro Raman and high performance computational facilities.

The department offers (i) M.Sc. Integrated 5-year programme in Chemistry, and (ii) Joint M.Sc.-Ph.D. programme in Chemistry. A major highlight of the integrated M.Sc. programme is a judicious amalgamation of science and engineering subjects with core chemistry courses and a research intensive final year project, while that of the Joint M.Sc.-Ph.D. programme is that it offers a borderless course structure with opportunity to pursue cutting edge interdisciplinary research. The Joint M.Sc.-Ph.D. programme has course work for the first two years with a research project from the third semester.

Every year the department attracts a good number of students with high JAM ranking from reputed colleges all over the country. The Masters and Ph.D. graduates from this department find placement in high ranking universities/institutes in India, USA and Europe as well as in industry.

Department of Geology and Geophysics

The Department of Geology and Geophysics offers Joint M.Sc.-Ph.D. programme in (i) Geology and (ii) Geophysics. The aim of these two courses is to groom students to enter upon careers in the field and in the laboratory. ***Currently, the Joint M.Sc. Ph.D. programme in Geophysics is kept in abeyance.*** Over the years a large number of graduates of this Department have come to occupy important positions in professional organizations like the ONGC, GSI, AMD, etc., in several universities and research organizations both in India and abroad. The Department counts among its faculty and alumni one Padma Shri, five Bhatnagar Prize winners, two Vice-Chancellors, one Director General of GSI, Directors of AMD and ONGC, and fellows of the National Academies of Science and Engineering. Students will have the opportunity to participate in activities of the Earth Science Study Circle, which promotes both curricular and extra-curricular activities.

The Department is actively engaged in carrying research wok in the field of Paleoclimatology, Isotope Geology, Groundwater geology- and geophysics, Seismic Reflections and Refractions, Numerical Modeling and inversion of geophysical data, Seismic and Electrical Tomography, Seismic and Electromagnetic wave propagation, Earthquake and Engineering Seismology, Radionuclide Pollution and modeling, Gravity, Magnetics, Magnetotellurics, deep crustal studies, Electrical and Electromagnetics, Structural Geology, Precambrian Geology, Igneous and Metamorphic Petrology, Ore-Geology, Geochemistry, Environmental Earth Science, Sedimentary Geology, Remote-sensing and GIS, Sequence Stratigraphy, Biostratigraphy, Vertebrate Paleontology, Well-logging, etc. The Department has high end equipments such as stable isotope mass spectrometer, EPMA, SEM and LA-ICP-MS. Other facilities include AMS and global seismological network with a broadband seismological observatory. The Department runs a collaborative research and training programme with Cambridge University (U.K.). The Department has contributed textbooks to the national and international Earth Science community.

Department of Physics

The Department of Physics and Meteorology started its academic programmes right from the inception of IIT Kharagpur. The distinctive character of this department has made it especially conducive to postgraduate studies and research. There are 26 faculty members, two research associates and about 65 research scholars pursuing Ph.D. in the department. The department offers (i) Five-year integrated M.Sc. Programme in Physics, (ii) Joint M.Sc.-Ph.D. Programme in Physics, (iii) Two-year M. Tech Programme in Solid State Technology, and (iv) Ph. D. in Physics.

In the initial two years of the Joint M.Sc.-Ph.D. programme, students are offered basic courses (Theory/ Laboratory) on classical mechanics, quantum mechanics, statistical mechanics, electronics, electrodynamics, mathematical methods, nonlinear dynamics, computational methods, modern optics, nuclear and particle physics, condensed matter physics, atomic and molecular spectroscopy etc. Besides the above basic courses, electives from the variety of areas of physics, such as, astrophysics and cosmology, superconductivity and magnetism, soft condensed matter physics, nanoscience and technology, nonlinear instabilities, complex systems, gravitation, frontiers of radiation science and technology, high-energy physics, non-linear optics, photonics, semiconductor physics, surface physics, quantum field theory etc. are also offered to bring the students up-to-date with the current status of these areas.

In the second year of the Joint M.Sc.-Ph.D. programme, students are required to undertake one year long project (either theoretical or experimental), which involves investigative work leading to a dissertation. Also, the students are trained to use various experimental equipments like spectro-photometer, diffracto-meter, Gamma ray spectrometer, impedance analyzer etc. It is observed that such training helps the students in acquiring a placement in research and development (R & D) sector of the different industries in India and abroad. The department has excellent infrastructural support including modern computers and modern instruments in different teaching laboratories.

Advanced research facilities are available in the department. The advanced research facilities of the other departments are also available for uses whenever needs arise. The faculty of the department is actively engaged on a broad range of research activities, almost evenly distributed between experimental and theoretical areas of research. The major research areas however, include Atomic Physics, Atmospheric Sciences, Astrophysics and Cosmology, Biophysics and Complex Systems, Chaos and Non-Linear Dynamics, Condensed Matter Physics, Ferroelectrics, Gravitation, High-energy and Particle Physics, Hydrodynamics and Pattern-forming instability, Magnetism including Spintronics, Nanotechnology, Nuclear Physics, Photonics & Optoelectronics, Quantum Computation and Information, Quantum and Non-Linear Optics, Renewable Energy sources, Semiconductor Devices, Surface Physics and Thin Films, and String Theory. There exists very good intra- and inter—departmental interaction leading to a healthy research environment. Faculty of the department is involved in various R & D projects in the above mentioned areas, which have both national and international collaborative elements. The department has a number of theoretical and experimental projects in different branches of physics

funded by various national agencies under the supervision of different faculty members.

Further information about the Department of Physics & Meteorology can be had from the following link: **http://www.phy.iitkgp.ernet.in/**

Department of Mathematics

Since its inception in 1951, the department has been offering different undergraduate and postgraduate programmes as per the need of the time and availability of its expertise in different topics of Mathematics, Statistics and Theoretical Computer Science. Over the years it has pioneered in publishing internationally acclaimed research articles in different topics of Pure and Applied Mathematics, Statistics and Theoretical Computer Science. Today many of its alumni are occupying very high positions in reputed educational/ R & D institutes in India and abroad.

The department offers (i) Five-year Integrated M.Sc. in Mathematics and Computing (ii) Joint M.Sc.-Ph.D. in Mathematics, (iii) Two year M.Tech. in Computer Science and Data Processing, and (iv) Ph.D. in Mathematics.

The department has four computer labs with several UNIX based powerful workstations and all these systems are connected to the institute LAN. Also Department has a Library with reasonably good number of books.

The major thrust areas of the department are Functional Analysis, Fluid Mechanics, Optimization and Numerical Analysis, Decision Theory and Queueing Theory. Moreover, the faculty and the research scholars of the department are engaged actively in various other frontier areas of Pure and Applied Mathematics, Statistics and Theoretical Computer Science. The department is involved in various research projects funded by different sponsoring agencies like CSIR, DST, ISRO etc.
For more information, see **www.webmath.iitkgp.ernet.in**

FINANCIAL ASSISTANCE FOR JOINT M.Sc.-Ph.D. STUDENTS

(i) Merit-cum-means scholarship of Rs. 1000/- p.m. for 25% of the students.
(ii) SC/ST students whose parental income is not more than Rs. 50,920/- per annum are entitled to free hostel accommodation, free basic menu and Rs. 250/- p.m. as pocket allowance for ten months.
(iii) All admitted students will be given waiver of tuition fee for the first two years.
(iv) Students not covered under items (i) and (ii) will be paid scholarship of Rs. 1000/- p.m. for the first four semesters provided they give an undertaking to continue with the Ph.D. programme if selected based on the prescribed criteria.
(v) A student enrolled for Ph.D. programme will get a fellowship of Rs. 12,000/- p.m. for the first two years of his Ph.D. programme and Rs. 14,000/- p.m. for the next two years.

Fees and other payments*:

Caution Money	Rs. 6000/-
One time fee	Rs. 3100/-
Semester fee	Rs. 3650/
Hostel charge (includes mess advance)	Rs. 16,250
Training and Placement	Rs. 500/-
Student Welfare Policy	Rs. 650/-
Student Brotherhood Fund	Rs. 100/-
Total	**Rs. 30,250/-**

***** Tentative and subject to change.

Students may note that IIT Kharagpur does not consider open university and correspondence course degrees for admission to Joint M.Sc.-Ph.D.

INDIAN INSTITUTE OF TECHNOLOGY MADRAS

The Indian Institute of Technology Madras belongs to the genre of new generation institutes of national importance in higher education in the field of Technology and Science. The institute has grown from strength to strength ever since it obtained its charter from the Parliament of India in 1961 and has established itself as a premier centre for education, research, consultancy and technological/scientific development. It all began in the year 1956 when Pandit Jawaharlal Nehru, the then Prime Minister of India, was on an official visit to West Germany and was offered assistance by the Government of the Federal Republic of Germany, to set up a higher technological institute in India. This resulted in the signing of the first Indo-German Agreement in Bonn in 1958, for the establishment of an Indian Institute of Technology at Madras, with assistance from Germany in terms of faculty, technical staff and equipment.

The institute has sixteen departments, which offer undergraduate and post-graduate courses in various disciplines of engineering and pure sciences. The Central Library and Computer Centre of the institute are well equipped to fulfill the needs of the faculty and students. There are many advanced research centres in the institute having excellent facilities for carrying out research in frontier areas of science and technology. The institute has about 470 faculty members, 6200 students and 735 administrative and support staff.

The institute with a self contained beautiful campus of 630 acres is located in South Chennai, on Sardar Patel Road. It is at a distance of about 14 kilometres from the Central Railway Station as well as from the Airport, and is well connected with buses to the city.

The campus is residential, with 17 student hostels (Two hostels exclusively for girl students) and quarters for the families of faculty and staff. The general facilities for the residents of the campus include two schools (one Kendriya Vidyalaya and another with IIT Management), Banks (SBI, Canara Bank and ICICI Banking facility), Post Office, Shopping Complex, Hospital, and an Open Air Theatre. The campus houses a natural forest, which is a haven for spotted deers and black bucks. It offers several student amenities such as Swimming Pool, Gymnasium, Canteens and Play Grounds. Campus bus transportation facility is also available.

Master of Science Programmes

Indian Institute of Technology Madras offers two-year M.Sc. programmes in Chemistry, Mathematics and Physics. The M.Sc. programme has a credit based curriculum. Besides a common core programme, students have opportunity to register for a number of elective courses to match their interests. The evaluation is based on continuous assessment through quizzes, assignments and tests.

Scholarships:

Merit scholarship: On the basis of the performance at the end of the 1st semester, 25% of the students admitted or 25% of the sanctioned strength, whichever is less, will be awarded merit scholarship for the first two semesters of the programme and renewal for III and IV semesters will be based on the performance in the II and III semesters, at the rate approved by the GoI from time to time (presently Rs.1000/- per month). These students are exempted from payment of tuition fees.

Fee Waiver: In addition, 10% of the students admitted or 10% of the sanctioned strength, whichever is less, are exempted from payment of tuition fees for the first two semesters of the programme and renewal will be based on the performance in the II and III semesters. Out of the remaining students, those securing CGPA of not less than 6.5 and whose parental income is not more than Rs.4.5 lakhs per annum will be awarded 50% waiver of tuition fee.

Department of Chemistry

The Department of Chemistry has 32 faculty members with expertise in diverse areas of Chemistry. The Department typically has 150+ students registered for Ph.D and 80+ students registered for M.Sc. In addition, the Department is supported by many technical and other staff members. The 2 year (4 semesters) M.Sc course is an internationally well-recognized programme and is designed to expose students to all important branches of Chemistry.

New curriculum and syllabus are in place for the M.Sc programme from July 2011 onwards. Core theory and laboratory courses are offered during the first three semesters and elective courses in highly specialized subjects in the fourth semester. The core theory courses are designed to expose the students to advanced levels of Chemistry in all the areas. The core laboratory courses are designed to give practical training in organic, inorganic and physical chemistry. In addition, a computational and spectroscopy laboratory course is also offered as a core laboratory course to train the students in these areas. M.Sc students have an option to either carry out a project (9 credits) under the supervision of a faculty or take additional three elective courses (instead of the project) to earn the 9 credits. The project work is expected to be an original piece of research work and it is meant to prepare students adequately for a career in research. The duration of the project is for 2 semesters in the second year of the programme. Students who get more than 8.0 CGPA in the M.Sc programme can be directly admitted to Ph.D programme with an interview at the Department level. They need not write GATE or CSIR/UGC-NET examinations. The top two first year M.Sc students who have secured the highest All India JAM rank (within first 50 ranks) are eligible for Professor and Mrs. V. Ramamurthy scholarship.

The Department is endowed with excellent instrumentation (UV-Vis, FTIR, Fluorescence, ESI-MS, NMR, powder and single crystal XRD, TGA and DSC, AFM-SPM, CHN analyzer etc.) and computational facilities. Students have access to Scifinder, a Chemistry on-line database, and several on-line journals. With funding from MHRD and DST more and more facilities are being added every year to make the Department one of the best in the country and comparable to top ranking universities around the Globe. The National Centre for Catalysis Research (NCCR), MRI-MRS Centre and DST Unit of Nanoscience are part of the Department. In addition to the Central Library the Department Library houses books that are prescribed for the courses. For further information, students are encouraged to contact the Head of the Department (*cyhead@iitm.ac.in, cyoffice@iitm.ac.in*).

Department of Mathematics

The Department of Mathematics is engaged in teaching and research in many areas of Pure, Applied and Computational Mathematics. The department offers M.Sc. (two-year programme) and Ph.D. Degree programmes in Mathematics, and a two-year M.Tech. Degree programme in Industrial Mathematics and Scientific Computing. The outgoing students of the department are recruited by leading industries through the institute Placement Office. They hold high positions in reputed institutes, universities and companies around the globe.

The core courses for the M.Sc. programme are offered in the first three semesters. These courses include subjects such as Algebra, Discrete Mathematics, Linear Algebra, Ordinary and Partial Differential Equations, Calculus of Variations, Mechanics, Continuum Mechanics, Real Analysis, Complex Analysis, Functional Analysis, Topology, Measure and Integration, Probability Theory, Principles of Computing and Numerical Analysis. In the second year, students can choose electives from a rich menu of subjects such as Computational Fluid Dynamics, Combinatorial Optimization, Commutative Algebra, Fuzzy Sets, Operator Theory, Fixed Point Theory and Applications, Graph Theory, Stochastic Processes and Operations Research. The students will also do a project, which will introduce them to advanced topics and research methodologies. Seminar and viva-voce are also part of the programme.

The department has 31 faculty members. In addition to teaching and research, they are actively engaged in continuing education and consultancy. Several faculty members have authored books which are used as texts in many universities. Many of them coordinate important projects funded by national agencies/organizations like CSIR, DST, ISRO, DRDO, DAE and NBHM. Many of them are recipients of national and international awards for their teaching and research. Their research areas include Real and Complex Analysis, Functional Analysis, Operator Theory, Harmonic Analysis and Wavelet Theory, Applied Algebra, Commutative Algebra, Algebraic Geometry, Algebraic Topology, Numerical Analysis, Computational Fluid Dynamics, Optimization Theory, Differential Equations, Inverse and Ill-Posed Problems, Mathematical Physics, Fluid Mechanics, Applied Probability and Stochastic Processes, Graph Theory, Fuzzy Sets, Mathematical Logic and Theoretical Computer Science.

The department is well-equipped with two computer labs meant for research scholars and post-graduate students. Each lab has about 30 systems, high-end servers and workstations. All the machines are connected under institute network system. The department has a separate library to cater to the needs of our students and faculty.

The department conducts weekly seminars and invited lectures addressed by visiting mathematicians and faculty from IIT and other institutes. The department arranges two annual events, namely, the National Symposium on Mathematical Methods and Applications held on 22nd December commemorating the birth anniversary of Indian Mathematical genius Srinivasa Ramanujan and FORAYS – a MATHFEST conducted by students. Besides, the faculty members organize National/International Conferences/ Workshops periodically.

Department of Physics

The Department of Physics currently has 44 faculty members and 25 technical and supporting staff members. It offers B.Tech. in Engineering Physics, M.Sc. (2 year programme) in Physics, B.S.-M.S. Dual Degree in Physics (5 year programme), M.Tech. (2 year programme) in Solid State Technology and Ph.D. degree in Physics.

The core courses offered in the department include Classical Mechanics, Mathematical Physics, Statistical Physics, Quantum Mechanics, Electromagnetic Theory, Condensed Matter Physics, Electronics, Atomic and Molecular Physics and Nuclear and Particle Physics. A number of elective courses are offered - these courses include Condensed Matter Physics, Lasers, Modern Optics, Digital Electronics, Low Temperature Physics, Physics and Technology of Nanomaterials and Theoretical Physics. The students undertake Project works in various areas to gain exposure to various advanced level research topics in physics.

The research and development activities of the department encompass different areas of condensed matter physics, lasers, photonics and theoretical physics. Some of these areas are: Low Temperature Physics, Superconductivity, Thin Films, Heterostructures and Nanostructures, Microwave Materials, Magnetic Materials and Magnetic Resonance, Ultrafast Phenomena, Holography, Imaging and Photonic Materials, Photonics and Laser Physics, Semiconductor, Transport and Dielectric Properties of Material, Solid State Ionics, Physics and Application of Nanomaterials, Atomic and Molecular Physics, Nonlinear Dynamics and Chaos, Classical and Quantum Field Theory, Quantum Computing and Quantum Information Theory, String Theory, Theoretical Biophysics, Theoretical Condensed Matter Physics, Complex Fluids and Experimental High Energy Physics.

The Department is equipped with several major facilities in its laboratories. These include Helium and nitrogen liquefiers, thin-film coating units, He-Ne lasers, argon ion laser, excimer laser, ruby laser, Nd-YAG Laser, Tunable Diode lasers, X-ray diffractometer UV-Visible Spectrometer, Confocal Raman Spectrometer, Vibrating sample Magnetometer, MPMS SQUID Magnetometer, TGA and DSC, impedance spectroscopy, etc. The department has a modern applied optics laboratory and facilities such as physical properties measurement system (PPMS), HFCVD, MWCVD, FESEM and HRTEM are available as part of the Nano functional materials technology centre (NFMTC). A machine shop facility is available to assist research and teaching laboratories.

A department computing facility (DCF) is available for research-oriented and general purpose computing by physics students and faculty. At present there are several desktop machines, servers running on GNU/Linux, with most of the standard scientific computation packages installed. The department publishes quality research papers in reputed international journals. Further information is available in the website *http://www.physics.iitm.ac.in.*

Fees and Payment (in Rs.):

(a)	Tuition and Admission fee	6,250
(b)	Refundable Deposit	2,000
(c)	Hostel fee, including advance dining charges of Rs.10,000 for the first semester and medical insurance annual premium of Rs.742.	16,842

Tuition fee of Rs. 3,000/- per semester is exempted for SC/ST students.

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Indian Institute of Technology Roorkee is an institute with long and illustrious history. Its eventful journey began in 1847 as Roorkee College, the first Engineering College in British Empire which was later renamed as Thomson College of Civil Engineering in 1854 and again as Thomson College of Engineering in 1945, when other engineering disciplines were introduced. On November 25th 1949 it became University of Roorkee, the first Engineering University of Independent India and finally an IIT on September 21st 2001 by an Act of Parliament.

The Institute has 18 academic departments, supported by 6 academic and service centres (like Institute Computer Centre, Information Superhighway Centre, Instrumentation Centre etc.), offering 22 undergraduate programmes (including 5 IDD programmes, 6 Integrated M.Sc./ M.Tech. programmes) and 51 postgraduate courses in engineering, architecture, sciences, computer applications and business administration, besides research programmes at doctoral and post-doctoral levels in cutting-edge technology and sciences. One of the academic departments namely the department of Pulp and Paper Engineering is located at the Saharanpur Campus (approximately 50 km from Roorkee) because of proximity with Paper Industries in Saharanpur.

The IIT Roorkee has a highly qualified and motivated faculty of about 400 members who are engaged in research and consultancy in addition to teaching. The faculty members offer their expertise through consultancy services to private/public sector industries as well as to government agencies. The institute has about 3500 undergraduate students, 1800 postgraduates and nearly 950 research scholars.

There are a number of academic and research centres engaged in interdisciplinary research, and collaborative programs exist with many institutions in India and abroad. Several central facilities such as Central Library having more than 3,20,000 volumes of books and periodicals, Information Superhighway Centre with Internet connectivity, a modern Computer Centre and Institute Instrumentation Centre with highly sophisticated analytical instruments exist on the campus.

The Institute prepares students to meet ever-increasing technological and social challenges with its traditions of self-discipline, hard work, all-round personality development and innovative approach to problems.

The IIT Roorkee is a fully residential Institute, with well-designed hostels (Bhawans) for both boys and girls, sprawling sports ground, a modern swimming pool, boat club and a host of students clubs with facilities for different games including Tennis, Squash and Billiards. Societies and Associations for activities like NCC, Rangering and Rovering, Mountaineering and Trekking provide excellent opportunities to the students for their self-development.

Roorkee Town

Roorkee, a quiet town of moderate size in the district of Hardwar (Uttarakhand), is located on the banks of the Upper Ganga Canal, which takes off at Hardwar. It is about 30 km south of the Shivalik range of the mighty Himalayas, about 170 km to the north of Delhi and is situated on Amritsar-Howrah main railway line. Roorkee is linked by rail to many important mega cities such as Delhi, Kolkata and Mumbai. Roorkee is also well connected by road being located on the Delhi-Hardwar National Highway (NH 58), and on the Roorkee-Panchkula Highway (NH 73). The Roorkee town (Latitude 29.0^o 52' N and Longitude 77.0^o 53' 52" E) is 268 m above mean sea level and has a cold winter. The summer months, though hot, are moderated by the proximity of the Shivalik. The rainy season is mainly between July and September with an average rainfall of 1050 mm.

Apart from the institute, which is situated in a 150-hectare campus, Roorkee town is an important centre of engineering activity. It has the Central Building Research Institute, the National Institute of Hydrology, the Irrigation Research Institute, the Irrigation Design Organization and the headquarters of Bengal Engineering Group and Centre along with an important Army base.

The institute campus is 2.5 Km from the Roorkee Railway Station and is only 200 m from the Roadways Bus Station.

Institute Scholarships

The Institute offers a certain number of merit-cum-means scholarships to the deserving students in M.Sc. courses on merit, based on the student's cumulative performance as reflected in CGPA and their economic status. One scholarship in M.Sc. final year is awarded for the best performance in the previous year, in Mathematics, Physics and Chemistry departments by rotation. Some trust scholarships and tuition free-ships are also available.

In M.Sc. Biotechnology a scholarship of Rs. 1200/- per month is available for meritorious students.

All SC/ST category students whose parents/guardians income is less than Rs. 4.50 lakh per annum and wish to avail the facility of scholarship of Rs.1000/- per month or free messing and Rs. 250/- per month for 10 months are required to give their options and submit their parents/guardians income certificate in the prescribed proforma obtainable from the Academic Section.

Only one scholarship / assistantship is admissible to a student at a time.

Department of Biotechnology

The Department of Biotechnology, established in 1981, offers 2-year M.Sc. Biotechnology (sponsored by Department of Biotechnology, Government of India) and Ph. D. & B.Tech. (Initiated in 2005) Biotechnology programmes. Research is carried out in identified thrust areas in the field of Molecular Biophysics, Genetics, Microbiology, Animal and Plant Biotechnology, Protein Biochemistry and Crystallography, Bioinformatics, Biochemical Engineering and Molecular Biology. Several sponsored research projects have been undertaken in the specialized areas of protein–DNA interactions, 3D Structure and Molecular Dynamics of biological molecules based on Nuclear Magnetic Resonance (NMR) spectroscopy, DNA-Anticancer Drug interactions, Structure based Drug Designing, Plant defense proteins, Genetic Engineering of Nitrogen Fixation, Genome and Genomics of Wheat and Rice, Plasma Membrane based Enzymes, Therapeutically important Viral Enzymes and Proteins, Molecular Mechanism of Hormone Action and Endocrine Disruptors, Microbial Biosynthesis of Enzymes and Organic Acids, Biocatalysis, Biofuels, Biofilms, Cell Surface Antigens, Molecular Biology of abiotic stress in plants, plant therapeutic proteins, biosensors, aptamers, drug discovery for antimicrobials and microbial pathogenesis. Research collaboration has been initiated/exists with institutions such as Tata Institute of Fundamental Research (TIFR) Bombay, Institute of Genomics and Integrative Biology Delhi, Central Drug Research Institute (CDRI) Lucknow, International Centre for Genetic Engineering and Biotechnology (ICGEB), All India Institute of Medical Sciences (AIIMS) New Delhi, Punjab Agricultural University Ludhiana, Indian Agricultural Research Institute (IARI) New Delhi, National Dairy Research Institute (NDRI) Karnal & Birla Institute of Technology & Science (BITS) Pilani-Goa campus.

Department of Chemistry

The Department of Chemistry was established 1960 and has a glorious record in academic activities. Currently the department has 24 faculty members earnestly devoted to teaching and frontline research in various areas in chemistry.

The total number of seats in M.Sc. (2 year programme) is 25. The department offers specialization in Organic, Inorganic, Physical and Analytical Chemistry. In the fourth semester each M.Sc. student is required to carry out a laboratory project work under supervision of a faculty member and submit dissertation along with a seminar presentation.

The department is well equipped with instrumental facilities like HPLC, GC, GC-Mass, CHNS analyzer, AAS, Electrochemistry system, Anodic stripping voltameter, Muffle furnace, nuclear detectors, Fluorimeter, UV-visible spectrophotometer, IR etc. Several other sophisticated instrumental facilities like NMR (500 MHz), X-ray diffractometer (single crystal and powder), EPMA, XRF, SEM-EDAX, TEM, AFM, LA-ICPMS, VSM and SQUID magnetometer, Fluorescence life time spectrometer, Mossbauer spectrometer etc. are also available at the Institute Instrumentation Centre.

Placement opportunities through Institute's placement cell are also available. In addition, the department also offers a 2 year M.Tech. programme in Advance Chemical Analysis, a 5-year integrated M.Sc. (Chemistry) programme with admission through JEE and Ph.D. programmes in all major areas in chemistry.

Department of Earth Sciences

The Department of Earth Sciences, formerly the Department of Geology and Geophysics, was established in 1960. During the span of about five decades, the Department has become one of the foremost centers of research, postgraduate training and consultancy in the field of Earth Sciences. Presently, the Department runs two year M.Sc. course in Applied Geology, three year M.Tech. courses in Geological Technology & Geophysical Technology and five year Integrated M.Tech courses in Geological Technology & Geophysical Technology. The Department has been recipient of financial aid under the prestigious Special Assistance and COSIST programmes of UGC (Ministry of HRD, Govt. of India).

Research work in several interdisciplinary areas and consultancy programmes constitute an integral part of the Departmental activities. The faculty is engaged in a number

of research projects sponsored by the Government of India agencies like CSIR, DST, ONGC, AICTE etc. Consultancy projects sponsored by agencies such as U.P. Irrigation, Ministry of Environment, UNICEF, ISRO, NTPC, Tehri Hydro Development Corporation, and various river valley projects etc. have been successfully implemented.

The focus of scientific projects has been on the development of technological skills and applications on the following themes in the Himalayan origin :

- Landslide mapping, landslide hazard zonation, remediatides etc.
- Seismotectonic evaluation of river valley projects, seismic hazard mapping and earthquake damage surveys
- Snow cover and glaciological studies, glacial terrain mapping
- Land use land cover mapping in mountaineer terrain
- Environmental geology, Himalayan lake and river water characteristics
- Magneto-telluric investigations
- Geophysical Inversion Studies
- Mathematical and Numerical Modelling Geophysics
- Remote Sensing and GIS Investigations

Department of Mathematics

The Department of Mathematics attained its present status of an independent department in 1960. Growing steadily, today the department not only teaches various courses in Mathematics to undergraduate and postgraduate students of different engineering and science departments, but is also running its own M. Sc. courses in Applied Mathematics and Industrial Mathematics & Informatics. From the academic session 2007-2008, the department has started a 5-year integrated M.Sc. programme in Applied Mathematics.

The department also coordinates an interdisciplinary MCA Course. Nine batches of MCA have passed out and they have been well placed in the Industry. The students have got jobs in the companies like Microsoft Corporation, TCS, Infosys, Wipro, Oracle India Ltd, IBM India Ltd, Cognizant, CSC Ltd., Accenture Kairus Software, Tata Steel, Market Rx, etc with a very good package. Besides the central computing facilities of the Institute, the department has its own state of the art Computational Laboratory, Image Processing Lab, Parellel Processing Lab & Mathematical Modeling Lab. The department has a very well stocked library which is self sufficient in providing text books to M.Sc. and M.C.A. students.

The department offers facilities for research work leading to Ph.D. in various fields of Pure and Applied Mathematics. The department has a mathematical modelling laboratory and a PC based system analyzer and a PC based sound analyzer. Department has research collaborations with different national and international organizations. The Department of Mathematics offers consultancies in mathematical modeling and solution of various industrial and real life problems. The faculty also joins different industrial research and consultancy teams to mutually solve problems of higher mathematical contents.

Department of Physics

The Physics Department was opened in 1960 and now has emerged as an active centre of quality teaching and research. Today it stands as one of the leading departments in the country, well known for its high quality teaching and research. Besides teaching the undergraduate engineering students, the faculty of the department provides active leadership in training the postgraduate students. The department offers M.Sc. (2-year post B.Sc. programme), M.Sc. (5-year integrated programme), and M.Tech. (Solid State Electronic Materials) degree. Research facilities leading to Ph.D. degree are available in all major branches of Physics. The faculty of Physics department has been actively pursuing research in important areas like High-T_C superconductivity, heavy fermions, magneto-optical properties of transition metal compounds, conducting polymers and device applications, smart electro ceramics and biomaterials, nano-physics, scattering of spin-polarized electrons with atoms and molecules, nuclear structure physics, theoretical nuclear physics, particle high energy physics, Quark-Gluon Plasma Theory, Gauge Field Theories, String Theory, Lightning, atmospheric, cloud formation and precipitation, tropospherics- ionospheric interaction, ionospheric chemistry, Auroral and airflow studies, fibre optics and semiconductor photonics. The department is also a member of the International Network of Nuclear Structure and Decay data evaluators under I.A.E.A. The Experimental and theoretical research activities in the department are recognized by CSIR, AICTE, DST and ISRO etc. and a number of research projects funded by these agencies are in progress. The achievements in research have been well recognized by U.G.C. in selecting this department under Special Assistance programme in 1979 in the thrust areas of Condensed Matter Physics, and Atomic and Molecular Collision Physics. The programme was further extended in 1985 and 1992. The U.P. Council of Science and Technology has also selected the department as a Centre of Excellence in Physics. The department has also received support under the FIST programme of DST.

As a member of the Theoretical Physics Seminar Circuit programme (TPSC), the department is able to invite a large number of eminent scientists from other institutions in India. The department has several national and international collaborations which include collaborations with universities and research institutes in USA, UK, France, Canada, Portugal, Germany, Japan, Poland, Italy, Netherlands, South Korea and Hong Kong.

Brief description of curriculum and other information regarding each course could be obtained on the website of IIT Roorkee : www.iitr.ac.in/jam.

Institute Fees* to be Deposited for Admission

Sl. No.	Fees	M.Sc. / M.Tech. (Sciences)	MCA
1.	Semester fees: a)Tuition fees** b)Other fees c)Hostel fees***	 Rs. 3,000/- / 25000/- Rs. 2,250/- Rs. 5,500/-	 Rs. 10,000/- Rs. 2,250/- Rs. 5,500/-
2.	One Time fees	Rs. 2,790/-	Rs. 2,790/-
3.	Yearly fees for GIS, Bhawan fund	Rs. 380/-	Rs. 380/-
4.	Refundable deposits	Rs. 4,000/-	Rs. 4,000/-
Total		Rs. 17,920/- (M.Sc.) Rs. 39,920/(M.Tech)	Rs. 24,920/-

* Tentative and subject to change

** Not chargeable from SC/ST students

*** Includes elect. advance Rs. 2,000/- to be adjusted and Rs. 1,500/- for common facilities to be charged from all students.

Institute Fees to be Deposited for Admission

Sl. No.	Programme	General/ OBC	SC/ST/PD	Mess Security
1.	M.Sc.	17920/-	14920/-	9500/-
2.	M.Tech Geological/ Geophysical Technology	39920/-	14920/-	9500/-
3.	Master of Computer Application	24920/-	14920/-	9500/-

16. SYLLABI FOR TEST PAPERS

16.1 Biotechnology (BT)

The Biotechnology (BT) test paper comprises of Biology (44% weightage), Chemistry (20% weightage), Mathematics (18% weightage) and Physics (18% weightage).

BIOLOGY (10+2+3 level)

General Biology: Taxonomy; Heredity; Genetic variation; Conservation; Principles of ecology; Evolution; Techniques in modern biology. **Biochemistry and Physiology**: Carbohydrates; Proteins; Lipids; Nucleic acids; Enzymes; Vitamins; Hormones; Metabolism – Glycolysis, TCA cycle, Oxidative Phosphoryation; Photosynthesis. Nitrogen Fixation, Fertilization and Osmoregulation; Vertebrates - Nervous system; Endocrine system; Vascular system; Immune system; Digestive system and Reproductive System. **Basic Biotechnology**: Tissue culture; Application of enzymes; Antigen-antibody interaction; Antibody production; Diagnostic aids. **Molecular Biology**: DNA; RNA; Replication; Transcription; Translation; Proteins; Lipids and Membranes; Operon model; Gene transfer. **Cell Biology**: Cell cycle; Cytoskeletal elements; Mitochondria; Endoplasmic reticulum; Chloroplast; Golgi apparatus; Signaling. **Microbiology**: Isolation; Cultivation; Structural features of virus; Bacteria; Fungi; Protozoa; Pathogenic micro-organisms.

CHEMISTRY (10+2+3 level)

Atomic Structure: Bohr's theory and Schrodinger wave equation; Periodicity in properties; Chemical bonding; Properties of s, p, d and f block elements; Complex formation; Coordination compounds; Chemical equilibria; Chemical thermodynamics (first and second law); Chemical kinetics (zero, first, second and third order reactions); Photochemistry; Electrochemistry; Acid-base concepts; Stereochemistry of carbon compounds; Inductive, electromeric, conjugative effects and resonance; **Chemistry of Functional Groups**: Hydrocarbons, alkyl halides, alcohols, aldehydes, ketones, carboxylic acids, amines and their derivatives; Aromatic hydrocarbons, halides, nitro and amino compounds, phenols, diazonium salts, carboxylic and sulphonic acids; Mechanism of organic reactions; Soaps and detergents; Synthetic polymers; Biomolecules – amino acids, proteins, nucleic acids, lipids and carbohydrates (polysaccharides); Instrumental techniques-chromatography (TLC, HPLC), electrophoresis, UV-Vis, IR and NMR spectroscopy, mass spectrometry.

MATHEMATICS (10+2 level)

Sets, Relations and Functions, Mathematical Induction, Logarithms, Complex numbers, Linear and Quadratic equations, Sequences and Series, Trigonometry, Cartesian System of Rectangular Coordinates, Straight lines and Family, Circles, Conic Sections, Permutations and Combinations, Binomial Theorem, Exponential and Logarithmic Series, Mathematical Logic, Statistics, Three Dimensional Geometry, Vectors, Matrices and Determinants, Boolean Algebra, Probability, Functions, limits and Continuity, Differentiation, Application of Derivatives, Definite and Indefinite Integrals, Differential Equations.

PHYSICS (10+2 level)

Physical World and Measurement, Elementary Statics and Dynamics, Kinematics, Laws of Motion, Work, Energy and Power, Electrostatics, Current electricity, Magnetic Effects of Current and Magnetism, Electromagnetic Induction and Alternating Current, Electromagnetic waves, Optics, Dual Nature of Matter and Radiations, Atomic Nucleus, Solids and Semiconductor Devices, Principles of Communication, Motion of System of Particles and Rigid Body, Gravitation, Mechanics of Solids and Fluids, Heat and Thermodynamics, Oscillations, Waves.

16.2 CHEMISTRY (CY)

PHYSICAL CHEMISTRY

Basic Mathematical Concepts: Differential equations, vectors and matrices.

Atomic Structure: Fundamental particles. Bohr's theory of hydrogen atom; Wave-particle duality; Uncertainty principles; Schrödinger's wave equation; Quantum numbers, shapes of orbitals; Hund's rule and Pauli's exclusion principle.

Theory of Gases: Kinetic theory of gases. Maxwell-Boltzmann distribution law; Equipartition of energy.

Chemical Thermodynamics: Reversible and irreversible processes; First law and its application to ideal and non-ideal gases; Thermochemistry; Second law; Entropy and free energy, Criteria for spontaneity.

Chemical and Phase Equilibria: Law of mass action; K_p , K_c, K_x and K_n; Effect of temperature on K; Ionic equilibria in solutions; pH and buffer solutions; Hydrolysis; Solubility product; Phase equilibria–Phase rule and its application to one-component and two-component systems; Colligative properties.

Electrochemistry: Conductance and its applications; Transport number; Galvanic cells; EMF and Free energy; Concentration cells with and without transport; Polarography.

Chemical Kinetics: Reactions of various order, Arrhenius equation, Collision theory; Theory of absolute reaction rate; Chain reactions – Normal and branched chain reactions; Enzyme kinetics; photochemical processes; Catalysis.

ORGANIC CHEMISTRY

Basic Concepts in Organic Chemistry and Stereochemistry: Isomerism and nomenclature, electronic (resonance and inductive) effects. Aromaticity and Huckel's rule. Optical isomerism in compounds containing one and two asymmetric centres, designation of absolute configuration, conformations of cyclohexanes.

Organic Reaction Mechanism and Synthetic Applications: Methods of preparation and reactions of alkanes, alkenes, alkynes, arenes and their simple functional derivatives. Mechanism and synthetic applications of electrophilic aromatic substitution. Stereochemistry and mechanism of aliphatic nucleophilic substitution and elimination reactions. Diels-Alder reactions, Wittig Reactions, Mechanism of aldol condensation, Claisen

condensation, esterification and ester hydrolysis, Cannizzaro reaction, benzoin condensation. Perkin reaction, Claisen rearrangement, Beckmann rearrangement and Wagner-Meerwein rearrangement. Synthesis of simple molecules using standard reactions of organic chemistry. Grignard reagents, acetoacetic and malonic ester chemistry. Introduction to the following classes of compounds- alkaloids, terpenes, carbohydrates, amino acids, peptides and nucleic acids.

Heterocyclic Chemistry: Furans, thiophenes, pyrrols and pyridines.

Qualitative Organic Analysis: Functional group interconversions, structural problems using chemical reactions, identification of functional groups by chemical tests.

INORGANIC CHEMISTRY

Periodic Table: Periodic classification of elements and periodicity in properties; general methods of isolation and purification of elements.

Chemical Bonding and Shapes of Compounds: Types of bonding; VSEPR theory and shapes of molecules; hybridization; dipole moment; ionic solids; structure of NaCl, CsCl, diamond and graphite; lattice energy.

Main Group Elements (s and p blocks): Chemistry with emphasis on group relationship and gradation in properties; structure of electron deficient compounds of main group elements and application of main group elements.

Transition Metals (d block): Characteristics of 3d elements; oxide, hydroxide and salts of first row metals; coordination complexes; VB and Crystal Field theoretical approaches for structure, colour and magnetic properties of metal complexes. Ligands with back bonding capabilities; molecular orbital theory approaches to explain bonding in metal-carbonyl and metal-phosphine complexes.

Analytical Chemistry: Principles of qualitative and quantitative analysis; acid-base, oxidation-reduction and EDTA and precipitation reactions; use of indicators; use of organic reagents in inorganic analysis; radioactivity; nuclear reactions; applications of isotopes.

16.3 COMPUTER APPLICATIONS (CA)

The Computer Applications (CA) test paper comprises of Mathematics, Computer awareness, and Analytical ability and General awareness and they will be in the ratio 4:2:1.

MATHEMATICS

Algebra: Set theory and its simple applications. Basic concepts of groups, fields and vector spaces.

Matrices: Rank of a matrix. Existence and uniqueness of solution of a system of linear equations. Eigenvalues and Eigenvectors. Inverse of a matrix by elementary transformations.

Differential Calculus: Differentiation, Partial differentiation, Taylor series and approximate calculations. Maxima and minima of functions of one and two variables.

Integral Calculus: Single and multiple integration. Definite integrals, Change of order and change of variables. Applications to evaluation of area, surface and volume.

Differential Equations: First order differential equations, linear differential equations of higher order with constant coefficients.

Vector Algebra: Addition, subtraction, dot product, cross product, triple product and their applications.

Numerical Analysis: Solution of non-linear equations using iterative methods. Interpolation (Lagrange's formula and Newton's formula for equidistant points). Numerical differentiation and integration (Trapezoidal and Simpson's rules).

Probability: Basic concepts of probability theory. Binomial and Poisson distributions.

Linear Programming: Formulation and its graphical solution for two variable problems.

COMPUTER AWARENESS

Elements of computers. Number systems. Basic electronic gates. Boolean algebra. Flip-Flops. Algorithmic approach to solve problems. Fundamentals of C language.

ANALYTICAL ABILITY AND GENERAL AWARENESS

Simple questions will be asked to test the analytical ability and general awareness of candidates.

16.4 GEOLOGY (GG)

The Planet Earth: Origin of the Solar System and the Earth; Geosphere and the composition of the Earth; Shape and size of the earth; Earth-moon system; Formation of continents and oceans; Dating rocks and age of the Earth; Energy in the earth system; Volcanism and volcanic landforms; Interior of earth; Earthquakes; Earth's magnetism and gravity, Isostasy; Elements of Plate tectonics; Orogenic cycles.

Geomorphology: Weathering and erosion; Transportation and deposition due to wind, ice, river, sea, and resulting landforms, Structurally controlled landforms.

Structural Geology: Concept of stratum; Contour; Outcrop patterns; Maps and cross sections; Dip and strike; Classification and origin of folds, faults, joints, foliation and lineation, unconformities; shear zones.

Palaeontology: Major steps in the evolution of life forms; Fossils; their mode of preservation and utility; Morphological characters, major evolutionary trends and ages of important groups of animals - Brachiopoda, Mollusca, Trilobita, Graptolitoidea, Anthozoa, Echinodermata; Gondwana plant fossils; Elementary idea of verterbrate fossils in India.

Stratigraphy: Principles of stratigraphy; Litho-, chrono- and biostratigraphic classification; distribution and classification of the stratigraphic horizons of India from Archaean to Recent.

Mineralogy: Symmetry and forms in common crystal classes; Physical properties of minerals; Isomorphism and polymorphism, Classification of minerals; Structure of silicates; Mineralogy of common rock-forming minerals; Mode of occurrence of minerals in rocks. Transmitted polarised light microscopy and optical properties of uniaxial and biaxial minerals.

Petrology: Definition and classification of rocks; Igneous rocks - forms of igneous bodies; Crystallization from magma; classification, association and genesis of igneous rocks; Sedimentary rocks - classification, texture and structure; size and shape of sedimentary bodies. Metamorphic rocks - classification, facies, texture and properties.

Economic Geology: Properties of common economic minerals; General processes of formation of mineral deposits; Physical characters; Mode of occurrence and distribution in India both of metallic and non-metallic mineral deposits; Coal and petroleum occurrences in India.

Applied Geology: Ground Water; Mineral exploration, elements of Mining Geology and Environmental Geology; Principles of Engineering Geology.

16.5 GEOPHYSICS (GP)

There will be **Three Sections** in the Geophysics (GP) test paper, namely, Geology, Mathematics and Physics, each with a weightage of 50%. A candidate has to attempt any **Two Sections.**

The syllabus for the Geology, Mathematics and Physics Sections of the Geophysics (GP) test paper are given below:

GEOLOGY SECTION

The Planet Earth: Origin of the Solar System and the Earth; Geosphere and the composition of the earth; Shape and size of the Earth; Earth-moon system; Formation of continents and oceans; dating the rocks and age of the Earth; Energy in the earth system; Volcanism and volcanic landforms; Interior of earth; Earthquakes. Earth's magnetism and gravity, Elements of plate tectonics.

Geomorphology: Weathering and erosion; transportation and deposition due to wind, ice, river, sea, and resulting landforms, structurally controlled landforms.

Structural Geology: Concept of stratum; Contour; Outcrop patterns; Maps and cross sections; Dip and strike; classification and origin of folds, faults, joints, foliation and lineation, unconformities; shear zones.

Mineralogy: Symmetry and forms in common crystal classes; physical properties of minerals; Isomorphism and polymorphism, Classification of minerals; Structure of silicates; Mineralogy of common rock-forming minerals; Mode of occurrence of minerals in rock.

Stratigraphy: Principles of Stratigraphy, Geological Time Scale and ages of major stratigraphic units of India.

Petrology: Definition and classification of rocks; Igneous rock-forms of igneous bodies; Crystallisation from magma; classification, association and genesis of igneous rocks; Sedimentary rocks-classification, texture and structure; Metamorphic rocks-Classification, facies, texture and structure.

Economic Geology: Physical properties of common ore minerals, General processes of formation of mineral deposits; Mode of occurrence of important metallic and non-metallic deposits in India; Coal, petroleum and ground water occurrences in India.

MATHEMATICS SECTION

Sequences, Series and Differential Calculus: Sequences of real numbers, Convergent sequences and series. Mean Value Theorem, Taylor's theorem, Maxima and Minima, functions of several variables.

Integral Calculus: Fundamental theorem of calculus, Integration, Double and Triple integrals, Surface Areas and Volumes.

Differential Equations: Linear and Non-linear ODE, existence and uniqueness (without proof), Linear Differential Equations of second order with constant coefficients.

Vector Calculus: Gradient, Divergence, Curl, Laplacian, Green's, Stokes and Gauss theorems and their Applications.

Linear Algebra: System of Linear Equations, Matrices, Rank, Determinant, Inverse, eigenvalues and eigenvectros. Dimension, Linear transformations.

Real Analysis: Open and closed sets and limit points in **R** and completeness in **R**, Uniform Continuity, Power Series, Uniform Convergence.

Probability: Probability spaces, Conditional Probability, Independence, Bayes Theorem, Univariate and Bivariate Random Variables, Moment Generating and Characteristic Functions, Binomial, Poisson and Normal distributions.

Statistics: Sampling Distributions of Sample Mean and Variance, Exact Sampling Distribution (Normal Population), Simple and Composite hypothesis, Best critical region of a Test, Neyman-Pearson theorem, Likelihood Ratio Testing and its Application to Normal population, comparison of normal populations, large sample theory of test of hypothesis, approximate test on the parameter of a binomial population, comparison of two binomial populations.

Complex Analysis: Analytical functions, Harmonic functions, Cauchy's theorem, Cauchy's Integral Formula, Taylor and Laurent Expansion, Poles and Residues.

Numerical Analysis: Difference table, symbolic operators, differences of a factorial, representation of a polynomial by factorials. Forward, backward and central difference approximation formulae. Simpson's one-third rule and the error in it, Gauss-Siedel method and method of elimination for numerical solution of a system of linear equations, iteration method and its convergence, Gradient and Newton-Raphson method and their convergence.

PHYSICS SECTION

Mechanics and General Properties of Matter: Newton's laws of motion and applications, Kepler's laws, Gravitational Law and field, Conservative and non-conservative forces. System of particles, Centre of mass (CM), equation of motion of the CM, conservation of linear and angular momentum, conservation of energy. Elastic and inelastic collisions. Rigid body motion, fixed axis rotations, rotation and translation, moments of Inertia and products of Inertia. Principal moments and axes. Elasticity, Hooke's law and elastic constants of isotropic solid, stress energy. Kinematics of moving fluids, equation of continuity, Euler's equation, Bernoulli's theorem, viscous fluids, surface tension and surface energy, capillarity.

Oscillations, Waves and Optics: Differential equation for simple harmonic oscillator and its general solution. Superposition of two or more simple harmonic oscillators. Lissajous figures. Damped and forced oscillators, resonance. Wave equation, travelling and standing waves in one-dimension. Energy density and energy transmission in waves. Group velocity and phase velocity. Sound waves in media. Doppler Effect. Fermat's Principle. General theory of image formation. Thick lens, thin lens and lens combinations. Interference of light, optical path retardation. Fraunhofer diffraction. Rayleigh criterion and resolving power. Diffraction gratings. Polarization: linear, circular and elliptic polarization. Double refraction and optical rotation.

Electricity and Magnetism: Coulomb's law, Gauss's law. Concept of Potential, Field and Boundary Conditions, Solution of Laplace's equation for simple cases. Conductors, capacitors, dielectrics, dielectric polarization, volume and surface charges, electrostatic energy. Magnetic susceptibility, bar magnet, Earth's magnetic field and its elements. Biot-Savart law, Ampere's law, Lenz's law, Faraday's law of electromagnetic induction, self and mutual inductance. Alternating currents. Simple DC and AC circuits with R, L and C components. Displacement current, Maxwell's equations and plane electromagnetic waves. Lorentz Force and motion of charged particles in electric and magnetic fields.

Kinetic theory, Thermodynamics: Elements of Kinetic

theory of gases. Velocity distribution and Equipartition of energy. Specific heat of Mono-, di- and tri-atomic gases. Ideal gas, Van-der-Waals gas and equation of state. Mean free path . Laws of thermodynamics. Zeroeth law and concept of thermal equilibrium. First law of thermodynamics and its consequences. Isothermal and adiabatic processes. Reversible, irreversible and quasi-static processes. Second law of thermodynamics. Carnot cycle.

Modern Physics: Blackbody radiation, photoelectric effect, Bohr's atomic model, X-rays. Wave-particle duality, Uncertainty principle, Pauli Exclusion Principle, Structure of atomic nucleus, mass and binding energy. Radioactivity and its applications. Laws of radioactive decay and half life, Fission and fusion

Solid State Physics and Electronics: Crystal structure, Bravais lattices and basis. Miller indices. X-ray diffraction and Bragg's law, Origin of energy bands. Concept of holes. Intrinsic and extrinsic semiconductors. p-n junctions, transistors. Amplifier circuits with transistors.

16.6 MATHEMATICAL STATISTICS (MS)

The Mathematical Statistics (MS) test paper comprises of Mathematics (40% weightage) and Statistics (60% weightage).

Mathematics:

Sequences and Series: Convergence of sequences of real numbers, Comparison, root and ratio tests for convergence of series of real numbers.

Differential Calculus: Limits, continuity and differentiability of functions of one and two variables. Rolle's theorem, mean value theorems, Taylor's theorem, indeterminate forms, maxima and minima of functions of one and two variables.

Integral Calculus: Fundamental theorems of integral calculus. Double and triple integrals, applications of definite integrals, arc lengths, areas and volumes.

Matrices: Rank, inverse of a matrix. systems of linear equations. Linear transformations, eigenvalues and eigenvectors. Cayley-Hamilton theorem, symmetric, skew-symmetric and orthogonal matrices.

Differential Equations: Ordinary differential equations of the first order of the form y' = f(x,y). Linear differential equations of the second order with constant coefficients.

Statistics Probability: Axiomatic definition of probability and properties, conditional probability, multiplication rule. Theorem of total probability. Bayes' theorem and independence of events.

Random Variables: Probability mass function, probability density function and cumulative distribution functions, distribution of a function of a random variable. Mathematical expectation, moments and moment generating function. Chebyshev's inequality.

Standard Distributions: Binomial, negative binomial, geometric, Poisson, hypergeometric, uniform, exponential, gamma, beta and normal distributions. Poisson and normal approximations of a binomial distribution.

Joint Distributions: Joint, marginal and conditional distributions. Distribution of functions of random variables. Product moments, correlation, simple linear regression. Independence of random variables.

Sampling distributions: Chi-square, t and F distributions, and their properties.

Limit Theorems: Weak law of large numbers. Central limit theorem (i.i.d.with finite variance case only).

Estimation: Unbiasedness, consistency and efficiency of estimators, method of moments and method of maximum likelihood. Sufficiency, factorization theorem. Completeness, Rao-Blackwell and Lehmann-Scheffe theorems, uniformly minimum variance unbiased estimators. Rao-Cramer inequality. Confidence intervals for the parameters of univariate normal, two independent normal, and one parameter exponential distributions.

Testing of Hypotheses: Basic concepts, applications of Neyman-Pearson Lemma for testing simple and composite hypotheses. Likelihood ratio tests for parameters of univariate normal distribution.

16.7 MATHEMATICS (MA)

Sequences, Series and Differential Calculus: Sequences of real numbers. Convergent sequences and series, absolute and conditional convergence. Rolle's Theorem, Mean value theorem. Taylor's theorem. Maxima and minima of functions of a single variable. Functions of two and three variables. Limit, Continuity, Partial derivatives, differentiability, maxima and minima.

Integral Calculus: Double and triple integrals, Areas, Volumes, and Surface areas.

Differential Equations: Ordinary differential equations of the first order of the form y'=f(x,y). Linear differential equations of second and higher order with constant coefficients. Cauchy- Euler equation.

Vector Calculus: Gradient, divergence, curl and Laplacian. Green's, Stokes and Gauss theorems and their applications.

Group Theory: Groups, subgroups and normal subgroups, Lagrange's Theorem for finite groups, group homomorphisms and basic concepts of quotient groups.

Linear Algebra: Vector spaces, Linear dependence of vectors, basis, dimension, linear transformations and matrix representation with respect to an ordered basis, rank and inverse of a matrix, determinant, solutions of systems of linear equations, consistency conditions. Eigenvalues and eigenvectors.

Real Analysis: Open and closed sets, limit points, completeness of R, Uniform convergence, Power series.

16.8 PHYSICS (PH)

Mathematical Methods: Calculus of single and multiple variables, partial derivatives, Jacobian, imperfect and perfect differentials, Taylor expansion, Fourier series. Vector algebra, Vector Calculus, Multiple integrals, Divergence theorem, Green's theorem, Stokes' theorem. First and linear second order differential equations. Matrices and determinants, Algebra of complex numbers.

Mechanics and General Properties of Matter: Newton's laws of motion and applications, Velocity and acceleration in Cartesian, polar and cylindrical coordinate systems, uniformly rotating frame, centrifugal and Coriolis forces, Motion under a central force, Kepler's laws, Gravitational Law and field, Conservative and non-conservative forces. System of particles, Centre of mass, equation of motion of the CM, conservation of linear and angular momentum, conservation of energy, variable mass systems. Elastic and inelastic collisions. Rigid body motion, fixed axis rotations, rotation and translation, moments of Inertia and products of Inertia. Principal moments and axes.. Kinematics of moving

fluids, equation of continuity, Euler's equation, Bernoulli's theorem.

Oscillations, Waves and Optics: Differential equation for simple harmonic oscillator and its general solution. Superposition of two or more simple harmonic oscillators. Lissajous figures. Damped and forced oscillators, resonance. Wave equation, traveling and standing waves in one-dimension. Energy density and energy transmission in waves. Group velocity and phase velocity. Sound waves in media. Doppler Effect. Fermat's Principle. General theory of image formation. Thick lens, thin lens and lens combinations. Interference of light, optical path retardation. Fraunhofer diffraction. Rayleigh criterion and resolving power. Diffraction gratings. Polarization: linear, circular and elliptic polarization. Double refraction and optical rotation.

Electricity and Magnetism: Coulomb's law, Gauss's law. Electric field and potential. Electrostatic boundary conditions, Solution of Laplace's equation for simple cases. Conductors, capacitors, dielectrics, dielectric polarization, volume and surface charges, electrostatic energy. Biot-Savart law, Ampere's law, Faraday's law of electromagnetic induction, Self and mutual inductance. Alternating currents. Simple DC and AC circuits with R, L and C components. Displacement current, Maxwell's equations and plane electromagnetic waves, Poynting's theorem, reflection and refraction at a dielectric interface, transmission and reflection coefficients (normal incidence only). Lorentz Force and motion of charged particles in electric and magnetic fields.

Kinetic theory, Thermodynamics: Elements of Kinetic theory of gases. Velocity distribution and Equipartition of energy. Specific heat of Mono-, di- and tri-atomic gases. Ideal gas, van-der-Waals gas and equation of state. Mean free path. Laws of thermodynamics. Zeroeth law and concept of thermal equilibrium. First law and its consequences. Isothermal and adiabatic processes. Reversible, irreversible and quasi-static processes. Second law and entropy. Carnot cycle. Maxwell's thermodynamic relations and simple applications. Thermodynamic potentials and their applications. Phase transitions and Clausius-Clapeyron equation.

Modern Physics: Inertial frames and Galilean invariance. Postulates of special relativity. Lorentz transformations. Length contraction, time dilation. Relativistic velocity addition theorem, mass energy equivalence. Blackbody radiation, photoelectric effect, Compton effect, Bohr's atomic model, X-rays. Wave-particle duality, Uncertainty principle, Schrödinger equation and its solution for one, two and three dimensional boxes. Reflection and transmission at a step potential, Pauli exclusion principle. Structure of atomic nucleus, mass and binding energy. Radioactivity and its applications. Laws of radioactive decay.

Solid State Physics, Devices and Electronics: Crystal structure, Braves lattices and basis. Miller indices. X-ray diffraction and Bragg's law Intrinsic and extrinsic semiconductors. Fermi level. p-n junctions, transistors. Transistor circuits in CB, CE, CC modes. Amplifier circuits with transistors. Operational amplifiers. OR, AND, NOR and NAND gates.

Appendix – I: TEST CITIES/TOWNS FOR JAM 2012

IISc Bangalore Zone

Test City	Code
Bengaluru	101
Hubli	102
Hyderabad	103
Mangalore	104

IIT Bombay Zone

Test City	Code
Ahmedabad	201
Goa	202
Mumbai	203
Nagpur	204
Nanded	205
Pune	206
Vadodara	207

IIT Delhi Zone

Test City	Code
Delhi Central	301
Delhi East	302
Delhi North	303
Delhi South	304
Delhi West	305
Faridabad	306
Gurgaon	307
Indore	308
Jaipur	309
Jammu	310
Jodhpur	311

IIT Guwahati Zone

Test City	Code
Dhanbad	401
Durgapur	402
Guwahati	403
Itanagar	404
Jorhat	405
Patna	406
Silchar	407
Siliguri	408

IIT Kanpur Zone

Test City	Code
Agra	501
Allahabad	502
Bareilly	503
Bhopal	504
Gorakhpur	505
Jabalpur	506
Jhansi	507
Kanpur	508
Lucknow	509
Varanasi	510

IIT Kharagpur Zone

Test City	Code
Bhubaneswar	601
Jamshedpur	602
Kakinada (AP)	603
Kharagpur	604
Kolkata	605
Raipur	606
Ranchi	607
Rourkela	608
Vijayawada	609
Visakhapatnam	610

IIT Madras Zone

Test City	Code
Chennai North	701
Chennai South	702
Coimbatore	703
Ernakulam	704
Kadapa	705
Madurai	706
Nellore	707
Thiruvananthapuram	708
Tiruchirapalli	709

IIT Roorkee Zone

Test City	Code
Amritsar	801
Chandigarh	802
Haldwani	803
Kurukshetra	804
Noida	805
Roorkee	806
Shimla	807

Appendix-II

AUTHORITIES WHO MAY ISSUE SC / ST / OBC (NON CREAMY LAYER) CERTIFICATES

SC/ST/OBC (non creamy layer) candidates should submit a certificate issued by any of the following authorities:

District Magistrate / Additional District Magistrate / Collector / Deputy Commissioner / Additional Deputy Commissioner / Deputy Collector /1st Class Stipendary Magistrate / Sub-Divisional Magistrate / Taluka Magistrate / Executive Magistrate / Extra Assistant Commissioner (not below the rank of 1st class Stipendary Magistrate) / Chief Presidency Magistrate / Additional Chief Presidency Magistrate / Presidency Magistrate / Revenue Officer not below the rank of Tehsildar / Sub-Divisional Officer of the area where the candidate and / or his / her family normally resides / Administrator / Secretary to Administrator / Development Officer (Lakshadweep Island).

(Certificate issued by any other authority will be rejected)

IMPORTANT NOTE

In all matters concerning JAM 2012, the decision of the **Organizing Institute** or the **Organizing Chairman, JAM 2012** will be final and binding on all the applicants.

Although JAM 2012 is held at different centres across country, **Indian Institute of Technology Bombay** is the **Organizing Institute**, and has the overall responsibility of conducting JAM 2012. In case of any claims or disputes arising in respect of JAM 2012, it is hereby made absolutely clear that the Mumbai High Court alone shall have the exclusive jurisdiction to entertain and settle any such disputes and claims.

Appendix-III
Proforma for Other Backward Class (OBC) Certificate

(CERTIFICATE TO BE PRODUCED BY OTHER BACKWARD CLASSES APPLYING FOR ADMISSIONS TO CENTRAL EDUCATIONAL INSTITUTIONS (CEIs), UNDER THE GOVERNMENT OF INDIA)

This is to certify that Shri/Smt./Kum. _____ Son/Daughter of Shri/Smt. _____ of Village/Town _____ District/Division _____ in the _____ State belongs to the _____ Community which is recognized as a backward class under:

(i) Resolution No. 12011/68/93-BCC(C) dated 10/09/93 published in the Gazette of India Extraordinary Part I Section I No. 186 dated 13/09/93.
(ii) Resolution No. 12011/9/94-BCC dated 19/10/94 published in the Gazette of India Extraordinary Part I Section I No. 163 dated 20/10/94.
(iii) Resolution No. 12011/7/95-BCC dated 24/05/95 published in the Gazette of India Extraordinary Part I Section I No. 88 dated 25/05/95.
(iv) Resolution No. 12011/96/94-BCC dated 9/03/96.
(v) Resolution No. 12011/44/96-BCC dated 6/12/96 published in the Gazette of India Extraordinary Part I Section I No. 210 dated 11/12/96.
(vi) Resolution No. 12011/13/97-BCC dated 03/12/97.
(vii) Resolution No. 12011/99/94-BCC dated 11/12/97.
(viii) Resolution No. 12011/68/98-BCC dated 27/10/99.
(ix) Resolution No. 12011/88/98-BCC dated 6/12/99 published in the Gazette of India Extraordinary Part I Section I No. 270 dated 06/12/99.
(x) Resolution No. 12011/36/99-BCC dated 04/04/2000 published in the Gazette of India Extraordinary Part I Section I No. 71 dated 04/04/2000.
(xi) Resolution No. 12011/44/99-BCC dated 21/09/2000 published in the Gazette of India Extraordinary Part I Section I No. 210 dated 21/09/2000.
(xii) Resolution No. 12015/9/2000-BCC dated 06/09/2001.
(xiii) Resolution No. 12011/1/2001-BCC dated 19/06/2003.
(xiv) Resolution No. 12011/4/2002-BCC dated 13/01/2004.
(xv) Resolution No. 12011/9/2004-BCC dated 16/01/2006 published in the Gazette of India Extraordinary Part I Section I No. 210 dated 16/01/2006.

Shri/Smt./Kum. _____ and/or his family ordinarily reside(s) in the _____ District/Division of _____ State. This is also to certify that he/she does not belong to the persons/sections (Creamy Layer) mentioned in Column 3 of the Schedule to the Government of India, Department of Personnel & Training O.M. No. 36012/22/93-Estt.(SCT) dated 08/09/93, modified vide OM No. 36033/3/2004 Estt.(Res.) dated 09/03/2004, or the latest notification of the Government of India.

This certificate is being issued based on the annual income / status of the parents / guardian of the applicant as on financial year ending March 31, 2011.

Dated:

District Magistrate/
Seal Deputy Commissioner, etc.

NOTE:

(a) The term 'Ordinarily' used here will have the same meaning as in Section 20 of the Representation of the People Act, 1950.
(b) The authorities competent to issue Caste Certificates are indicated below:
  (i) District Magistrate / Additional Magistrate / Collector / Deputy Commissioner / Additional Deputy Commissioner / Deputy Collector / Ist Class Stipendiary Magistrate / Sub-Divisional Magistrate / Taluka Magistrate / Executive Magistrate / Extra Assistant Commissioner (not below the rank of 1st Class Stipendiary Magistrate).
  (ii) Chief Presidency Magistrate / Additional Chief Presidency Magistrate / Presidency Magistrate.
  (iii) Revenue Officer not below the rank of Tehsildar and
  (iv) Sub-Divisional Officer of the area where the candidate and / or his/her family resides.

IMPORTANT DATES FOR JAM 2012

Issue of application forms and information brochures at Canara Bank counters or by post only from IIT Bombay	22 September 2011 (Thursday)
Commencement of Online Registration	22 September 2011 (Thursday)
Last date for receipt of requests at IIT Bombay for the issue of application material by post	18 October 2011 (Tuesday)
Last date for issue of application forms and information brochures at Bank counters	22 October 2011 (Saturday)
Last date for Online Registration on the website / website closure.	25 October 2011 (Tuesday) at 18:00 hrs
Last date for receipt of completed OMR application form along with Pay-in-slip and Demand Draft (if any) at IIT Bombay	1 November 2011 (Tuesday)
Last date for receipt of completed Online Registration Form along with Demand Draft at IIT Bombay	1 November 2011 (Tuesday)
Date of JAM 2012 Test	12 February 2012 (Sunday)
Announcement of the result of JAM 2012	10 April 2012 (Tuesday) at 17:00 hrs
Issue of application form(s) for admission by JAM Office of IIT Bombay / downloading from the website of IIT Bombay starts	12 April 2012 (Thursday)
Last date for receipt of completed application forms for admission along with Demand Draft of Rs. 300/- at IIT Bombay	30 April 2012 (Monday)
Declaration of First Admission List	25 May 2012 (Friday)
Declaration of Second Admission List	8 June 2012 (Friday)
Declaration of Third Admission List	23 June 2012 (Saturday)

CONTACT ADDRESSES OF CHAIRMEN, JAM 2012

Institute	Phone / Fax
IIT Bombay, Powai, Mumbai - 400 076	(022) 25767022 / 25722674
IIT Delhi, Hauz Khas, New Delhi - 110 016	(011) 26591749 / 26581579
IIT Guwahati, Guwahati - 781 039	(0361) 2582751 / 2582755
IIT Kanpur, Kanpur - 208 016	(0512) 2597412 / 2590932
IIT Kharagpur, Kharagpur - 721 302	(03222) 282091 / 278243
IIT Madras, Chennai - 600 036	(044) 22578200 / 22578204
IIT Roorkee, Roorkee - 247 667	(01332) 284531 / 285707

INSTITUTE	WEBSITE	E – mail
IIT Bombay	www.iitb.ac.in/jam	jam@iitb.ac.in
IIT Delhi	www.iitd.ac.in/jam	jam@admin.iitd.ac.in
IIT Guwahati	www.iitg.ernet.in/gate/jam	jamoff@iitg.ernet.in
IIT Kanpur	www.iitk.ac.in/jam	jam@iitk.ac.in
IIT Kharagpur	jam.iitkgp.ac.in	chrgate@adm.iitkgp.ernet.in
IIT Madras	jam.iitm.ac.in	jam@iitm.ac.in
IIT Roorkee	www.iitr.ac.in/jam	jam@iitr.ernet.in