POST-GRADUATE TEACHING OF PHYSICS – A MODEL APPROACH*

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Of all the problems that our nation faces today, I believe that there is none more urgent or more fundamental than that of revamping our system of science education at all levels (1-3). University post-graduate departments of teaching present a dismal picture due to over-emphasis on research and specialisation. The faculty strengths have increased to such an extent that Parkinson's law starts operating On the other hand, P. G. departments in colleges are poorly staffed and ill-equipped to cope with the problem. Some of them are hardly better than teaching shops, churning out half-baked products. Examination results are no index of intrinsic worth of a University or college don.

This brief report presents a model approach to creating a new post graduate (PG) department of Physics in the University set up. Historically speaking, Physics can be classified into three broad categories: Theoretical, Experimental and Applied Physics. The domain of applied physics overlaps with technology and it is better to keep its teaching confined to institutions of Technology where necessary infrastructure facilities already exist for imparting training in job-oriented professional courses. The University departments must concentrate on theoretical and experimental aspects of Physics. A model scheme for a two year, 4-semester, M Sc. programme in Physics is given as per Appendix. This scheme lays equal stress on both the Theoretical and Experimental aspects of physics. During each semester, there are (a) two papers in theoretical category, and (b) two in experimental category, followed by (c) two laboratory courses based on experimental stream. An experimental course does not mean merely experimental methods or techniques; rather stress is laid on conceptual and theoretical basis of the experimental physics. During the last Semester, students must be given the option to choose any four courses out of a number of special papers based on inter-disciplinary areas or advanced topics in Physics. During this semester, the student must be given the option to do project work either in theory or in experimental physics. Those opting for Experimental stream must be given workshop training and those who opt for Theoretical project must learn computer programming.

To implement this scheme effectively, all laboratories should be housed in separate rooms and put under the charge of a single teacher. Better, the person who sets up the laboratory must be made incharge of that particular laboratory. This is the only way of keeping the experiments in proper working conditions and improving.

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All theory and lab. courses should be treated as separate, independent units. Mixing of topics (e.g. Solid State Physics and Nuclear Physics) in theory papers or experiments in the same laboratory (e.g. Nuclear Physics and Electronics) creates confusion. We have worked out this scheme for a short span of 5 years and found it works quite satisfactorily provided the infrastructure facilities exist. As this scheme envisages each laboratory course as a separate unit, it is possible to implement it if the staff break up in the initial stages is as follows : *

Posts	Experimental	Theoretical
2 Professors	1	1
4 Readers	2	2
6 Lecturers	5	1

There is considerable variation in the course content of different Universities. It will not be a healthy sign to introduce uniform syllabi and courses throughout India at P. G. level. However, there is a need to evolve a uniform scheme after identifying core courses at P. G. level as listed in the Appendix. It is imperative to work out this scheme keeping in view the requirements of National level test introduced by University Grants Commission.

REFERENCES

(1) Physics Education in Eighties—S. P. Pandya, IAPT Bulletin, Vol. 1, No. 5,3 (1984).
(2) M. Phil Programme—An Overview—H. S. Virk, IAPT Bulletin, Vol. I, No. 6, 18 (1984).
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Appendix

Scheme of courses for 2 - Year M.Sc. Programme**

I Semester

Mathematical Physics (a)†
Classical Mechanics (a)
Electronics-I (b)
Nuclear Physics-I (b)
Electronics Lab. (c)
Nuclear Physics Lab. (c)

II Semester

Quantum Mechanics-I (a)
Statistical Mechanics (a)
Spectroscopy (b)
Solid State Physics-I b)
Spectroscopy Lab. (c)
Solid State Physics Lab. (c)

III Semester

Quantum Mechanics-II (a)
Electrodynamics (a)
Nuclear Physics-II (b)
Solid State Physics-II (b)
Nuclear Physics Lab. (c)
Solid State (Electronics) Lab. (c)

IV Semester

Any four special/interdisciplinary/advanced theory courses followed by Research Project/Experimental Techniques/Advanced Practicals and Workshop Practice.

* Sharp division of experimental/theoretical is not always possible, and is probably not desirable. Major research interests may, however, inoicate the demarcation. (Ed.)

** All courses with equal credits, except that the IV Semester courses have 5/4 fold credit each.
†(a) Theory based, (b) Experimental based, (c) Laboratory based (See text)