

Earning your doctorate

Proper planning is the key to getting a Ph.D in engineering

■ LEON RAJ J.

The Ministry of Human Resources and Development (MHRD) encourages all faculty members of engineering colleges to complete a Ph.D in their respective fields. Also, the MHRD encourages them to integrate research and teaching. As the demand for Ph.D-holders has increased, the number of students pursuing this qualification has also increased. Ph.D aspirants need to have a clear plan on how to proceed during each stage of the programme so that they can finish successfully within the stipulated time. The stages involved are as follows:

First year

Depending on the institute, first-year students are expected to complete relevant coursework. Four courses will be selected by the student and his mentor, and the same should be approved by the doctoral committee. Candidates should score more than the minimum grade set by their university. Subsequently, the candidate must appear for a comprehensive exam which includes the topics studied in the courses.

Research proposal

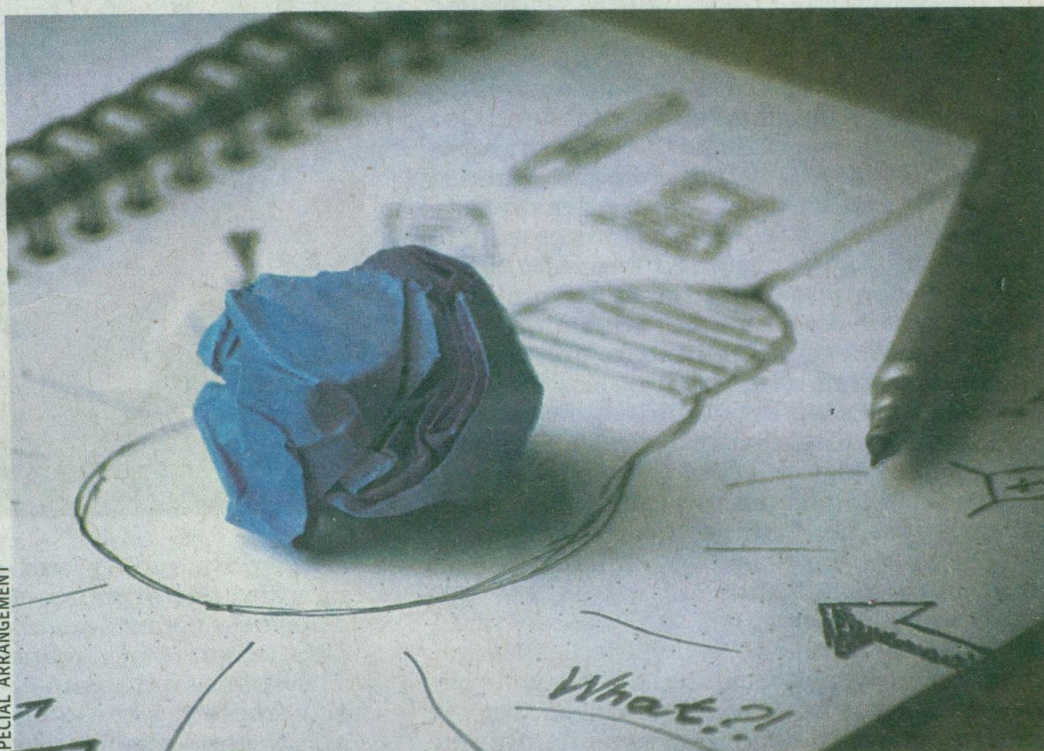
Students have to conduct an extensive literature survey during this period. The real challenge here is to document the previous research carried out in their respective fields. Once an objective is finalised, the methodology to carry it out can be formulated. The student's vision on the outcome should be as clear as possible before starting any investigation.

Experimental studies

Experimental studies need clear planning. Experiments can be carried out in two ways: complete all experiments first, then analyse the results. Or, carry out each experiment and analyse the subsequent outcome immediately. Sometimes, the experiments may not give the expected results. Do not get discouraged and be patient. It is wise to respond rather than react.

Analytical or numerical studies

Generally, analytical studies need deep knowledge in mathematics. On the other hand, numerical studies require knowledge of computation. Nowadays, gaining knowledge in software and mathematics is easy, as there are lots of YouTube tutorials available. It is expected that numerical and/or analytical results should as close as



SPECIAL ARRANGEMENT

Chart your course: Stay ahead of the curve.

possible to the experimental results. Do not fabricate results – that is a breach of scientific ethics.

Analysis and compilation

Graphs, charts and line diagrams are helpful in analysing the results. Compare your innovations with the existing one so that you can highlight your contribution. Technical writing is an art and it can't be learned in one day. Usually, students think that they have to start writing the thesis only at the end. But, thesis writing starts at the research proposal stage itself. In general, it is a good idea to present your complete research work in not more than three to six contribution chapters. The introduction and literature survey chapters can be prepared during the early stages.

Synopsis submission

For a synopsis report, the limit may be 10-30 pages including all figures and tables. Introduce your topic briefly, present important figures and tables, discuss all the figures and tables in the text, and also ensure that the synopsis summarises the four to five years of your research work. The sequence is as follows: introduction, literature survey, objective, scope, methodology, analytical or numerical studies, experiments, results, comparison of experimental results with analytical and numerical res-

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ults, conclusion and references. Ensure that all the literature cited in the text are listed in the references. Once their synopsis report is approved by the committee, the student will be expected to submit their final thesis within three months. Before you submit your synopsis, complete the first draft of your thesis.

Thesis submission and viva-voce

Spelling and grammar checking software like Grammarly and Ginger are useful during the submission stage. Also, ensure that the thesis does not contain any plagiarised text, figures or tables. After a final round of proof-reading, submit the thesis. As per institute norms, the thesis will be sent to Indian and foreign reviewers. Based on the reviewer's comments, the student will be recommended for the degree during viva-voce.

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