

IS THE IIT ENTRANCE EXAMINATION A LOTTERY?

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The 19th of August was a day of Judgment for a couple of lakhs of the brightest students in this country. The results of the Joint Entrance Examination (JEE) for the Indian Institutes of Technology (I.I.T) were declared on this day. A few lucky ones were selected and a vast majority were declared as unfit to gain admission in these august centres of learning of our nation. The chosen few will get the privilege of getting world class education at ridiculously subsidized rates and at the end of it, a virtual green card to greener pastures overseas. Even for those who choose to stay behind, a vast majority will become marketing or finance whizzes while some of them will enter the Civil Service.

The importance of this one exam in the lives of lakhs of students cannot be overestimated. It is taken to be the pinnacle of scholastic achievement at the secondary school level with some students spending a couple of years preparing for the examination. Even those who fail to qualify in the first attempt, will try again after a year in college. The stakes involved are so high that there is a proliferation of coaching and tutorial classes, with each of them charging exorbitant fees and advertising their success rate in hugely expensive advertising campaigns. Understandably, the high stakes have also created conditions for the entry of unscrupulous elements, as witnessed in the unprecedented leakage of papers this year, which led to the cancellation of the JEE.

The scandalous leakage, which has placed the careers of thousands of prospective entrants in jeopardy, needs to be investigated and the guilty brought to book. Nevertheless, these events have brought to the fore certain issues which could have far reaching implications for higher education in our country, viz. the proliferation of entrance tests, the unbelievably high premium placed on entrance to certain professional institutions and the concomitant growth in the coaching industry. All these are issues which need to be discussed if we want to improve higher education. But there is another issue which relates to the actual conduct of the JEE, which is no less important. This is the method of evaluation of the students and the methods used to assign ranks to them.

The Joint Entrance Examination itself consists of three papers in Physics, Chemistry and Mathematics, each of 100 marks. Out of more than a lakh of students who appear for the examination, about 2400 students get ranked for admission into the various courses in the six I.I.Ts (Delhi, Chennai, Mumbai, Kharagpur, Kanpur and Guwahati) and the BHU Institute of Technology. The rank that you obtain in the JEE is very crucial because on it depends whether you get computer science in Kanpur or ceramic engineering in BHUIT.

Given the importance of the rank obtained in the JEE in determining the future of the successful candidates, it is important to see how the ranking is actually decided. The procedure followed by the IITs in evaluation of the JEE is not made public. Thus one can only make reasonable guesses as to what the actual process is. Nevertheless, some facts are startling. For instance, it is known (from colleagues who have assisted in evaluating the examination) that the marks are always given in whole numbers and not fractions. Given this simple fact, it is difficult to understand how 2400 ranks can be assigned out of 300 marks. The situation is actually much worse than this. It is reasonable to assume that though there will be a significant dispersion in the higher rankings, there will be a lot of crowding in for a majority of the ranks. Thus for example, while for the first 100 ranks there could be a significant spread of marks, the majority will be getting overlapping marks.

So how exactly are the ranks decided when there are ties in the marks, which occur for the majority of the students? The IITs are not forthcoming on the method they use to separate the candidates who obtain identical marks. It is rumoured that some subjects are given a higher weightage and the tie is broken. But in the absence of any clear cut and transparent procedure to assign a unique rank to 2400 students, there will be always be scope for error.

While one could question the whole philosophy behind entrance tests, in the limited sense, a well known statistical test would clearly indicate the extent to which chance plays a role in the selection process. The three papers are each divided into two equal parts of 50 marks each. Care is taken that there is no bias in this division, i.e., the two parts are of roughly equal difficulty. Now two ranking lists are prepared on the basis of the marks obtained in each of the two parts. The question then is: Will the two lists be more or less identical? If the answer is yes, then one can safely assert that the selection process truly identifies the academic competence of the candidate. If however, the two lists are significantly different, then one will have to concede that chance plays a major role in the selection. Another method could be to determine the rank of the same students in similar examinations conducted by other institutes, like the Roorkee University. This would give us the ranking error or noise between the IIT and other examinations which have similar expectations from the students. Carried out on a large enough sample and over a few years would give us an accurate estimate of the element of chance involved in the JEE.

It is no ones contention that those who make it into the IIT lack in merit. It is just that there is no accurate and reliable way in which the examination as presently conducted and evaluated can decide that the ranking of the majority of the 2400 students. There is also the issue of what happens on the borderline. This is not a trivial point since it is reasonable to expect that there will be a large number of students who would be getting the same number of marks as the last person who is selected. What decides who gets in from the borderline and who does not?

The IIT entrance examination is a landmark event in the lives of many of our brightest students. A failure in this examination leaves an enormous psychological impact on their minds. For some, it leads to a crash in self esteem and confidence, the effects of which they live with for the rest of their lives. With the help of the simple statistical tests that we have outlined (and other more sophisticated ones) it will be easy to estimate the extent of the chance factor in getting into these elite educational institutions. Would it not be better to frankly acknowledge the role of chance and have an open lottery for admission after a preliminary screening test? That way, at least those who do not make it will not suffer the trauma of being certified as inferior. It is time that the IITs carry out this statistical exercise and make the results public. Transparency and openness will go a long way in clearing any doubts about the efficacy of entrance tests in identifying academic competence.