

ALTERNATIVE TO IIT- JEE, AIEEE AND STATE JEEs

The following Committee was formed vide Order No. F.19-2/2010-TS.I dated, 8th March, 2010 (Copy given in Annexure-I) to explore possible alternatives to the present IIT-JEE, AIEEE and other State Joint Entrance Examinations for admission to engineering programmes in the country:

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| 1. Prof. D. Acharya, Director, IIT Kharagpur | - | Chairman |
| 2. Prof. M. S. Ananth, Director, IIT Madras | - | Member |
| 3. Prof. Devang V. Khakhar, Director, IIT Bombay | - | Member |
| 4. Prof. S. C. Saxena, Director, IIT Roorkee | - | Member |

The Committee also had the mandate of streamlining and rationalizing other examinations such GATE, JMET, JAM etc. The Committee was advised to invite / associate Chairman CBSE, COBSE officials and Chairman CCB for AIEEE.

The Committee met six times:

(1) On 16th March, 2010 in IIT Madras. Chairman, COBSE, COBSE officials, Chairman CCB, AIEEE, JEE Chairman of all IITs were present. The Committee took cognisance of the report of the IIT-JEE reform committee set up by the Directors in 2007 with Prof. V. G. Idichandy, Deputy Director, IIT Madras as Convenor and the findings of Prof. A. N. Samanta, Chairman, JEE, IIT Kharagpur in 2010. Prof. M. Anandakrishnan, former VC, Anna University, shared the experience of Tamil Nadu in the abolition of JEE in the state and admission based on the normalized +2 results with the Committee. The Committee discussed the JEEs and their impact on school education in general and technical education in particular and prepared a document suggesting alternatives.

(2) Four different consultations were held with the stakeholders in different zones.

- In Kolkata (East Zone) on May 17, 2010
- In Delhi (North Zone) on May 19, 2010
- In Hyderabad (South Zone) on May 25, 2010 and
- In Mumbai (West Zone) on May 31, 2010

The stakeholders included the Vice Chancellors / Directors of the Universities, Secretaries of Technical Education and Directors of NITs and one of the Directors of IISER. The MHRD was represented by the Additional Secretary and a Director in some of the consultations. While the Chairman of IIT Delhi participated in Delhi consultation, the Chairman of IIT Kanpur participated in both IIT Madras and IIT Hyderabad consultations. The Directors and senior colleagues of IIT Delhi and IIT Bombay

participated in the consultation meetings held in these Institutions. Director IIT Hyderabad participated in the consultation held in Hyderabad. Representatives of the Directors of IIT Patna, Guwahati and Bhubaneswar participated in Kolkata consultation.

- (3) The outcome of these consultations was discussed by the Committee on 15th June in Kolkotta and a pre-final draft of the report is given below.

1. Joint Entrance Examinations

Joint Entrance Examinations are being conducted to admit students to a group of Institutions offering degree programmes in Engineering, Medicine, Pharmacy, Architecture, Management, and Computer Applications. Students from various Boards at XII level whose curriculum, syllabus and standards vary appear at All India, State and Institution level JEEs. Each JEE prescribes its own syllabus which may be different from or similar to a Board's syllabus. Each JEE serves as a common base to evaluate students from various Boards and rank them in the order of their test score.

The JEEs differ in terms of the syllabus and the method of examination and evaluation. This calls for extra preparation and coaching. The performance in the JEE is the sole basis of ranking. Other inputs such as XII performance, aptitude, teachers' feedback etc. to judge the merit and suitability of a student are conspicuously absent in the admission process.

The Common Entrance Examination (CEE) for admission to IITs in 1961 evaluated students on a common curriculum and syllabus. CEE did away with the multiplicity of tests, minimised costs and inconveniences to the students. The test format was designed to evaluate the higher analytical skills and ability to use combination of concepts in solving problems. Test of English, General Knowledge, Engineering Drawing etc. helped to evaluate the communication, aptitude and general awareness of the students. The students were ranked based on CEE Score and Institution – Branch of study allocation was done as per the choice of the student and availability of seats.

Institutions like IITs used the All India Rank. The State conducted JEEs used the State level rank for admission to State level Institutions. AIEEE used both All India and State level ranks to facilitate admission to Institutes having both State and Central quota. Other Institutions also used these ranks to admit students as per their requirement. All JEEs also prepared ranks category-wise (General, SC, ST, OBC, Female and Physically Challenged etc.) to facilitate category-wise admission to Institutions.

With the increase in number of Institutions and number of candidates appearing at JEE, pen and paper mode of examination gave way to answering Multiple Choice Questions and their evaluation through use of OMR sheets.

2. Current Status

The IIT JEE is considered to be one of the toughest examinations. Nearly 500,000 students appear at IIT JEE and compete for about 10,000 seats. The number in terms of both the candidates and the available seats is likely to grow by 10% every year.

Nearly 11 lakhs students appear in the AIEEE for admission to about 20 NITs, some of the Deemed Universities and over 100 Private Colleges. This number is also expected to grow by about 10 percent a year.

For admission to State level Government and Private Engineering Institutions, State level JEE is conducted, practically in every State except Tamil Nadu. Tamil Nadu has dropped State level JEE and admits students to their Engineering Institutions based on normalized +2 marks. Though a student now appears at 3-5 Entrance Examinations to get an admission into a Technical Institution, the total number of students appearing at one Joint Entrance Examination or the other is around 25 lakhs.

A student is offered admission to the Institution and discipline of his / her choice based on his / her rank. The rank of the students in the JEE is determined by his / her score in the JEE. Some JEEs prescribe an eligibility criteria based on +2 examination result. For instance, IIT JEE prescribes 60% mark for General candidates and 55% mark for SC/ST candidates. Some State JEEs also insist on minimum of 40-45% mark in +2 Examination. Some States like Gujarat and Andhra Pradesh gives 50% and 25% weightages respectively to the +2 performance in preparation of the Merit List.

The number of students appearing in the JEEs in many States is less than the number of available seats. Therefore, the qualifying mark for inclusion in the Merit List of the Joint Entrance Examinations even goes down to below zero! Some of the States such as Bihar, Jharkhand and North-Eastern States do not have many Government or Private Institutions. Students of these States appear at either AIEEE or State Level JEEs of other States to seek admission to Technical Institutions.

The JEEs are limited to multiple choice questions in Physics, Chemistry and Mathematics (PCM) for Engineering or Bio-Science (PCB) for Medicine and Pharmacy,. For admission to Architecture, in addition to a test in PCM, one has to take Aptitude Test. For lateral level admission to Engineering, the syllabus for the JEEs is limited to that of the discipline specific diploma programmes.

3. Evolution of JEE Patterns

As noted earlier, the “Common Entrance Examination” was started in 1961 for admission to 4 IITs for nearly 700 intake at both First Year and Second Year level. Nearly 15,000 candidates appeared. CEE used long answer, problem-solving, manual evaluation format to search for talent. In the early 60s, the name of the examination was changed to the JEE. In the late 70s Engineering Drawing and General Knowledge were dropped and in 1988 English was dropped. Coaching for JEE started in 70s. The perceived competition between coaching classes and paper setters made the examination more tougher and the students became more dependent on coaching. IIT JEE remained a low scoring tough examination. To cope with the increase in number of candidates, two stage JEE was introduced in 2000: an objective Screening Test followed by a Main paper that was evaluated only for those who qualified in the Screening Test. Objective testing alone was introduced in 2006.

With expansion in Engineering Colleges JEEs at State level started in late 80s. The AIEEE was introduced in 2002. RECs / NITs opted for AIEEE while deemed Universities and Colleges opted for AIEEE for some percentage of their seats. Multiple Choice Test is being followed in AIEEE and State JEEs from the beginning. Most JEEs have focused only on testing PCM or PCB neglecting other attributes.

4. Variations among the JEEs and Admissions

The country has large number of Institutions with widely varying capabilities, focus and standards. Institutes like IITs and IISER are on the top of the ladder. These Institutions offer research and innovation focused education that requires higher analytical abilities and problem solving skills using multiple concepts. Therefore the IIT-JEE tests higher analytical abilities and concurrent use of multiple concepts even from multiple disciplines in solving problems. Though the syllabus is at the +2 level, the test is well above the XII examinations. It is considered to be one of the toughest examinations and a time-tested filter of talent for admission to the IITs. It has earned a well-deserved reputation for fairness and for the integrity of those organizing the examination.

NITs and several Government and Private Institutions offer quality technical education. They admit students through the AIEEE. AIEEE tests the students on clear understanding and application of concept covered at standard 12 level in PCM. The syllabus used for the AIEEE is primarily the CBSE syllabus with suitable modifications to take care of the needs of other Boards.

The State level JEEs are used to admit students to the large number of State level Government and Private Institutions. The tests are designed based on the State Board syllabus for PCMB.

In addition to the above at State level JEE, Entrance Examinations are conducted for lateral entry of Diploma holders in Engineering and Architecture to Degree programmes. Here, the Test syllabus is same as the State level Diploma syllabus.

For admission to many leading Institutions in Medicine and Central quota on State level Medical Colleges, CBSE conducts a Medical Entrance Test. The test is on PCB and the syllabus is CBSE XII level plus. This test is considered to be very tough requiring extensive memorization and coaching to crack.

JEE Merit List is used as the sole criteria not only for admission to an Institution but also for the allocation of the branch of study to a student in that Institution. Institution and branch allocation requires assignment of distinct ranks to individuals. The number and difficulty level of the questions that have to be answered in a limited time have been increased to make the tests more discriminating. Bunching is minimized by the design of the questions and by the use of several tier tie-breaking rules.

5. Impact of JEEs in the present form

Since the success in JEEs is the sole criteria for admission to many technical Institutions, the focus of the better students has shifted from +2 Science education in School to Coaching for the JEEs.

School attendance has become a casualty.

Many coaching classes concentrate on teaching students tricks that help crack Multiple Choice Questions.

Some students suffer from burn-out syndrome; some think they have “arrived” just because they cracked the JEE; some who failed to get admission to the disciplines of their choice feel frustrated.

JEEs are urban centric and rural students without access to coaching fail to qualify.

Girl students fare worse than boys in the JEEs despite their superior Board performance.

- Dearth of quality Institutions has increased the competition for admission to the few available ones beyond desirable limits.
- Increase in number of students has led to Multiple Choice ORS based examination, which is pedagogically not as effective as the long answer format.

6. Analysis of JEEs and Suggestions for Change

An analysis of the performance of the relatively few students admitted to the IITs over the last decade in the IIT-JEE and subsequently in the IITs (2 tier JEE was conducted between 2000 and 2005 and a single objective-type examination has been conducted since 2006) leads to the following broad and somewhat expected conclusions:

There is a strong correlation between the Standard X and Standard XII marks and CGPA including the final performance in IIT.

Both AIR and percentage marks at Standard XII are better correlated to the CGPA only upto the end of the first year.

There is poor correlation between AIR and the CGPA of GE and OBC candidates from 2nd year onwards.

- Percentage of marks at XII level better explains group performance in later years.

Students with high AIR (less than 1000) have higher score at XII level while aberrations are more prominent at lower AIRs.

An analysis of the performance of students in the screening and main tests of IIT JEE between 2000 and 2005 showed a considerable overlap between the sets of top 5000 students although their ranks within the sets showed little correlation. Hence it would be expedient to settle for a completely objective single examination.

The studies recommended (some already implemented)

Screening based on normalized Board scores at Standard X and/or Standard XII and Multiple Choice examination replacing the two stage JEE from 2006.

Entry barrier to be raised to 60% in the +2 examinations.

Factors, other than the Standard XII marks and AIR based on PCM testing, such as raw intelligence, logical reasoning, aptitude, comprehension and general knowledge need to be considered.

Need to factor in school performance more significantly into the selection process.

The last two recommendations are applicable to all JEEs. From the discussions held by this committee the following additional desirable features of the admission process were identified:

Decision based on one time test needs to be re-examined. Opportunities to improve must be built in.

Students must be relieved of the pressure of multiple JEEs. Currently a student appears

on an average at 5 JEEs all within a few days of the Board Examinations.

Influence of coaching for JEE needs to be minimised.

- Urban-rural and gender bias has to be eliminated or atleast minimised.

The objective type of examination lends itself to undue influence of coaching. The conventional pen and paper examination with well designed long and problem solving oriented questions should be revived by keeping numbers in any JEE within reasonable limits.

JEEs, especially the IIT JEE, have become a huge money spinning activity for coaching centres with attendant undesirable consequences.

7. Recommended Alternative

- Scores in a well-designed National Aptitude Test (NAT) should be used to capture parameters of interest such as raw intelligence, aptitude, general awareness, comprehension and written communication skills.
- NAT should not require extensive preparation and coaching. The questions in the test should be so designed that it would not require inputs beyond the +2 level.

Ideally candidates should be able to take NAT any time in a year. One can also have the option to improve over (say) 3 attempts. The test could be an online test and the highest of the 3 scores shall be considered.

- Standard XII Scores normalized appropriately across Boards, considering PCM for Engineering, Science and Architecture and PCB for Medicine and Pharmacy should be used to capture the School Science Performance (SSP).
- A Composite Weighted Performance (CWP) Score may be computed as follows:

$$\text{CWP Score} = X (\text{SSP Score}) + (1-X) (\text{NAT Score})$$

An X value of 0.7 is recommended to begin with. This may be revised after a few year's experience.

- There is wide variation in requirements and standards of admitting Institutions. While CWP Score should be compulsory for all, add on tests (like the IIT JEE) need to be conducted in order to meet the specific needs of elite Institutions like IITs and IISERs and of special programmes like Architecture. In these Institutions the CWP Score should be used as a screening criterion to reduce the number of candidates taking the add on test to about three times the number of seats to be filled.

8. The National Aptitude Test

The test has to be a online test that can be taken by a candidate any time. A candidate must get a chance to improve, thus may have maximum of 3 chances.

To handle about 5 millions on line test, several test centres of about 500 in number have to be created.

Each Centre should have its own server, thin clients, printers, storage devices, security and internet connectivity. Power back up has to be ensured.

Mock testing facility should also be made available with the Test Centres. The same, however, could be made available online.

The test system has to be designed and test items are to be created to make sure that large number of unique test with identical difficulty level could be administered. This will eliminate chance of malpractice. Instant evaluation and reporting of score have to be done.

To have necessary credibility, the test system has to be created, administered and managed by the Government through a statutory agency.

- The facilities thus created could be used for other tests such as GATE, CAT, PMTS and UPSC for their preliminaries.

The credibility of National Aptitude Test has to be high. Active involvement of Institutions like IITs is required at initial stage to make the test credible.

- Implementation of the scheme requires broad consensus building and commitment of the State Government and Boards to improve School education, examination and evaluation system. They must also adhere to strict time schedule for publication of result in a form that can be used by the Central Agency and admitting Institutions.
- Central Government must commit to the creation of Test facilities, consensus building through CAGE and giving statutory status to the credible Agency.
- To organize 5 million tests a year, 25,000 test seats are to be created to conduct one test of three hours a day for 20 days in a month. The number of tests could be doubled or even tripled to take care of the peak load. Each Test Centre should have 50 test seats and 20 mock test seats. Thus there will be 500 Test Centres. Depending on the load, one city may have several Centres. **Annexure II** gives typical configuration of a Test Centre.

Designing, validating and administration of NAT is crucial to the success of the system. **Annexure III** gives their salient features.

9. Plus 2 Reforms

The Committee felt it was advisable to articulate a few necessary reforms in the +2 system in this context:

Common curriculum for PCMB across all Boards should be introduced. (According to COBSE, most of the Boards will implement common curriculum and syllabus in Physics, Chemistry, Mathematics and Bioscience by 2012).

Efforts need to be made to ensure free and fair examination and evaluation at the +2 level in all the Boards.

The Board examination results could be brought to a meaningful common base if all Boards use the same question paper for examination and common model answer for evaluation. This can facilitate use of raw SSP scores for computation of the CWP Score. Till then normalized scores can be used to compute CWPS.

An agency to conduct NAT online test should be created. Necessary infrastructure has to be created to conduct test for about 5 million candidates. The physical infrastructure shall include servers, thin client, printers, broadband connectivity, standby generators, security etc. Adequate administrative support infrastructure has to be provided.

The availability of Board result in time is critical to the success of the alternative. It was agreed that +2 results could be made available by May 1 in all Boards by 2012.

The issue of unique identity of a candidate was discussed. It was generally agreed, the Unique Identification Scheme would be operational by then and each candidate would have a UID number.

The COBSE Members have agreed to the above. They, however, require the support of the States.

10. Some Deadline Dates

- Standard XII results should be available by 1st of May.
- All India Rank based on CWP Score shall be prepared for all candidates by 10th of May.

- All India Rank Certificates shall be made available category-wise : General, SC, ST, OBC, Male, Female and Physically Challenged to all candidates by end of May. This rank shall be used for admitting students to NITs, Universities and Institutions who admit students based on All India Rank.
- State and Category-wise Rank Certificates shall be made available for admission of candidates to State Government and Private Colleges to all candidates by 31st of May.
- Based on CWP Scores candidates shortlisted for add-on test for admission to elite Institutions like IITs and IISER shall be available by 10th of May.
- These add-on tests shall be held by the end of May and the Rank based on the test shall be available by 20th of June.
- Online counseling shall start by 1st of July and be completed by 15th of July. Online counseling can be done at State level for State and Private Colleges and centrally for admission to IITs and NITs based on CWP Score.