A REPORT ON

Science Academies’ 79th Refresher Course in Experimental Physics

The Science Academies’ 79th Refresher Course in Experimental Physics was held at Department of Physics, Panjab University, Chandigarh from September 25th to October 10th, 2016.

The proposal for this course was sent to the Science Academy in the month of May and we planned the course from the last week of July. It was observed that the time was too short to properly publicize the course as a result it was postponed for two months. Finally as per the suggestion of the academy it was slotted from September 25th to October 10th, 2016. The announcement regarding the course was put up on the website in the first week of June 2016. The last date for online applications was kept as August 12th 2016. About 56 candidates applied online/offline for the course from all over India comprising 23 faculty members, 7 research scholars and 26 students. From these 56 applicants 30 were selected that include all facility members, research scholars and four students. The participants were informed timely and the acceptance letters were received. Since this course was slotted in the mid-semester, there were last minute dropouts sitting different reasons such as duties in the Youth festivals and NAC evaluation visits in their respective colleges. Therefore few students from the waiting list were also admitted for the course and the finally the course was conducted with 24 participants.

Prof. Navdeep Goyal, Dean Student Welfare, Panjab University inaugurated the 79th Refresher Course on 10th of September 2016, Prof. Devinder Mehta, Chairperson, Department of Physics; and Dr. J S Shahi, Course Director; were present on the dais. The function was attended by, the participants of the refresher Course, faculty members, research scholars of the Physics Department. Bouquet were presented to dignitaries by the students as a mark of welcome. In his inaugural address, Prof. Navdeep Goyal talked about the history of Department of Physics Panjab University and his experiences with Physics
laboratories from his student days. He very nicely elaborated the importance of lab experiments in the process of learning science. He also talked about the falling standards of experimental labs at the school level and tried to motivate the participants to sincerely work for the improvement of science labs at their institutes. Prof. Devinder Mehta gave brief account of the activities in the Physics department. Dr. J S Shahi welcomed the participants and the resource persons, and gave a succinct regarding the refresher course. Dr. Shahi also talked about the MOU signed between the Panjab University and the Science Academy to hold these courses regularly and made the participants aware of the continuing efforts of Prof. R. Srinivasan and Science Academies in establishing the Refresher Course laboratories at various places in India, especially at Jalahalli Annexe of the Indian Academy of Sciences, Bangalore.

Dr. J S Shahi, Course Director, Er. Manish Dev Sharma (PU), Er. Neeru Choudhary (PU) Er. A K Jain (Guest faculty PU) and Dr. Atul Bhalla (D A V College Jalandhar) helped as Resource persons in the course. Dr. C N Kumar (PU) also took two lectures discussing the theoretical foundation for understanding the philosophy of Feigenbaum circuit, Chua circuit by giving the flavor of non-linear dynamics to the participants. The working and procedural part of these experiments were taken up by Dr. Shahi. Since Dr. Atul Bhalla left after delivering his lectures, Dr. Heena Duggal (Guest faculty PU) acted as Lab supervisor for rest of the refresher course.

The first four days of the course were totally devoted to lecturers on the theoretical background and procedural part of the experiments to be conducted in the course. At the end of the fourth day, the participants were divided into groups of two and Laboratory sessions (18 nos.) of three hours each were planned for the participants to conduct experiments (Time schedule attached). In this course we decided to extend the working hours by one extra hour where the participants were encouraged to discuss the subject with themselves and the resource persons. There was sufficient time and opportunity for closer interaction between
the participants and the resource persons. However, the laboratory facilities were available to the participants as and when required, even on week-ends and late night hours so that the participants can complete the experiments comfortably. Rest all experiments worked well and the results matched with the earlier measurements. The participants showed great enthusiasm and carried out the experiments thoroughly. Many of the ideas were also useful for the participating Research scholars in their field of research.

Since we had run the 72\textsuperscript{nd} Course last year our lab was already in place with all required infrastructure. We only had problems with some experiments as those were also used by our PG students as a part of their syllabus. We sent the equipment for repair and placed new orders for the same but somehow we could not get the support from Ajay Sensors Bangalore, reasons best known to them. Finally we were able to setup all the experiments except the BH curve (because of Charge Integrator) and the portion of nonlinear experiment (Figenbun Circuit was not functional). In view of a long-term association with the academy in terms of running these courses periodically resulting some equipment failure, it is not practically possible all the time to send these to Bangalore to get them repaired. We have enough trained manpower in the department and are capable of handling these repairs if the repair manual / circuit diagrams are made available to us. We can support the regain for the quick repair of these equipment and assure you these information will not be commercially exploited.

There were ten especial lecturers delivered by eminent speakers Dr. B.P. Ajith Kumar (Inter-University Accelerator Centre, New Delhi), Dr. Sandeep Sahijpal (PU), Dr. Vipin Bhatnagar (PU), Dr. K S Bindra (PU), Dr. Baljinder Singh (PGIMER Chandigarh), Dr. B C Choudhary (NITTER Chandigarh), Mr. S S Marwaha (SGGS Khalsa College Chandigarh) and Er. A.K. Jain. (PU). The lecturers covering a wide range of advance topics were highly appreciated. A marathon lecture cum demonstration was delivered by Dr. B.P. Ajith Kumar in which he introduced the participants a microprocessor based experimental kit.
(PHINIX) and explained how the Python software language can be used in designing different physics experiments. The kit which is not bigger than a matchbox is outcome of meticulous efforts of Dr. Ajith Kumar and his group at Inter-University Accelerator Centre, New Delhi, for the low-cost Physics experiments in various teaching institutes. Dr. Sandeep Sahijpal presented a brief overview of the origin and evolution of the universe from big band around 13.7 billion years to the present time. The various astrophysical processes related with the formation of galaxies, star and chemical elements were discussed. Dr. Bhatnagar introduced the basic experimental particle Physics and discussed various experimental setups involved in high energy experiments located at different parts of the world. Dr. Bindra gave a elaborated talk on Physics education and discussed various school of thoughts. The roll of nuclear radiations and radioisotopes in the field of medicine especially in detection and cure of different types of cancers was discussed by Dr. Blajinder. Dr. Choudhary gave a detailed overview from very basic to very latest technological breakthroughs in the field of optical communication. Mr. Marwaha demonstrated many popular scientific experiments with very lively involvement from course participants. Er. A.K. Jain talked about the microprocessor / microcontroller based low cost kit based projects and demonstrated the data acquisition and precise timing measurements. All the lectures were well discussed and highly appreciated by the participants.

The participants enjoyed the inaugural function of the department students held on 28th October 2016 and had a special dinner with faculty and students. An excursion trip was also organized on 8th November and the participants were taken to Kasauli, about 70 KM from Chandigarh and they visited different locations in between such as Panjor Gardens, Timber Trail, and few locations in Chandigarh itself and everybody enjoyed the fullest.

At the end of the refresher course the feedback on the refresher course from the participants both through discussions and feedback form was taken. The
The most important outcome of the feedback was regarding the time slot of the course, the month of May, June were favored by all. At present, the feedback forms are with us. The course came to conclusion on 10th October, 2016, with the Valedictory.

The refresher course certificates were distributed to the participants by Prof. B R Behra and Prof. Devinder Mehta. Resource persons and Participants stayed in Panjab University campus at Rajiv Gandhi College Bhawan. For better time management the food/catering was arranged at the Department itself by a contractor. A high tea at the Inauguration function and a Special Lunch on Valedictory function was arranged.

All the guidance and financial arrangements for the course were provided in time and by efficient means by Dr. T D Mahabaleswara and his team at the IISc, Bangalore.