Professor Dr. Atta-ur-Rahman
Chairman, Higher Education Commission
Islamabad.

SUBJECT: Ph.D Entrance/Qualifying Examinations

Dear Dr. Atta,

This letter is with reference to entrance and qualifying examinations for Ph.D degree programs of Pakistani universities. These programs, as you will surely agree, are in a rather dismal state. Although some of what follows below is in the context of physics, nevertheless the conclusion at the end of this letter applies equally to all sciences.

As you know and fully appreciate, a doctoral degree carries meaning only when the recipient has sound basic knowledge of his or her discipline, and has also demonstrated the ability to independently carry out new research. The latter obviously requires the former. For this reason, all US universities, as well as many around the world, have qualifying examinations that test a candidate's general understanding of the subject. It is understood that these examinations cannot be eliminated or trivialized without seriously harming quality.

Regrettably, Ph.D qualifying comprehensive examinations are rarely administered in Pakistani universities. Even if they are formally required, the spirit and purpose of the examinations is frequently not adhered to and therefore they do not fulfill their stated purpose. Consequently many Ph.D degrees that have been awarded are really quite undeserved. This has had a very deleterious effect upon academic life in Pakistan because such people lay claim to jobs, are routinely promoted in a seniority-based system, and often block entrance of those who they fear to be more competent.

To arrest further deterioration of a Ph.D program that is visibly headed downhill, some faculty members in the physics department of Quaid-e-Azam University felt that a concerted effort was needed to improve the quality of the physics general examination. To this end, in September 2003 an improved test was administered to Ph.D candidates. I was appointed convener of the exam committee.

Here are some salient features of that examination that I would like to bring to your notice:

1) The level of questions in the Ph.D qualifying examination was set roughly between A-levels (British high school) and that of the subject GRE. Approximately 1/3 of questions were taken directly from past GRE exams. I am enclosing an electronic copy of the papers for your reference.

2) In GRE exams, instructions state that candidates are required to answer 100 questions in 170 minutes. Marks are deducted for wrong answers. However, in the QAU exam, students were asked to answer 20+20 questions (of approximately the same level) in 3+3

hours, making it 9 minutes per question. Partial marks were given for method, and (obviously) there was no negative marking.

3) Some months prior to the above examination, a sample paper had been discussed in a tutorial so that candidates would have a reasonable idea of the type and level of questions to be expected.

4) Students were allowed to (repeatedly, in some cases) examine their marked papers and discuss their answers with the examiners. There were 4 examiners, one for each of the 4 sections. As the convener, I did not mark any paper but mediated between the examiner and student where there was a dispute. In several cases, I agreed with the student and changed the marks awarded. Approximately 5% of marked questions were thus revised. If some student insisted, he was allowed to see the paper of any other student as well. This is unprecedented openness and the ultimate fairness that can be accorded in the marking of papers. Student supervisors were accorded the same privileges as well. The process of marking and verification by students took 3 weeks. There is no comparable example of openness, fairness, and quality to be found in examinations conducted in any other Pakistani university or department that I am aware of.

To conclude this point: the QAU exam was considerably below the level of difficulty of the physics GRE. Furthermore, as you know, GRE exams are used as yardsticks for entrance into the Masters and Ph.D programs. They are NOT considered to be at the level of Ph.D qualifying examinations of good US universities.

I am sad to say that, in spite of this relatively easy examination, the candidates did poorly. The maximum mark obtained by the single successful candidate was only 52%. All others scored far less. Some candidates, who believed that their supervisors would somehow get them through regardless, reacted negatively. Subsequently various anonymous letters have been sent to you, the QAU vice-chancellor and deans, all teachers in the physics department, and possibly other persons as well. These letters have accused me, and other members of the Ph.D exam committee, of attempting to "destroy the careers of students" by raising the level of the QAU physics examinations to an impossibly high and of "unfair and strict marking".

A still more vexing point is the pressure on the examination committee from other colleagues to soften the Ph.D qualifying examination requirements and drive it even below the previous level. The committee was told to specify not just the names of preparatory books, but also their chapters and sections. Further, it was forced to accept that 50% of the questions would be from the specified chapters. Again, by international standards this would be considered entirely unacceptable.

Unfortunately, the pressure to keep lowering standards seems to be unstoppable even after having stepped so far back. Students approached the physics department chairman demanding that the entire subject of thermal physics be dropped. A second demand was that the quantum mechanics portion be significantly curtailed. Among the topics to be

eliminated were the Pauli Principle and the hydrogen atom. In any other country this would be considered laughable and outrageous.

Over the last several years the QAU physics department has awarded many substandard Ph.D degrees. A department that was of truly high quality 30 years ago and had many good minds has now reached a pitiful stage of intellectual degeneration. It now survives on the reputation and work of those who had done good work in physics some decades ago, not by dint of its own worth. To turn the situation around does not require crores of rupees worth of expensive apparatus but, instead, a resolve to improve teaching and evaluation standards. The experience gained during this attempt to find some genuine measure of student accomplishment has been useful but not pleasant.

In the light of the above, here are my recommendations:

(1) I would urge that the HEC require attainment of a reasonable score in the GRE subject examinations (physics, mathematics, chemistry, biology) as necessary for award of a HEC Ph.D scholarship.

(2) By no means should the HEC try to make its own Ph.D entrance or qualifying examinations (whether general or subject). It was seen that every single candidate selected from "GRE-type" general examinations, devised and administered by the HEC, badly failed the physics examination discussed above. Instead objective standards must be competently applied. These standards must be those that have been determined internationally, and should be beyond departmental and institutional politics.

(3) To alleviate the substantial financial burden upon students, the HEC could offer to pay the GRE test fees for the first attempt by a candidate. To limit the number of candidates, various formulae for pre-screening can be examined. For example, adequate performance in the HEC's own "GRE-type" exam, a supervisor's or department's recommendation, or some other criterion can be used for pre-screening.

I hope that the experiences recorded above can be used to initiate a discussion on the subject with the goal of eventually leading to better, more viable, Ph.D programs in Pakistan.

Sincerely yours.

Dr. Pervez Hoodbhoy
Professor of Physics
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copies to: QAU Vice-Chancellor, Dean, physics faculty