

**JOINT ADMISSION TEST FOR M.Sc. 2015**

# JAM 2015

Admission to

Integrated Ph.D. Programmes

at

INDIAN INSTITUTE OF SCIENCE BANGALORE

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M. Sc. (Two Years), Joint M.Sc.-Ph.D., M.Sc.-Ph.D. Dual Degree, M.Sc.-M.Tech., M.Sc.-  
M.S.(Research)/Ph.D. Dual Degree and other Post-Bachelor's Degree Programmes

at

INDIAN INSTITUTES OF TECHNOLOGY

BHUBANESWAR • BOMBAY • DELHI • GANDHINAGAR • GUWAHATI • HYDERABAD  
INDORE • KANPUR • KHARAGPUR • MADRAS • ROORKEE • ROPAR

## INFORMATION BROCHURE

*JAM 2015 Examination Date: February 08, 2015 (Sunday)*

Organizing Institute



**INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI  
GUWAHATI - 781 039**

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## JAM 2015: What's new?

- ▶ IIT Guwahati is the Organizing Institute for JAM 2015.
- ▶ JAM 2015 Examination will be conducted **ONLINE only** as a Computer Based Test (CBT) for all Test Papers.
- ▶ All the seven Test Papers of JAM 2015 will be of fully **objective type**, with three different patterns of questions, namely (i) multiple choice questions (MCQ), (ii) multiple select questions (MSQ), and (iii) numerical answer type (NAT) questions.
- ▶ Applications will be accepted **ONLINE only** through JAM 2015 website.
- ▶ No hardcopies of documents (except challan) are to be sent to the Organizing Institute. The documents (if applicable) are to be uploaded to the online application website only. Where applicable, only the JAM Office copy of the challan is to be sent to the Organizing Institute.
- ▶ No hardcopy of JAM 2015 score card will be sent to the JAM 2015 qualified candidates by the Organizing Institute. It can only be downloaded from JAM 2015 website.

### 1. INTRODUCTION

The Indian Institutes of Technology (IITs) are institutions of national importance established through an Act of Parliament. The Indian Institute of Science (IISc) is a premier research and teaching institute established in 1909. The IISc Bangalore & IITs are well known, the world over, for quality education in engineering, science, management and research in frontier areas. The aim of these institutes 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. The vibrant academic ambience and research infrastructure of IISc Bangalore & 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, IISc and 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, IITs have started conducting a **Joint Admission Test for M.Sc. (JAM)**. The objective of JAM is to provide admissions to M.Sc. (Two Years), Joint M.Sc.-Ph.D., M.Sc.-Ph.D. Dual Degree, M.Sc.-M.Tech., M.Sc.-M.S.(Research)/Ph.D. Dual Degree, and other Post-Bachelor's Degree Programmes at the IITs and Integrated Ph.D. Degree Programmes at IISc and to consolidate Science as a career option for bright students from across the country. JAM is expected to serve as a benchmark for the undergraduate level science education in the country. The integrated Ph.D. Programme at IISc was started in the early 90's to enable students to directly join for a Ph.D. degree after their B.Sc. Degree.

The M.Sc. (Two Years), Joint M.Sc.-Ph.D, M.Sc.-Ph.D. Dual Degree, M.Sc.-M.Tech., M.Sc.-M.S.(Research)/Ph.D. Dual Degree, and other Post-Bachelor's Degree Programmes at the IITs and the integrated Ph.D. Programmes at IISc 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 IISc and IITs. The interdisciplinary content of the curricula equips the students with the ability to utilize scientific knowledge for practical applications. The medium of instruction is English for all the above mentioned programmes.

### 2. GENERAL INFORMATION

- JAM 2015 is open to all nationals (Indian/Foreign). Candidates seeking admission to the academic programmes covered under JAM 2015 need to appear in JAM 2015. There is no age restriction.

- (b) **JAM 2015 examination will be held on February 08, 2015 (Sunday) as Computer Based ONLINE Examination.**
- (c) 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 concerned Admitting Institute(s).
- (d) 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 (MEQs) and Eligibility Requirements (ERs) of the respective Academic Programme.
- (e) The candidates who have either appeared or are due to appear in the final examination of their qualifying degree in 2015 are also eligible to appear in the test. By qualifying in JAM 2015, candidates can apply for provisional admission subject to the condition that: (a) all parts of their final examination shall be completed by the date of registration of the Admitting Institute, and (b) proof of having passed the qualifying degree with required eligibility, as specified by the Admitting Institute, will be submitted by **September 30, 2015**.
- (f) Admission to most of the Academic Programmes at various institutes will be made on the basis of merit in JAM 2015.
- (g) The admission for a few programmes at IISc, IITB, and IITK will additionally depend on interviews that will be held during the time window given in this brochure (see Important Dates on the last page).
- (h) The candidates who have obtained B.Sc. degree through Distance Education/Correspondence Mode and are desirous of admission to M.Sc. Mathematics or M.Sc. Physics programmes of IIT Madras will have to appear for an additional interview.
- (i) On the basis of performance in JAM 2015, for each test paper, separate merit lists will be prepared for General (GEN), OBC Non-Creamy Layer (OBC-NCL), SC, ST, and Persons with Disability (PwD) category candidates.
- (j) Requests for the change of category, if any, with proper documentation, should reach the Organizing Institute latest by **December 05, 2014**. Requests received after this date will not be accepted under any circumstances.
- (k) **Candidates should note that mere appearance in JAM 2015 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 in each category and depending on the number of seats available at the Admitting Institute(s).
- (l) The list of academic programmes, number of seats, eligibility requirement and minimum educational qualifications of each of the programmes mentioned in this Information Brochure are subject to change, as per the policy of admitting institute(s).
- (m) In this document, the phrases 'Un-Reserved' and 'General' are used interchangeably and they both mean the same.
- (n) With regard to the interpretation of the provisions on any matter not covered in this Information Brochure, the decision of the Organizing Institute shall be final and binding on all the parties concerned.
- (o) In all matters concerning JAM 2015, the decision of the **Organizing Institute** or the **Organizing Chairperson, JAM 2015** will be final and binding on all the applicants.
- (p) Although JAM 2015 is held at different centres across country, **Indian Institute of Technology Guwahati** is the **Organizing Institute**, and has the overall responsibility of conducting JAM 2015. In case of any claims or disputes arising in respect of JAM 2015, it is hereby made absolutely clear that the Guwahati High Court alone shall have the exclusive jurisdiction to entertain and settle any such disputes and claims.

### 3. ACADEMIC PROGRAMMES

The following are the full-time M.Sc. (Two Years), Joint M.Sc.-Ph.D., M.Sc.-Ph.D. Dual Degree, M.Sc.-M.Tech., M.Sc.-M.S.(Research)/Ph.D. Dual Degree, and other Post-Bachelor's Degree Programmes at different IITs and Integrated Ph.D. Programmes at IISc to which admissions shall be made on the basis of JAM 2015.

- I. **Indian Institute of Science Bangalore (IISc):** Integrated Ph.D. Programmes in (i) Biological Sciences, (ii) Chemical Sciences, (iii) Mathematical Sciences, and (iv) Physical Sciences.

- II. **IIT Bhubaneswar (IITBBS):** Joint M.Sc.-Ph.D. Programmes in (i) Chemistry, (ii) Earth Science, (iii) Mathematics, (iv) Physics, and (v) Atmosphere and Ocean Sciences.
- III. **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.
- IV. **IIT Delhi (IITD):** Two-year Master of Science (M.Sc.) Programmes in (i) Chemistry, (ii) Mathematics, and (iii) Physics.
- V. **IIT Gandhinagar (IITGN):** Two-year Master of Science (M.Sc.) Programmes in (i) Chemistry, (ii) Mathematics, and (iii) Physics.
- VI. **IIT Guwahati (IITG):** Two-year Master of Science (M.Sc.) Programmes in (i) Chemistry, (ii) Mathematics and Computing, and (iii) Physics.
- VII. **IIT Hyderabad (IITH):** Two-year M.Sc. Programmes in (i) Chemistry, (ii) Mathematics, and (iii) Physics.
- VIII. **IIT Indore (IITI):** Two-year Master of Science (M.Sc.) Programmes in (i) Chemistry, (ii) Physics, and (iii) Mathematics, with an option to convert it into M.Sc.-Ph.D. dual degree programme at the end of second semester. The conversion is confirmed subjected to qualifying the CSIR/UGC-NET.
- IX. **IIT Jodhpur (IITJ):** Two-year Master of Science (M.Sc.) Programmes in (i) Chemistry, (ii) Physics, and (iii) Mathematics.
- X. **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).
- XI. **IIT Kharagpur (IITKgp):** Joint M.Sc.-Ph.D. Programmes in (i) Chemistry, (ii) Geology, (iii) Mathematics, (iv) Physics, and (v) Geophysics.
- XII. **IIT Madras (IITM):** Two-year Master of Science (M.Sc.) Programmes in (i) Chemistry, (ii) Mathematics, and (iii) Physics.
- XIII. **IIT Roorkee (IITR):** Two-year Master of Science (M.Sc.) Programmes in (i) Applied Geology, (ii) Biotechnology, (iii) Chemistry, (iv) Mathematics, and (v) Physics.
- XIV. **IIT Ropar (IITRPR):** Two-year Master of Science (M.Sc.) Programmes in Mathematics. M.Sc.-M.S.(Research)/Ph.D. Dual Degree Programmes in (i) Chemistry, and (ii) Physics.

The academic programmes, their durations and number of seats available in various institutes with programme codes are listed in **Appendix-I**.

#### 4. TEST PAPERS AND MINIMUM EDUCATIONAL QUALIFICATIONS (MEQs) FOR ADMISSION

JAM 2015 examination will be conducted in the seven subjects, also referred to as Test Papers, of Biological Sciences (BL), Biotechnology (BT), Chemistry (CY), Geology (GG), Mathematics (MA), Mathematical Statistics (MS) and Physics (PH). Candidates are advised to become familiar with the code(s) of the test paper(s) that they wish to appear as this information is required at the time of application form submission, at the time of examination, and later at the time of admission process.

The Minimum Educational Qualifications (MEQs) for admissions to various Academic Programmes covered under JAM are given in **Appendix-II**, along with the names of the Test Papers with their Codes and the

Institute offering the Academic Programmes. Admission to each of the Academic Programmes shall be offered on the basis of merit in the corresponding Test Paper(s) of JAM 2015. As mentioned in Section 2 above, admission to some programmes will additionally depend on an interview.

## 5. ELIGIBILITY REQUIREMENTS (ERs) FOR ADMISSION

The candidates who qualify in JAM 2015 shall have to fulfill the following Eligibility Requirement (ER) for admissions in IISc and IITs.

- (i) **For IISc Bangalore: First class** marks (as declared by the University) for Un-Reserved/OBC Category Candidates and **Second class** (as declared by the University) or **50%** aggregate marks, **without rounding off**, for SC/ST and PwD Category Candidates in the qualifying degree.
- (ii) **For IIT Guwahati:** At least (a) **55%** marks or **6.0** CPI in a scale of 10, **without rounding off**, in Major/Honors and Pass in all other subjects, including Languages and Subsidiaries or (b) **60%** aggregate marks or **6.5** CPI in a scale of 10, **without rounding off**, taking into account all subjects, including Languages and Subsidiaries, all years combined, for Un-Reserved/OBC(NCL) Category Candidates; and at least (a) **50%** marks or **5.5** CPI in a scale of 10, **without rounding off**, in Major/Honors and pass in all other subjects, including Languages and Subsidiaries, or (b) **55%** aggregate marks or **6.0** CPI in a scale of 10, **without rounding off**, taking into account all subjects, including Languages and Subsidiaries, all years combined, for SC/ST and PwD Category Candidates, in the qualifying degree.
- (iii) **For IIT Indore:** A **first class** in the qualifying degree. At IIT Indore, the First Class is defined as: (i) A minimum of **60%** marks for GEN/OBC (**55%** for SC/ST) category in aggregate or as specified by the university/institute OR (ii) A minimum CPI of **6.0** for GEN/OBC (**5.5** for SC/ST) category on the scale of 10; with corresponding proportional requirements when the scales are other than on 10 (for example 4.8 for GEN/OBC category (4.4 for SC/ST) on a scale of 8) OR (iii) A first class as specified by the university/institute.
- (iv) **For IIT Jodhpur:** A **first class** in the qualifying degree. The First Class is defined as: (i) A minimum of **60%** marks for GEN/OBC (**55%** for SC/ST) category in aggregate or as specified by the university/institute OR (ii) A minimum CGPA of **6.5** for GEN/OBC (**6.0** for SC/ST) category on the scale of 10; with corresponding proportional requirements when the scales are other than on 10 (for example 5.2 for GEN/OBC category (4.8 for SC/ST) on a scale of 8) OR (iii) A first class as specified by the university/institute.
- (v) **For all other IITs:** At least **55%** aggregate marks, **without rounding off**, (taking into account all subjects, including Languages and Subsidiaries, all years combined) for Un-Reserved/OBC Category Candidates and at least **50%** aggregate marks, **without rounding off**, (taking into account all subjects, including Languages and Subsidiaries, all years combined) for SC/ST and PwD 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).

Proof of having passed the Qualifying Degree with the Minimum Educational Qualifications (MEQ) as specified by the admitting institute should be submitted by **September 30, 2015**.

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 (MEQs) and Eligibility Requirements (ERs) 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 JAM 2015 examination for all the seven test papers will be carried out as **ONLINE** Computer Based Test (CBT) where the candidates will be shown the questions in a random sequence on a computer screen. For all the seven test papers, the duration of the examination will be 3 hours. The medium for all the test papers will be English only. There will be a total of 60 questions carrying 100 marks. The entire paper will be divided into three sections, A, B and C. All sections are compulsory. Questions in each section are of different types as given below:

- Section – A contains a total of 30 Multiple Choice Questions (MCQ) carrying one or two marks each. Each MCQ type question has four choices out of which only one choice is the correct answer. Candidates can mark the answer by clicking the choice.
- Section – B contains a total of 10 Multiple Select Questions (MSQ) carrying two marks each. Each MSQ type question is similar to MCQ but with a difference that there may be one or more than one choice(s) that are correct out of the four given choices. The candidate gets full credit if he/she selects all the correct answers only and no wrong answers. Candidates can mark the answer(s) by clicking the choice(s).
- Section – C contains a total of 20 Numerical Answer Type (NAT) questions carrying one or two marks each. For these NAT type questions, the answer is a signed real number which needs to be entered using the virtual keyboard on the monitor. No choices will be shown for these type of questions. Candidates have to enter the answer by using a virtual numeric keypad.
- In all sections, questions not attempted will result in zero mark. In Section – A (MCQ), wrong answer will result in **negative** marks. For all 1 mark questions, 1/3 marks will be deducted for each wrong answer. For all 2 marks questions, 2/3 marks will be deducted for each wrong answer. In Section – B (MSQ), there is **no negative** and **no partial** marking provisions. There is **no negative** marking in Section – C (NAT) as well.
- There is **no** provision of online virtual calculator and hence, the candidates are required to bring their own non-programmable calculator. Sharing of calculators is **NOT** allowed.
- Mobile phones or any other electronic devices, other than calculators, are **strictly prohibited** inside examination hall. Charts, graph sheets, tables, are also **NOT** allowed inside the examination hall.
- A scribble pad will be provided for rough work and this has to be returned back at the end of the examination.
- The candidates are required to select the answer for MCQ and MSQ type questions, and to enter the answer for NAT questions using only a mouse on a virtual keypad (the keyboard of the computer will be disabled). At the end of the 3-hour window, the computer will automatically close the screen from further actions.

Use of unfair means by a candidate in JAM 2015, whether detected at the time of examination, 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.

**The candidates are advised to visit the JAM 2015 website for more details on the patterns of questions for JAM 2015, including examples of the questions. Candidates will also be able to take a mock examination through a 'Mock Test' link that will be made available on the website closer to the examination dates.**

## 7. TEST SCHEDULE

The JAM 2015 online examination will be held on **February 08, 2015 (Sunday)** in two sessions as Computer Based Test (CBT). The schedule for different Test Papers of JAM 2015 is given in Table 1.

**Table 1: JAM 2015 Examination Test Schedule**

Exam Date	Session	Time	Test Papers and Codes
February 08, 2015 (Sunday)	I	9:00 a.m.-12:00 noon	Biological Sciences (BL), Mathematics (MA) and Physics (PH)
	II	2:00 p.m.- 5:00 p.m.	Biotechnology (BT), Chemistry (CY), Geology (GG) and Mathematical Statistics (MS)

The Test Schedule will not be changed under any circumstances.

#### **Number of Test Papers Allowed:**

A candidate can appear in either one or two Test Paper(s), subject to the restrictions imposed by the Test Schedule (Table 1) and on payment of the requisite additional fee for the second Test Paper, as applicable. Candidates desirous of appearing in two Test Papers must ensure, from the Test Schedule (Table 1), that these Test Papers are not scheduled in the same session.

### **8. CHOICE OF EXAMINATION CITIES**

The JAM 2015 examination is conducted through collaboration of eight zones. The names of these eight zones and the locations of Examination Cities/Towns for JAM 2015 are listed zone-wise in **Appendix-III**. Candidates must specify their first, second and third choice cities at the time of applying for JAM 2015 examination. When the first city choice is chosen, then zone gets determined and the candidates will be able to choose the remaining two cities from this zone only. If enough candidates are not available at a listed City/Town, then the City/Town may be dropped from the final list, and those candidates will either be allotted a centre in the city of their second choice or third choice. However, because of operational constraints, the JAM 2015 Committee reserves the right to add a new city or remove an existing one, and allot a city that may not be any of the choices of a candidate.

An examination city may have one or more examination centres. 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 any circumstances. In exceptional circumstances, a change of examination City/Town may be permitted, if a request with a valid reason for the same is received in the office of the Organizing Chairperson, JAM 2015, IIT Guwahati, Guwahati-781039, on or before **November 13, 2014**, along with a Demand Draft of Rs. 500/- drawn in favour of "**Chairperson, JAM, IIT Guwahati**", on any Nationalized Bank, payable at Guwahati. The decision of the Organizing Chairperson, JAM 2015, in this regard will be final.

### **9. RESERVED SEATS**

In every programme, a certain number of seats are reserved for candidates belonging to various categories. The number of seats reserved under various categories in each of the programmes covered under JAM 2015 is given in **Appendix-I**. The category-wise list in a JAM paper will be prepared based on the category declared by the candidate in the 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/OBC-NCL category must submit, along with the application form for admission, the requisite certificate issued by a competent authority as specified in **Appendix-IV**, failing which his/her candidature for admission will not be considered under the reserved category.

A candidate who seeks admission under the OBC-NCL Category must submit an OBC-NCL Certificate in the format shown in **Appendix-V** along with the application form for admission. **The candidate will be considered in the Un-Reserved (i.e., General) Category in case the OBC-NCL Certificate is not in the prescribed format or has submitted an invalid certificate and no opportunity will be given to the candidate for late submission of the said certificate under any circumstances.**

For PwD candidates with any category of disability (viz., blindness or low vision, hearing impairment, locomotor disability, and/or cerebral palsy), benefit will be given to only those who have at least **40%** permanent physical impairment with respect 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 disability percentage of candidates selected for admission under PwD 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 (MEQ), etc., and for claiming reservation under a specific category.



## 10. APPLICATION PROCEDURE FOR JAM 2015

Candidates can apply for JAM 2015 only through an online application process at JAM 2015 website <http://www.iitg.ernet.in/jam2015> or <http://www.iitg.ac.in/jam2015>. The details of the application fee specific to Genders/Category are given in Table 2. **The application fee is non refundable.**

**Table 2: Application Fee Details for JAM 2015**

Gender	Category	Fee Details	
		One Test Paper	Two Test Papers
Female	All	Rs. 750/-	Rs. 1050/-
Male & Others	General/OBC	Rs. 1500/-	Rs. 2100/-
	SC/ST/PwD*	Rs. 750/-	Rs. 1050/-

\*Person with Disability

The facility for Online Registration and Application will be available through the website <http://www.iitg.ernet.in/jam2015> or <http://www.iitg.ac.in/jam2015> from **September 03, 2014**. A candidate has to first register on the JAM 2015 website, by providing his/her name, a valid E-mail address, a working mobile number and a password. The candidate must give an E-mail address that he/she uses and checks frequently, as all communications to the candidate from JAM 2015 will be sent to this E-mail address. The candidate must not use somebody else's E-mail address and **only one candidate can be registered with one E-mail address**. Similarly, the candidate should provide his/her personal mobile number because most of the communications may also be sent via SMS. The password that the candidate provides should be chosen so that it cannot be guessed easily by others and this password must not be forgotten by the candidate as he/she will require it to login to the online application website. Upon successful registration, an E-mail containing your enrolment ID will be sent to the candidate in the E-mail address provided by the candidate. The enrolment ID will also be sent to the mobile number provided by the candidate. The candidate needs to use this enrolment ID along with the password for all JAM 2015 related communications or website operations.

Upon logging in to the JAM 2015 application processing website, the candidate needs to fill in information, such as parent/guardian's name and mobile number, city choices, the number and choice of test paper(s) that he/she wishes to appear, date of birth, gender, address for communication, category and PwD status. The candidate's application fee will get determined based on these information. The candidate should also fill his/her other details, such as information on qualifying degree, percentage of marks/CGPA, details of valid personal ID information, etc. It may be noted that the candidate can specify any one of the following for the personal ID information: Aadhar ID, College ID, Driving License, Employee ID, PAN Card, Passport, Voter ID.

The candidate should upload the following files/documents to the application website:

- A high quality image of the candidate's photograph, as per the requirements given below (see *section 10.1*).
- A good quality image of the candidate's signature, as per the requirements given below (see *section 10.2*).
- A good quality scanned image of SC/ST/PwD certificates, if applicable (*in JPEG/PDF format*).

**NOTE to OBC-NCL Candidates:** OBC-NCL candidates are **NOT** required to submit/upload any category certificate along with the online application form. However, they are required to submit this certificate in the prescribed format (*Appendix V*) at a later date (see *section 12.1*).

After filling in the required fields in the application form and uploading the required documents, the candidate must review his/her complete application form. After ensuring that there is no error in the application form and all the relevant and valid documents are uploaded, the candidate can submit the application and proceed for payment of application fee.

The application fee can be paid either **online** or through **challan** via State Bank of India, as detailed below. Additional bank charges may apply for the above transactions.

- If the candidate chooses to **pay through online** payment mode, then he/she will be able to make the payment using his/her netbanking account, debit or credit cards, until **October 09, 2014**. The charges may vary depending on the payment option.
- In case the candidate chooses the offline payment mode to **pay through challan**, then a challan will be generated (as a .pdf file). The candidate has to take the printout of the challan and the payment

should be made in cash at any SBI branch latest by **September 30, 2014 (Tuesday)**. The payment information gets updated in the candidate's login typically within 72 hours. The candidate has to upload a **good quality scanned image of SBI-stamped JAM copy of Challan (in JPEG/PDF format) to the application website. Additionally, the candidate is required to send the SBI-stamped JAM copy of the challan to the organizing Institute, by post at the address 'Organizing Chairperson, JAM 2015, IIT Guwahati, Guwahati - 781039, Assam'**.

**The last date to complete and submit the application form is October 09, 2014 (Thursday).**

Any application which is incomplete in any respect and does not have the required valid documents will be summarily rejected. The candidates must take care to fill in the details in the application form correctly and must upload the correct and valid documents, including signatures and photographs.

The candidates are required to visit the **'How to Apply?'** link in JAM 2015 website for more information on the application and payment processes. The candidates are advised to visit the **'FAQ'** section as well for additional queries.

**Note:**











*If the fee paid is NOT as per the Gender and Category, and the number of Test Paper(s), entered in the Application Form, then the filled in form will be rejected without any intimation to the candidate.*











### **10.1 Photograph Requirements**

The JAM 2015 online application process requires that copy of the candidate's photograph and be uploaded as an electronic file at the time of submitting the application. Uploading a photograph that do not meet specifications can result in disqualification of the application without any refund of the fee.

- i. The photograph must be in color and must be taken in a professional studio. Photographs taken using a Mobile phone and other self-composed portraits are NOT acceptable.
- ii. Photograph must be taken in a White or a very light background.
- iii. The photograph must have been taken after July 01, 2014.
- iv. In the photograph, the face should occupy about 50% of the area, and with a full-face view looking into the camera directly.
- v. The main features of the face must not be covered by hair of the head, any cloth or any shadow. Forehead, eyes, nose and chin should be clearly visible.
- vi. If you normally wear spectacles, glare on glasses is not acceptable in your photo. Glare can be avoided with a slight downward tilt of the glasses or by removing the glasses for the photo shoot.
- vii. You must not wear spectacles with dark or tinted glasses, only clear glasses are permitted.
- viii. Ask your photo studio to provide the image in a JPEG format and also on a standard 3.5 cm x 4.5 cm print
- ix. Maximum pixel resolution for JPEG: 480 x 640 (0.3 Mega pixel) (Ask your studio to reduce it to this resolution if it is higher)
- x. Minimum pixel resolution for JPEG: 240 x 320.
- xi. For your own benefit, it may be prudent not to intentionally change your facial features or hair style as in the photograph until the day of the exam.

Sample Photographs:

Not Acceptable Photograph	Reason for Rejection	Acceptable
	<p>Photo taken with Mobile phone; Distorted face</p>	
	<p>Blue Background</p>	
	<p>Facial Area is less than 50% of total</p>	
	<p>Not looking straight into Camera</p>	
	<p>Cloth Covering facial features</p>	

Not Acceptable Photograph	Reason for Rejection	Acceptable
	<p><b>Shadow on face</b></p>	
	<p><b>Improper flash or Improper Lighting</b></p>	
	<p><b>Too much glare on spectacles</b></p>	
	<p><b>Dark/Tinted Spectacles or Sunglasses</b></p>	
	<p><b>Poor Digital Resolution (100x75)</b></p>	

## 10.2 Signature Requirements

The JAM 2015 online application process requires that copy of the candidate's signature and be uploaded as an electronic file at the time of submitting the application. Uploading a signature file that do not meet specifications can result in disqualification of the application without any refund of the fee.

- i. Please draw a rectangular box of size 7 cm × 2 cm (width x height) on an A4 white paper. Put your signature with black or dark blue ink within this box.
- ii. Get the signature digitally image scanned by a professional using a scanner, and get the image cropped to the box by the professional.
- iii. Only JPEG image formats will be accepted.
- iv. The maximum pixel resolution for the image is 560 × 160.
- v. The minimum pixel resolution for the image is 280 × 80.
- vi. Photograph of signature taken using mobile phone is NOT acceptable, and can result in disqualification of the application without any refund of the fee.

## 11. ADMIT CARD

An Admit Card, bearing the Candidate's Name, Registration Number, Photograph, Signature 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 available for download from JAM 2015 website from **December 31, 2014 to January 31, 2015**. Admit Cards will not be sent by post/E-mail. The Candidate should carefully examine the Admit Card for all the entries made therein. In case of any discrepancy, the Candidate should inform the Organizing Chairperson, JAM 2015, IIT Guwahati immediately. If a candidate is not able to download the Admit Card, then the Chairperson JAM of the respective IISc/IITs (see Appendix-III), under which the first choice Test City/Town of the candidate falls, may be contacted through Phone/Fax/E-mail, giving the Online Enrolment ID, Name, E-Mail ID, Mobile Number, Mailing Address and City Code of the desired Test Centre (first choice) to get information about the Registration Number and the Name of the Test Centre allotted.

A printout of the downloaded Admit Card must be brought to the test centre along with the original and valid photo identification. Please note that you have to give the details of this ID proof while filling the online application. No candidate will be permitted to appear in JAM 2015 examination without a valid Admit Card, and a valid and original ID. The Admit Card should be presented to the invigilators/JAM officials for verification.

**The Admit Card of JAM 2015 must be carefully preserved by the Candidate and produced at the time of admission, if required by the Admitting Institute.**

The Organizing Institute may withdraw the permission granted to a candidate to appear in JAM 2015, if it is found that the candidate is not eligible to appear in the exam, even though an Admit Card has been issued and is produced by the candidate before the Presiding Officer of the Test Centre.

## 12. RANK AND MERIT LIST

### 12.1 Rank List

For each test paper in JAM 2015, an All India Rank (AIR) will be assigned to all the appeared candidates based on the performance of the candidates in the test paper.

**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:

The candidate with a 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.

## 12.2 Merit List

The results (merit lists) will be declared at 17:00 hrs on **March 19, 2015**. The results will be available on the website: <http://www.iitg.ernet.in/jam2015>.

For each test paper, an All India Merit list will be prepared based on AIR. The number of candidates included in the All India Merit List will depend on the total number of seats available in each category in a given subject. These candidates (henceforth called Qualified Candidates) are eligible to apply for admission to any of the corresponding academic programmes available (see Appendix-I) at IISc and IITs. The category-wise lists (OBC-NCL, SC, ST, and PwD) of qualified candidates in a JAM test paper will be prepared based on the category declared by the candidates in their application forms.

**NOTE to OBC-NCL Candidates:** The candidates must submit the valid OBC-NCL certificate in the prescribed format when they submit their application form for admission after the declaration of JAM 2015 results. The final seat allotment will be done based on the OBC-NCL certificate submitted along with the application form for admission. **The relevant certificate will NOT be accepted after April 24, 2015 under any circumstances. The candidate will be considered in the General (Un-Reserved) category in case the OBC-NCL Certificate is invalid or is not in the prescribed format.**

The **Score Card (indicating the All India Rank(s) and the mark(s) obtained by the candidate)** will be available for download in the JAM 2015 website from March 26, 2015 to July 31, 2015 to qualified candidates.

## 13. ADMISSION PROCEDURE

Only the candidates who **qualify** in JAM 2015 (whose names appear in the Merit List) will be eligible to apply for admission to any of the corresponding academic programmes available at IISc and IITs (refer to Appendices-I and II of this Information Brochure).

For admission to Integrated Ph.D. programmes at IISc, M.Sc.-Ph.D. dual degree programmes at IIT Bombay and M.Sc.-Ph.D. dual degree programme in Physics at IIT Kanpur, the JAM 2015 qualified candidates are required to refer to the websites of IISc Bangalore, IIT Bombay, and IIT Kanpur for details including the dates for the interview. Qualified candidates who have obtained B.Sc. degree through Distance Education/Correspondence Mode and are desirous of admission to M.Sc. Mathematics or M.Sc. Physics programmes of IIT Madras are required to refer to the website of IIT Madras for details including the dates for the interview.

Candidates are advised, in their own interest, to refer to the brief profiles of the Admitting Institutes and Departments at their respective websites (Table 3). Applicants should note that they have to apply for admission by filling an online Application Form for Admission (henceforth called Admission Form) available only at JAM 2015 website.

Based on the test paper(s) qualified, an applicant can apply to one or more academic programmes covered under that test paper(s), subject to fulfillment of the Minimum Educational Qualifications (MEQs) and the Eligibility Requirements (ERs) of the Admitting Institute(s). For the academic session 2015-16, the following admission procedure shall be followed for all the Programmes at IISc and IITs covered under JAM 2015. Candidates are also advised to refer to the JAM 2015 website for latest updates.

- (i) After JAM 2015 results are announced, **a qualified candidate will have to apply ONLINE only using the prescribed Admission Form available at JAM 2015 website <http://www.iitg.ernet.in/jam2015> or <http://www.iitg.ac.in/jam2015> only, irrespective of IISc and IITs where the admission is sought.** The duration for **online Admission Form submission** is from **April 11- 20, 2015**.
- (ii) Irrespective of whether a candidate has qualified in one or two Test Papers, **only one** duly completed Admission Form should be submitted listing, in an option form, all the programmes at IISc and IITs (along with the order of preferences) where the candidate is seeking admission.
- (iii) The facility for Online submission of Admission Form will be available through the website <http://www.iitg.ernet.in/jam2015> or <http://www.iitg.ac.in/jam2015> from **April 11, 2015**. Upon logging in to the JAM 2015 website (JAPS), the candidate needs to fill in the required information, such as choice of the programmes in order of preference, educational qualifications, percentage of marks/CGPA, category, PwD status etc. After carefully choosing the order of programme preferences based on the ER and MEQ of the programmes at Admitting Institutes, a payment of Rs 600/- (Rupees

six hundred only) is to be made as non-refundable processing fee. The payment can be made **only through challan via State Bank of India**. After locking programme preferences and proceeding to payment, a challan will be generated as a .pdf file. The candidate has to take the printout of the challan and the payment should be made in cash at any SBI branch latest by **April 20, 2015 (Monday)**. Additional bank charges may apply for this transaction.

- (iv) The Admission Form will not be considered if it is found incomplete in any respect or if it is not accompanied by the payment and the candidate will not be considered for admission, irrespective of satisfying the ER and MEQ of any programme(s) for which the Admission Form has been submitted. Also, a candidate will be considered for admission only to the programme(s), given in his/her Admission Form.
- (v) Qualified Candidates who have chosen to apply for integrated Ph.D. programmes at IISc and selected M.Sc.-Ph.D. dual degree programmes at IIT Bombay, M.Sc.-and Ph.D. dual degree programme in Physics at IIT Kanpur will additionally follow procedure given on the admission website of these institutes and complete the required procedure.
- (vi) Qualified candidates who have obtained B.Sc. degree through Distance Education/Correspondence Mode and chosen to apply for M.Sc. Mathematics or M.Sc. Physics programmes of IIT Madras will additionally follow procedure given on the admission website of this institute and complete the required procedure.
- (vii) 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 2015 will be prepared by the Organizing Institute and will be announced on **June 15, 2015** on JAM 2015 website.
- (viii) After the declaration of the First Admission List, admission offers will be sent by the respective Admitting Institute(s) to the concerned candidates on the next day. Along with the submission of the acceptance form, these candidates will also have to pay an advance seat booking fee (Rs. 10000/- for General/OBC-NCL category candidates and Rs. 5000/- for SC/ST/PwD category candidates) through **challan** via State Bank of India, within the deadline mentioned in the admission offer letter. This amount will be transferred to the Admitting Institute and it will be adjusted against the Institute Fee at the time of Registration.
- (ix) If seats remain vacant after the first admission process is over, the Organizing Institute will prepare a **Second Admission List**. This second list will be announced by the Organizing Institute on **June 29, 2015** on JAM 2015 website and the admission offers based on the second list, if any, will be sent by the Admitting Institute(s) to the candidates concerned.
- (x) Candidates who have been offered admission through the Second List but not through the First List, must submit their acceptance form, along with an advance seat booking fee (Rs. 10000/- for General/OBC-NCL category candidates and Rs. 5000/- for SC/ST/PwD category candidates) paid through **challan** via State Bank of India, within the deadline mentioned in the admission offer letter. This amount will be transferred to the Admitting Institute and it will be adjusted against the Institute Fee at the time of Registration.
- (xi) If seats remain vacant even after the second admission process is over, the Organizing Institute will prepare a **Third and Final Admission List**. This third and final list will be announced by the Organizing Institute on **July 13, 2015** on JAM 2015 website and the admission offers based on the third list, if any, will be sent by the Admitting Institute(s) to the candidates concerned.
- (xii) **With the Third and Final Admission List, the admission process based on JAM 2015 will come to a close.**
- (xiii) If a qualified candidate is allotted a seat through the First Admission List and if the offer of admission is accepted, the lower preferences of the candidate, if any, will be automatically cancelled. However, the candidate will remain on the waiting list for all the higher preferences (if any). Qualified candidates, who are not allotted any seat in the First/Second Admission List, will remain on the waiting list in the next round of admission(s). If a qualified candidate fails to accept an admission offer, he/she will not be considered further in the admission process.

#### **Important Note:**

- (a) Verification of Minimum Educational Qualifications (MEQs) and the Eligibility Requirements (ERs) 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).

#### 14. PROFILE OF IISc BANGALORE and IITs

The profile of the admitting institutes covered under JAM 2015 can be seen at the websites of the respective institutions as given below in Table 3.

**Table 3: Website Addresses of IISc Bangalore and IITs**

S.No.	Name of Institute	Website
1	IISc Bangalore	<a href="http://www.iisc.ernet.in">www.iisc.ernet.in</a>
2	IIT Bhubaneswar	<a href="http://www.iitbbs.ac.in">www.iitbbs.ac.in</a>
3	IIT Bombay	<a href="http://www.iitb.ac.in">www.iitb.ac.in</a>
4	IIT Delhi	<a href="http://www.iitd.ac.in">www.iitd.ac.in</a>
5	IIT Gandhinagar	<a href="http://www.iitgn.ac.in">www.iitgn.ac.in</a>
6	IIT Guwahati	<a href="http://www.iitg.ac.in">www.iitg.ac.in</a>
7	IIT Hyderabad	<a href="http://www.iith.ac.in">www.iith.ac.in</a>
8	IIT Indore	<a href="http://www.iiti.ac.in">www.iiti.ac.in</a>
9	IIT Jodhpur	<a href="http://www.iitj.ac.in">www.iitj.ac.in</a>
10	IIT Kanpur	<a href="http://www.iitk.ac.in">www.iitk.ac.in</a>
11	IIT Kharagpur	<a href="http://www.iitkgp.ac.in">www.iitkgp.ac.in</a>
12	IIT Madras	<a href="http://www.iitm.ac.in">www.iitm.ac.in</a>
13	IIT Roorkee	<a href="http://www.iitr.ac.in">www.iitr.ac.in</a>
14	IIT Ropar	<a href="http://www.iitrpr.ac.in">www.iitrpr.ac.in</a>

#### 15. SYLLABI FOR TEST PAPERS

##### 15.1 BIOLOGICAL SCIENCES (BL)

**General Biology:** Taxonomy and physiology, Pro-and eukaryotic organisms; cell organelles and their function; multicellular organization; energy transformations; internal transport systems of plants; respiration; regulation of body fluids and excretory mechanisms; cellular reproduction; Mendelian genetics and heredity; biology and populations and communities; evolution; genesis and diversity of organisms; animal behaviour, plant and animal diseases.

**Basics of Biochemistry, Biophysics, Molecular Biology:**

Buffers; trace elements in biological systems; enzymes and proteins; vitamins; biological oxidations, carbohydrates and lipids and their metabolisms; digestion and absorption; detoxifying mechanisms; plant and animal hormones and their action, nervous system, nucleic acids, nature of gene and its function, Genetic code, synthesis of nucleic acids and proteins. Enzyme mechanisms and kinetics, nucleic acid metabolism, photo synthesis.

Structure of biomolecules; intra and intermolecular forces; thermodynamics and kinetics of biological systems, principles of x-ray diffraction, IR and UV spectroscopy and hydrodynamic techniques.

**Microbiology, Cell Biology and Immunology:** Classes of microorganisms and their characterization, nutrient requirement for growth; laboratory techniques in microbiology, pathogenic microorganisms and disease; applied microbiology; viruses, Microbial genetics. Innate and adaptive immunity, antigen antibodies. Cell theory; Cell architecture; methods of cell fractionation; cell division; types of chromosome structure; biochemical genetics- inborn errors of metabolisms; viruses and fungi; principles of processes of development.

**Mathematical Sciences:** Mathematical functions (algebraic, exponential, trigonometric), their derivatives (derivatives and integrals of simple functions), permutations and combinations.

##### 15.2 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 Phosphorylation; 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.

## **15.3 CHEMISTRY (CY)**

### **PHYSICAL CHEMISTRY**

**Basic Mathematical Concepts:** Functions, maxima and minima, integrals, ordinary differential equations, vectors and matrices, determinants, elementary statistics and probability theory.

**Atomic and Molecular Structure:** Fundamental particles, Bohr's theory of hydrogen-like atom; wave-particle duality; Uncertainty principle; Schrödinger's wave equation; Quantum numbers, shapes of orbitals; Hund's rule and Pauli's exclusion principle, electronic configuration of simple homonuclear diatomic molecules.

**Theory of Gases:** Equation of state of ideal and non-ideal (van der Waals) gases, Kinetic theory of gases. Maxwell-Boltzmann distribution law; equipartition of energy.

**Solid state:** Crystals, crystal systems, X-rays, NaCl and KCl structures, close packing, atomic and ionic radii, radius ratio rules, lattice energy, Born-Haber cycle, isomorphism, heat capacity of solids.

**Chemical Thermodynamics:** Reversible and irreversible processes; First law and its application to ideal and nonideal 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; Concentration cells with and without transport; Debye-Huckel-Onsagar theory of strong electrolytes.

**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.

**Adsorption:** Gibbs adsorption equation, adsorption isotherm, types of adsorption, surface area of adsorbents, surface films on liquids.

## ORGANIC CHEMISTRY

**Basic Concepts in Organic Chemistry and Stereochemistry:** Electronic effect (resonance, inductive, hyperconjugation) and steric effects and its applications (acid/base property). Optical isomerism in compounds without any stereocenters (allenes, biphenyls), conformation of acyclic systems (substituted ethane/npropane/n-butane) and cyclic systems (mono and di substituted cyclohexanes).

**Organic Reaction Mechanism and Synthetic Applications:** Chemistry reactive intermediates, carbene, nitrene, benzyne, Hofmann-Curtius-Lossen rearrangement, Wolf rearrangement, Simmons-Smith reaction, Reimer-Tiemann reaction, Michael reaction, Darzens reaction, Wittig reaction, McMurry reaction. Pinacol-pinacolone, Favorskii, benzilic acid rearrangement, dienonc-phenol rearrangement, Bayer-Villegger reaction. Oxidation and reduction reactions in organic chemistry. Organometallic reagents in organic synthesis (Grignard and organocopper). Diels-Alder reaction, Sigmatropic reactions.

**Qualitative Organic Analysis:** Functional group interconversions, structural problems using chemical reactions, identification of functional groups by chemical tests, elementary  $^1\text{H}$  NMR and IR spectroscopy as a tool for structural elucidation.

**Natural Products Chemistry:** Introductory chemistry of alkaloids, terpenes, carbohydrates, amino acids, peptides and nucleic acids.

**Heterocyclic Chemistry:** Monocyclic compounds with one hetero atom.

## 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, color and magnetic properties of metal complexes. Organometallic compounds, metal caronyls, nitrosyls and metallocenes, ligands with back bonding capabilities; MO theory approaches to explain bonding in metal-carbonyl, metal-nitrosyl and metalphosphine complexes.

**Bioinorganic Chemistry:** Essentials and trace elements of life, basic reactions in the biological systems and the role of metal ions especially  $\text{Fe}^{2+}$ ,  $\text{Fe}^{3+}$ ,  $\text{Cu}^{2+}$  and  $\text{Zn}^{2+}$ , function of hemoglobin and myoglobin.

**Instrumental Methods of Analysis:** Basic principles, instrumentations and simple applications of conductometry, potentiometry, UV-vis spectrophotometry, analysis of water, air and soil samples.

**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.

## 15.4 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 vertebrate 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.

## 15.5 MATHEMATICS (MA)

**Sequences and Series of Real Numbers:** Sequences and series of real numbers, Convergent and divergent sequences, bounded and monotone sequences, Convergence criteria for sequences of real numbers, Cauchy sequences, absolute and conditional convergence; Tests of convergence for series of positive terms – comparison test, ratio test, root test; Leibnitz test for convergence of alternating series.

**Functions of One Variable:** limit, continuity, differentiation, Rolle's Theorem, Mean value theorem. Taylor's theorem. Maxima and minima.

**Functions of Two Real Variables:** limit, continuity, partial derivatives, differentiability, maxima and minima. Method of Lagrange multipliers, Homogeneous functions including Euler's theorem.

**Integral Calculus:** Integration as the inverse process of differentiation, definite integrals and their properties, Fundamental theorem of integral calculus. Double and triple integrals, change of order of integration. Calculating surface areas and volumes using double integrals and applications. Calculating volumes using triple integrals and applications.

**Differential Equations:** Ordinary differential equations of the first order of the form  $y'=f(x,y)$ . Bernoulli's equation, exact differential equations, integrating factor, Orthogonal trajectories, Homogeneous differential equations-separable solutions, Linear differential equations of second and higher order with constant coefficients, method of variation of parameters. Cauchy-Euler equation.

**Vector Calculus:** Scalar and vector fields, gradient, divergence, curl and Laplacian. Scalar line integrals

and vector line integrals, scalar surface integrals and vector surface integrals, Green's, Stokes and Gauss theorems and their applications.

**Group Theory:** Groups, subgroups, Abelian groups, non-abelian groups, cyclic groups, permutation groups; Normal subgroups, Lagrange's Theorem for finite groups, group homomorphisms and basic concepts of quotient groups (only group theory).

**Linear Algebra:** Vector spaces, Linear dependence of vectors, basis, dimension, linear transformations, matrix representation with respect to an ordered basis, Range space and null space, rank-nullity theorem; Rank and inverse of a matrix, determinant, solutions of systems of linear equations, consistency conditions. Eigenvalues and eigenvectors. Cayley-Hamilton theorem. Symmetric, skew-symmetric, hermitian, skew-hermitian, orthogonal and unitary matrices.

**Real Analysis:** Interior points, limit points, open sets, closed sets, bounded sets, connected sets, compact sets; completeness of  $\mathbb{R}$ , Power series (of real variable) including Taylor's and Maclaurin's, domain of convergence, term-wise differentiation and integration of power series.

## 15.6 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.

## 15.7 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 order equations and linear second order differential equations with constant coefficients. 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, Center 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, parallel and perpendicular axes theorem. 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. Zeroth 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. Ideas of ensembles, Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein distributions.

**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, the superposition principle, calculation of expectation values, Schrödinger equation and its solution for one, two and three dimensional boxes. Solution of Schrödinger equation for the one dimensional harmonic oscillator. 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, Bravais lattices and basis. Miller indices. X-ray diffraction and Bragg's law; Intrinsic and extrinsic semiconductors, variation of resistivity with temperature. Fermi level. p-n junction diode, I-V characteristics, Zener diode and its applications, BJT: characteristics in CB, CE, CC modes. Single stage amplifier, two stage R-C coupled amplifiers. Simple Oscillators: Barkhausen condition, sinusoidal oscillators. OPAMP and applications: Inverting and non-inverting amplifier. Boolean algebra: Binary number systems; conversion from one system to another system; binary addition and subtraction. Logic Gates AND, OR, NOT, NAND, NOR exclusive OR; Truth tables; combination of gates; de Morgan's theorem.

**Appendix-I: Academic Programmes (and their Codes) Covered under JAM 2015 at Various Admitting Institutes for JAM 2015 Qualified Candidates\***

**IISc Bangalore (Zone-11)\***

Integrated Ph.D.	Biological Sciences	Chemical Sciences	Mathematical Sciences	Physical Sciences
[Programme code] Seats Available	[1101] 8+4+2+1	[1102] 8+4+2+1	[1103] 6+3+2+1 GEN(1)	[1104] 6+3+2+1
Paper Code(s)	BL,BT,CY,MA,PH	BL,CY,PH	MA,MS	PH

**IIT Bombay (Zone-12)\***

M.Sc. (4 semesters)	Applied Geology	Applied Geophysics	Applied Statistics and Informatics	Biotechnology	Chemistry	Mathematics	Physics
[Programme code] Seats Available	[1201] 15+8+5+2	[1202] 8+5+2+1	[1203] 19+10+5+3 GEN(1)	[1204] 14+8+4+2	[1205] 20+11+6+3 GEN(1)	[1206] 15+8+5+2	[1207] 16+8+5+3 GEN(1)
Paper Code(s)	GG	PH	MS	BT	CY	MA	PH

M.Sc. – Ph.D. dual degree	Applied Geology	Applied Geophysics	Biotechnology	Chemistry	Energy	Environmental Science and Engineering	Operations Research	Physics
[Programme code] Seats Available	[1208] 2+1+1+0 OBC(1)	[1209] 2+1+1+0 GEN(1)	[1210] 4+2+1+1 ST(1)	[1211] 3+1+1+1 ST(1)	[1212] 9+5+3+1 SC(1)	[1213] 5+3+1+1	[1214] 6+4+1+1	[1215] 4+2+1+1
Paper Code(s)	GG	PH	BL,BT,CY,PH	CY	CY,MA,PH	BT,CY,MA,PH	MA,MS	PH

M.Sc.-M.Tech. (8 semesters)	M.Sc.(Physics)-M.Tech. (Materials Sciences with specialization in Nano-Science & Tech.)
[Programme code] Seats Available	[1216] 4+2+1+1 ST(1)
Paper Code(s)	PH

**IIT Delhi (Zone-13)\***

M.Sc. (4 semesters)	Chemistry	Mathematics	Physics
[Programme code] Seats Available	[1301] 27+15+8+4 GEN(1), OBC(1)	[1302] 27+15+8+4 GEN(1), SC(1)	[1303] 27+15+8+4 GEN(1), ST(1)
Paper Code(s)	CY	MA	PH

**IIT Guwahati (Zone-14)\***

M.Sc. (4 semesters)	Chemistry	Mathematics and Computing	Physics
[Programme code] Seats Available	[1401] 24+13+7+4 OBC(1)	[1402] 24+13+7+4 GEN(1), SC(1)	[1403] 24+13+7+4 GEN(1)
Paper Code(s)	CY	MA	PH

**IIT Kanpur (Zone-15)\***

M.Sc. (4 semesters)	Chemistry	Mathematics	Physics	Statistics
[Programme code] Seats Available	[1501] 20+11+6+3 GEN(1)	[1502] 20+11+6+3 SC(1)	[1503] 15+8+5+2 OBC(1)	[1504] 25+14+7+4 GEN(1)
Paper Code(s)	CY	MA	PH	MS

M.Sc.- Ph.D. dual degree	Physics
[Programme code] Seats Available	[1505] 7+4+2+1
Paper Code(s)	PH

#### IIT Kharagpur (Zone-16)\*

Joint M.Sc.- Ph.D.	Chemistry	Geology	Mathematics	Physics	Geophysics
[Programme code] Seats Available	[1601] 23+12+7+4 GEN(1)	[1602] 15+8+5+2 GEN(1)	[1603] 15+8+5+2 SC(1)	[1604] 23+12+7+4 OBC(1)	[1605] 12+6+4+2 GEN(1)
Paper Code(s)	CY	GG	MA	PH	GG,PH

#### IIT Madras (Zone-17)\*

M.Sc. (4 semesters)	Chemistry	Mathematics	Physics
[Programme code] Seats Available	[1701] 27+15+8+4 GEN(1), OBC(1)	[1702] 27+15+8+4 GEN(1), OBC(1)	[1703] 22+12+7+3 GEN(1)
Paper Code(s)	CY	MA	PH

#### IIT Roorkee (Zone-18)\*

M.Sc. (4 semesters)	Applied Geology	Biotechnology	Chemistry	Mathematics	Physics
[Programme code] Seats Available	[1801] 8+4+2+1 OBC(1)	[1802] 18+10+6+3 OBC(1)	[1803] 13+6+4+2 OBC(1)	[1804] 16+8+4+2 OBC(1)	[1805] 13+6+4+2 OBC(1)
Paper Code(s)	GG	BT	CY	MA	PH

#### IIT Bhubaneswar (Zone-19)\*

Joint M.Sc.-Ph.D.	Chemistry	Mathematics	Physics	Geology	Atmosphere and Ocean Sciences
[Programme code] Seats Available	[1901] 10+5+3+2 GEN(1)	[1902] 10+5+3+2 OBC(1)	[1903] 10+5+3+2 SC(1)	[1904] 10+5+3+2	[1905] 10+5+3+2
Paper Code(s)	CY	MA	PH	GG	CY,GG,MA,MS,PH

#### IIT Gandhinagar (Zone-20)\*

M.Sc. (4 semesters)	Chemistry	Mathematics	Physics
[Programme code] Seats Available	[2001] 10+5+3+2	[2002] 10+5+3+2 GEN(1)	[2003] 4+3+2+1
Paper Code(s)	CY	MA	PH

#### IIT Hyderabad (Zone-21)\*

M.Sc. (4 semesters)	Chemistry	Mathematics / Mathematics and Computing	Physics
[Programme code] Seats Available	[2101] 15+8+5+2 OBC(1)	[2102] 8+4+2+1 GEN(1)	[2103] 10+5+3+2
Paper Code(s)	CY	MA	PH

**IIT Indore (Zone-22)\***

M.Sc. (4 semesters)	Chemistry	Physics	Mathematics
[Programme code] Seats Available	[2201] 6+3+2+1	[2202] 6+3+2+1	[2203] 6+3+2+1
Paper Code(s)	CY	PH	MA

**IIT Ropar (Zone-23)\***

M.Sc. (4 semesters)	Mathematics
[Programme code] Seats Available	[2301] 5+3+1+1 OBC(1)
Paper Code(s)	MA

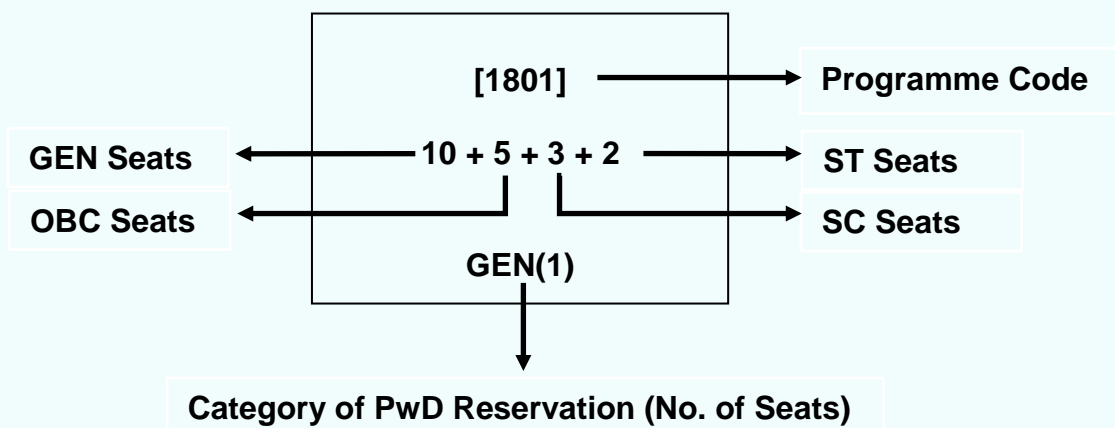
M.Sc.–M.S.(Research)/Ph.D. Dual Degree	Chemistry	Physics
[Programme code] Seats Available	[2302] 6+3+2+1 GEN(1)	[2303] 5+3+1+1 SC(1)
Paper Code(s)	CY	PH

**IIT Jodhpur (Zone-24)\***

M.Sc. (4 semesters)	Chemistry	Physics	Mathematics
[Programme code] Seats Available	[2401] 6+2+1+1 GEN(1)	[2402] 6+2+1+1 GEN(1)	[2403] 6+2+1+1 GEN(1)
Paper Code(s)	CY	PH	MA

\*The number of seats is subject to change

**Explanation of Entries in Cells (Appendix – I)**





**Appendix-II: Test Papers and their Codes, corresponding Academic Programmes offered by the Admitting Institutes and their Minimum Educational Qualifications for Admission**

Test Paper (Test paper code)	Academic Programme(s)	Institute(s)	Minimum Educational Qualification(s) for Admission
Biological Sciences (BL)	Integrated Ph.D. in Biological Sciences	IISc Bangalore	Bachelor's degree in Biology or Chemistry or Physics or Mathematics. The candidates should have passed Biology at the Higher Secondary (10+2) level.
	Integrated Ph.D.in Chemical Sciences	IISc Bangalore	B.Sc. or an equivalent degree with Chemistry as one of the subjects. The candidates should have passed mathematics at the PUC or the Higher Secondary (10+2) level.
	M.Sc.- Ph.D. Dual Degree in Biotechnology	IITB	Bachelor's degree in any branch of Science/ Agriculture / Pharmacy / Veterinary / Engineering / Medicine (MBBS). The candidate should have passed Mathematics at the Higher Secondary (10+2) level.
Biotechnology (BT)	Integrated Ph.D.in Biological Sciences	IISc Bangalore	Bachelor's degree in Biology or Chemistry or Physics or Mathematics. The candidates should have passed Biology at the Higher Secondary (10+2) level.
	M.Sc. Biotechnology	IITB, IITR	Bachelor's degree in any branch of Science/ Agriculture / Pharmacy / Veterinary / Engineering / Medicine (MBBS).
	M.Sc.- Ph.D. Dual Degree in Biotechnology	IITB	NOTE: For IITB only, the candidates should have passed Mathematics at the Higher Secondary (10+2) level.
	M.Sc.- Ph.D. Dual Degree in Environmental Science and 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 Higher Secondary (10 + 2) level.
Chemistry (CY)	Integrated Ph.D. in Chemical Sciences	IISc Bangalore	B.Sc. or an equivalent degree with Chemistry as one of the subjects. The candidates should have passed mathematics at the PUC or Higher Secondary (10+2) level.
	Integrated Ph.D. in Biological Sciences	IISc Bangalore	Bachelor's degree in Biology or Chemistry or Physics or Mathematics. The candidates should have passed Biology at the Higher Secondary (10+2) level.
	M.Sc. Chemistry	IITG	A bachelor's degree (at least 10+2+3) with Chemistry as a major/honours subject and Mathematics and Physics as other subjects, with a minimum of 55% or 6.0 CPI in a scale of 10, without rounding off, in major/honours subject (50% or 5.5 CPI in a scale of 10, without rounding off, for SC/ST/PwD candidates). <b>OR</b> Candidates having a bachelor's degree (at least 10+2+3) <i>without (Major/Honours)</i> must have the concerned degree with (a) <i>Chemistry as a subject for three years/six semesters</i> , (b) <i>minimum 2(Two) courses in Mathematics</i> , (c) <i>minimum 2(Two) courses in Physics</i> , and (d) <i>minimum 60% aggregate marks or 6.5 CPI in a 10-point scale, without rounding off (55% marks or 6.0 CPI in a 10-point scale, without rounding off, for SC/ST/PwD candidates).</i>

Test Paper (Test paper code)	Academic Programme(s)	Institute(s)	Minimum Educational Qualification(s) for Admission
Chemistry (CY)	M.Sc. Chemistry	IITB, IITD, IITGN, IITH, IITI, IITJ, IITK, IITM, IITR	Bachelor's degree with Chemistry as a subject for three years/six semesters and should have passed Mathematics at the Higher Secondary (10+2) level.
	Joint M.Sc.- Ph.D. in Chemistry	IITBBS, IITKgp	
	M.Sc.- Ph.D. Dual Degree in Chemistry	IITB	
	M.Sc.- Ph.D. Dual Degree 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 and 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 Higher Secondary (10 + 2) level.
	M.Sc.- Ph.D. Dual Degree in Biotechnology	IITB	Bachelor's degree in any branch of Science/ Agriculture / Pharmacy / Veterinary / Engineering / Medicine (MBBS). The candidate should have passed Mathematics at the Higher Secondary (10+2) level.
	Joint M.Sc.- Ph.D in Atmosphere and Ocean Sciences	IITBBS	Bachelor's degree with Mathamatics and Physics and any one of these subjects among Chemistry, Computer Science, Computer Application, Geology and Statistics.
	M.Sc.-M.S.(Research)/Ph.D Dual Degree in Chemistry	IITRPR	Bachelor's degree with Chemistry as one of the subject and should have passed Mathematics at the Higher Secondary (10+2) level.
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 should have passed Mathematics at Higher Secondary (10+2) level.
	Joint M.Sc.- Ph.D. in Geology	IITKgp	
	Joint M.Sc.- Ph.D. in Geophysics	IITKgp	
	M.Sc.- Ph.D. Dual Degree in Applied Geology	IITB	
	Joint M.Sc.- Ph.D. in Geology	IITBBS	Bachelor's degree with Geology as a subject for three years/six semesters and any two subjects among Mathematics, Physics and Chemistry. The candidate should have passed Mathematics at Higher Secondary (10+2) level.
	Joint M.Sc.- Ph.D in Atmosphere and Ocean Sciences	IITBBS	Bachelor's degree with Mathamatics and Physics and any one of these subjects among Chemistry, Computer Science, Computer Application, Geology and Statistics.
Mathematics (MA)	Integrated Ph.D. in Mathematical Sciences	IISc Bangalore	Bachelor's degree in science or engineering with mathematics as a subject for three years/six semesters.
	Integrated Ph.D. in Biological Sciences	IISc Bangalore	Bachelor's degree in Biology or Chemistry or Physics or Mathematics with Biology at the Higher Secondary (10+2) level.
	M.Sc. Mathematics	IITB, IITD, IITGN, IITI, IITK, IITM, IITRPR	Bachelor's degree with Mathematics as a subject for at least two years/four semesters.

Test Paper (Test paper code)	Academic Programme(s)	Institute(s)	Minimum Educational Qualification(s) for Admission
Mathematics (MA)	M.Sc. Mathematics / Mathematics and Computing	IITH	Bachelor's Degree with Mathematics as one of the core subjects.
	M.Sc. Mathematics and Computing	IITG	A bachelor's (at least 10+2+3) degree <i>with</i> major/honours in Mathematics and a minimum of 55% marks or 6.0 CPI on 10-point scale, without rounding off (50% marks or 5.5 CPI on 10-point scale, without rounding off, for SC/ST/PwD candidates) in major/honours only <b>OR</b> A bachelor's (at least 10+2+3) degree* <i>without</i> major/honours in Mathematics but with Mathematics as a subject for two years/four semesters and a minimum 60% aggregate marks or 6.5 CPI on 10-point scale, without rounding off (55% aggregate marks or 6.0 CPI on 10-point scale, without rounding off, for SC/ST/PwD candidates).  * (including major/honours in Computer Science)
	M.Sc. in Mathematics	IITR	Bachelor's degree with Mathematics / Statistics as a subject for at least two years/four semesters.
	Joint M.Sc.- Ph.D. in Mathematics	IITBBS, IITKgp	
	M.Sc.- Ph.D. Dual Degree in Operations Research	IITB	
	M.Sc.- Ph.D. Dual Degree in Environmental Science and 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 Higher Secondary (10 + 2) level.
	M.Sc.- Ph.D. Dual Degree 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.
	Joint M.Sc.- Ph.D in Atmosphere and Ocean Sciences	IITBBS	Bachelor's degree with Mathamatics and Physics and any one of these subjects among Chemistry, Computer Science, Computer Application, Geology and Statistics.
	M.Sc. in Mathematics	IITJ	Bachelor's degree with Mathematics as a subject for three years/six semesters and should have passed Mathematics at the Higher Secondary (10+2) level.
Mathematical Statistics (MS)	Integrated Ph.D. in Mathematical Sciences	IISc Bangalore	Bachelor's degree in Science or Engineering with Mathematics as a subject for three years or six semesters.
	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	IITB	
	M.Sc. Statistics	IITK	Bachelor's degree with Statistics as a subject for at least two years or four semesters
	Joint M.Sc.- Ph.D in Atmosphere and Ocean Sciences	IITBBS	Bachelor's degree with Mathamatics and Physics and any one of these subjects among Chemistry, Computer Science, Computer Application, Geology and Statistics.
PHYSICS (PH)	Integrated Ph.D. in Physical Sciences	IISc Bangalore	B.Sc. or equivalent degree with Physics as one of the main subjects.
	Integrated Ph.D. in Biological Sciences	IISc Bangalore	Bachelor's degree in Biology or Chemistry or Physics or Mathematics. The candidates should have passed Biology at the Higher Secondary (10+2) level.

Test Paper (Test paper code)	Academic Programme(s)	Institute(s)	Minimum Educational Qualification(s) for Admission
PHYSICS (PH)	Integrated Ph.D. in Chemical Sciences	IISc Bangalore	B.Sc. or an equivalent degree with Chemistry as one of the subjects. The candidates should have passed mathematics at the PUC or Higher Secondary (10+2) level.
	M.Sc. Physics	IITH	Bachelor's degree with Physics as a major subject and Mathematics as one of the subjects.
	M.Sc. Physics	IITG	A bachelor's degree (at least 10+2+3) with Physics as a major/honours subject and Mathematics as one of the other subjects with a minimum of 55% or 6.0 CPI in a scale of 10 in major/honours subject, without rounding off (50% or 5.5 CPI in a scale of 10, without rounding off, for SC/ST/PwD candidates). <b>OR</b> A bachelor's degree (at least 10+2+3) with Physics as a subject for at least two years/four semesters and Mathematics for at least one year/two semesters with a minimum of 60% or 6.5 CPI in a scale of 10 in aggregate, without rounding off (55% or 6.0 CPI in a scale of 10, without rounding off, for SC/ST/PwD candidates).
	M.Sc. Physics	IITB, IITD, IITI, IITK, IITM, IITR, IITGN	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. in Physics	IITBBS, IITKgp	
	Joint M.Sc.- Ph.D. in Geophysics	IITKgp	
	M.Sc.- Ph.D. Dual Degree in Physics	IITB, IITK	
	M.Sc.(Physics)-M.Tech (Materials Sciences with specialization in Nano-Science & Tech.)	IITB	
	M.Sc. Applied Geophysics	IITB	
	M.Sc.- Ph.D. Dual Degree in Applied Geophysics	IITB	Bachelor's degree with Physics and Mathematics/Mathematical Physics as subjects for two years/four semesters and at least one of them as subject for three years/six semesters.
	M.Sc.- Ph.D. Dual Degree 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 and 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 Higher Secondary (10 + 2) level.
	M.Sc.- Ph.D. Dual Degree in Biotechnology	IITB	Bachelor's degree in any branch of Science/ Agriculture / Pharmacy / Veterinary / Engineering / Medicine (MBBS). The candidate should have passed Mathematics at the Higher Secondary (10+2) level.
	Joint M.Sc.- Ph.D in Atmosphere and Ocean Sciences	IITBBS	Bachelor's degree with Mathematics and Physics and any one of these subjects among Chemistry, Computer Science, Computer Application, Geology and Statistics.
	M.Sc.- M.S.(Research)/Ph.D Dual Degree in Physics	IITRPR	Bachelor's degree with Physics for three years/six semesters and Mathematics/Statistics for at least two years/four semesters.
	M.Sc. in Physics	IITJ	Bachelor's degree with Physics as a subject for three years/six semesters and should have passed Mathematics at the Higher Secondary (10+2) level.

## Appendix–III: EXAMINATION CITIES / TOWNS FOR JAM 2015

### IISc Bangalore Zone

Test City	Code
Bengaluru	101
Hubli	102
Kollam	103
Kottayam	104
Kozhikode	105
Mangalore	106
Palakkad	107
Thrissur	108

### IIT Kharagpur Zone

Test City	Code
Bhubaneswar	601
Kharagpur	602
Kolkata	603
Raipur	604
Ranchi	605
Vijayawada	606
Vishakapatnam	607

### IIT Bombay Zone

Test City	Code
Ahmedabad	201
Goa	202
Hyderabad	203
Mumbai	204
Nagpur	205
Nanded	206
Nasik	207
Pune	208
Vadodara	209

### IIT Madras Zone

Test City	Code
Chennai	701
Coimbatore	702
Ernakulam	703
Madurai	704
Ongole	705
Thiruvananthapuram	706
Tiruchirapalli	707
Warangal	708

### IIT Delhi Zone

Test City	Code
Delhi-NCR	301
Faridabad	302
Ghaziabad	303
Gurgaon	304
Hisar	305
Indore	306
Jaipur	307
Jammu	308
Jodhpur	309
New Delhi	310

### IIT Roorkee Zone

Test City	Code
Dehradun	801
Jalandhar-Phagwara	802
Kurukshetra	803
NOIDA	804
Mohali-Rupnagar-Fatehgarh Sahib	805
Moradabad	806
Roorkee-Muzaffarnagar	807

### IIT Guwahati Zone

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

### IIT Kanpur Zone

Test City	Code
Agra	501
Allahabad	502
Bareilly	503
Bhopal	504
Kanpur	505
Lucknow	506
Varanasi	507

## Appendix-IV

### 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 1<sup>st</sup> 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 2015, the decision of the **Organizing Institute** or the **Organizing Chairperson, JAM 2015** will be final and binding on all the applicants.
- Although JAM 2015 is held at different centres across country, **Indian Institute of Technology Guwahati** is the **Organizing Institute**, and has the overall responsibility of conducting JAM 2015. In case of any claims or disputes arising in respect of JAM 2015, it is hereby made absolutely clear that the Guwahati High Court alone shall have the exclusive jurisdiction to entertain and settle any such disputes and claims.

## Appendix-V: Proforma for Other Backward Class (Non-Creamy Layer) Certificate

### (FORM OF 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./Kumari \_\_\_\_\_ Son/Daughter of \_\_\_\_\_ of Village/Town \_\_\_\_\_ in District/Division \_\_\_\_\_ in the State/Union Territory \_\_\_\_\_ belongs to the \_\_\_\_\_ Community which is recognized as a backward class under the Government of India, Ministry of Social Justice and Empowerment's Resolution No. \_\_\_\_\_ dated \_\_\_\_\_\*.

Shri/Smt./Kumari \_\_\_\_\_ and/or his/her family ordinarily reside(s) in the \_\_\_\_\_ District/Division of \_\_\_\_\_ State/Union Territory. 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 08.09.1993 as amended from time to time.

Dated:

District Magistrate,  
Deputy Commissioner, etc.

Seal

\* - The authority issuing the certificate may have to mention the details of Resolution (Number and Date) of Government of India, in which the caste of the candidate is mentioned as OBC.

#### 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 1<sup>st</sup> 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.

**The date of issue of OBC (NCL) certificate should be after March 31, 2014**

## IMPORTANT DATES FOR JAM 2015

Commencement of ONLINE Registration and Application on JAM 2015 Website	September 03, 2014 (Wednesday)
Last Date for Payment of Application Fee through Challan	September 30, 2014 (Tuesday)
Last Date for Online Application Submission and Uploading of Documents on the Website	October 09, 2014 (Thursday)
Date of JAM 2015 Examination	February 08, 2015 (Sunday)
Announcement of the Results of JAM 2015	March 19, 2015 (Thursday) at 17:00 hrs
Submission of Application Form for Admission on the JAM 2015 Website	April 11 - 20, 2015
Last Date for receipt of request for change of category along with valid documents in proper format at IIT Guwahati	April 24, 2015 (Friday)
Interview at <b>IIT Madras</b> <b>IIT Bombay</b> <b>IISc Bangalore</b> <b>IIT Kanpur</b>	May 18, 2015 (Monday) May 21 - 23, 2015 May 26 - 28, 2015 June 01 - 03, 2015
Declaration of First Admission List	June 15, 2015 (Monday)
Declaration of Second Admission List	June 29, 2015 (Monday)
Declaration of Third and Final Admission List and the Closure of Admissions through JAM 2015	July 13, 2015 (Monday)

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### JAM 2015 Website:

<http://www.iitg.ernet.in/jam2015>  
<http://www.iitg.ac.in/jam2015>