

**Report on
Science Academies' 76th Refresher Course in Experimental Physics
at
Department of Physics
Goa University
Taleigao Plateau, Goa 403206
(May 10 to 25, 2015)**

The fourth Refresher Course in Experimental Physics (76th of the series) was conducted as a part of MoU between Indian Academy of Sciences, Bangalore and Goa University to conduct Refresher courses in Experimental Physics, from May 10 to 25, 2015 at Goa University. The announcement of the course was made well in advance through advertisements in Current Science and Resonance as well as through letters to Principals of all affiliated colleges of Goa University.

In all 109 applications were received within due date out of which 72 were teachers and 37 students. Initially names of 60 participants (31 teachers and 3 students) were shortlisted and 35 of them were sent selection letters. Depending on cancellations or no response and equal number were added to the list to maintain the number 35 constant. Out of these 31 participants sent their confirmations by email as well as by post. About 30 of them uploaded their travel plans on the web portal or sent information by email. Participants were constantly reminded to send their confirmation as well update their travel plans on the website. However, some participants expressed their inability to attend about two days prior to the course by sending emails and finally 26 participants which included 17 teachers and 9 students attended the course.

This was perhaps the most serious and most interested set of participants received at Goa centre so far. All the participants showed keen interest in all the experiments and completed their calculations of all the experiments and their results were verified by us. Some of the participants even created journals with photographs of experimental setups etc. for their future reference. The participants expressed their satisfaction at the way the course was conducted. Some of the participants made inquiries about the kit and were provided by the price list obtained from M/s Ajay Sensors.

Resource persons also expressed their satisfaction in conducting the course for these participants. Most fruitful sessions were the discussion sessions, where the participants resolved their difficulties by discussing their results and asking questions about experiments. On demand from the participants, a special lecture and demonstration on X-ray diffraction was conducted by Prof. Priolkar. Prof. Sadique gave a special lecture on how to test transformers and building of DC regulated power supply again on demand from the participants. All the experiments worked well, the participants were happy to see a very good agreement between theory and experimental results. Their results and calculations were checked and difficulties were discussed.

There were four special lectures - one each by Prof. R. Srinivasan on "Superconductivity", Dr. Rahul Mohan, Head, Antarctic Science, National Centre of Antarctic and Ocean Research, Vasco-da-Gama, Goa on "Indian Research Activities at Antarctica", Dr. Bishwajit Chakraborty, National Institute of

Oceanography, Goa on “Use of Acoustic techniques and Numerical modeling for understanding Oceans and Ocean floor” and Prof. Eurico D’Sa, Louisiana State University, Louisiana, USA on “Use of optical techniques and remote sensing in Oceanography” In addition he spent two days in the laboratory and had discussions on different aspects of Experimental Physics with the participants.

All the participants were housed in Goa University guest house and were provided with all lodging and boarding facilities. They also had access to internet through wifi network of the University. A group photograph of the participants of the course was also arranged with Prof. S. R. Shetye, Vice-Chancellor, Goa University and Prof. R. Srinivasan. Feedback was collected from all the participants about the experiments and allied facilities and some of them gave their impressions at the valedictory function. Prof. Y. V. Reddy, Registrar, Goa University, was the chief guest for the valedictory function. Participants were awarded certificates for their successful completion of the course as well as three books, viz. **Solid State Physics** by C. Kittel, **Cryogenics and Measurement of Properties of Solids at Low temperatures** by R. Srinivasan, A. K. Raychaudhuri and S. Kasturirangan and **Data Reduction and Error Analysis for the Physical Sciences** by P. R. Bevington and D. K. Robinson were given as a gift from the three Science Academies. Overall the participants expressed their satisfaction about the experiments, their working, and the availability of resource persons to address their difficulties as well as about the other facilities made available to them.

Accounts of the course are presently being finalized and an audited statement will be submitted once all bills are paid.

K. R. Priolkar
Course Coordinator

76th REFRESHER COURSE IN EXPERIMENTAL PHYSICS
May 10 to May 25, 2016
AT
GOA UNIVERSITY, GOA
Sponsored by
INDIAN ACADEMY OF SCIENCES, BANGALORE
INDIAN NATIONAL SCIENCE ACADEMY, DELHI
NATIONAL ACADEMY OF SCIENCES OF INDIA, ALLAHABAD

TIME TABLE

Day and Date	09.30 - 10.30	10.45 – 11.45	11.45 – 12.45	14.00 – 15.00	15.15 – 16-15	16.15 – 17.15
Tuesday 10 May `16	Registration/Inauguration Introduction		ED1	SMS1	MN1	ED2
Wednesday 11 May `15	MN2	SMS2	KRP1	ED3	SMS3	MN3
Thursday 12 May `15	KRP2	ED4	SMS4	MN4	KRP3	ED5
Friday 13 May `15	SPL1	SMS5	MN5	KRP4	ED6	SMS6
Saturday 14 May `15	KRP5	LAB1		LAB2		
Sunday 15 May `15						
Monday 16 May `15	SPL2	LAB3		LAB4		
Tuesday 17 May `15	Discussion	LAB5		LAB6		
Wednesday 18 May `15	SPL3	LAB7		LAB8		
Thursday 19 May `15	Discussion	LAB9		LAB10		
Friday 20 May `15	Discussion	LAB11		LAB12		
Saturday 21 May `15	Discussion	LAB13		LAB14		
Sunday 22 May `15						
Monday 23 May `15	SPL4	LAB15		LAB16		
Tuesday 24 May `15	Discussion	LAB17		LAB18		
Wednesday 25 May `15	Feedback and Valedictory					

LUNCH

13-14 HRS

COFFEE/TEA BREAK

10-30 TO 10-45 HRS

15-00 TO 15-15 HRS

LECTURES

LECTURES BY Dr. EFREM DESA (ED)

1. Constant current source
2. TCR of Copper and Bandgap of silicon
3. Stefan's constant
4. Thermal and electrical conductivity of Copper and thermal conductivity of a poor conductor.
5. Calibration of Si diode and Thermocouple as temperature sensor
6. Young's Modulus and Rigidity Modulus of brass bar

LECTURES BY Mr. MANOHAR NAIK (MN)

7. Signal Generator and power amplifier
8. AC Experiments
9. Passive filters and AC Bridges
10. High Resistance by leakage and k/e using transistor
11. B-H curve

LECTURES BY PROF. S. M. SADIQUE (SMS)

12. DC differential amplifier
13. Capacitance meter – measurement of capacitance
14. Dielectric constant of benzene and dipole moment of acetone.
15. Verification of Curie Weiss Law for a ceramic capacitor
16. Phase sensitive detection and calibration of a lock in amplifier
17. Measurement of mutual inductance and low resistance with a lock in amplifier.

LECTURES BY Dr. K. R. PRIOLKAR (KRP)

18. Thermal Relaxation of a Light bulb
19. Thermal diffusivity of brass
20. Non-linear dynamics – Feigenbaum circuit and Chua circuit
21. Inversion temperature of Fe-Cu thermocouple
22. Error Analysis

SPECIAL LECTURES

SPL1 – Superconductivity – **Prof. R. Srinivasan**, Indian Academy of Sciences, Bangalore.

SPL2 – Indian Research Activities at Antarctica – **Dr. Rahul Mohan**, National Centre for Antarctic & Ocean Research, Vasco-da-Gama, Goa

SPL3 – Use of Acoustic techniques and Numerical modeling for understanding Oceans and Ocean floor
Dr. Bishwajeet Chakraborty, National Institute of Oceanography, Dona Paula, Goa.

SPL4 – Use of optical techniques and remote sensing in Oceanography **Dr. Eurico D'Sa**, Louisiana State University, Louisiana, USA

List of participants who successfully completed the course

Sr. No	Name & Affiliation	Email
1	RAVI SHANKAR C.S.	raavi.physics@gmail.com
	5E7, First Floor, Sri Sai Apts	
	Gandhi St, Janakiram Colony Extn, Arumbakkam	
2	GOVINDA LAKHOTIYA	lakhotiya.govinda@gmail.com
	Jankidevi Bajaj College of Science, Wardha	
	Wardha (M.S.)	
3	BIBEKANANDA SUNDARAY	bnsundaray@gmail.com
	Ravenshaw University,Cuttack	
	Cuttack	
4	DR. SR. JESSY MATHEW N.	sisjees.phy@gmail.com
	Mercy College, Palakkad	
	Palakkad	
5	RAJESH GHORPADE	ra_ghorpade@rediffmail.com
	Yashwantrao Chavan college	
	Halkarni	
6	AMEY TADPHALE	
	ASP College	
	Devrukh dist Ratnagiri	
7	S SAMYUKTH	samyukth2310@outlook.com
	Ramakrishna Mission Vivekananda College	
	Mylapore, Chennai	
8	EMMANUEL JOSE	emmanuel.j1293@yahoo.com
	Christ College	
	Irinjalakuda	
9	SULTHAN IBRAHIM ABDUL LATHEEF	sulthan1986@gmail.com
	Central University of Tamil Nadu	
	Thiruvarur	
10	RAJESH GOWDA	gowrazee@rediffmail.com
	Rizvi College of Arts, Science and Commerce	
	Bandra (W), Mumbai-400050	
11	S.MANU VARSHAN	manuvarshan11@gmail.com
	Ramakrishna Mission Vivekananda College	
	Chennai	
12	R KABILAN	kabilanrajagopal82@gmail.com
	Nehru Memorial College (Autonomous)	
	Puthanampatti	

Sr. No	Name & Affiliation	Email
13	MUHASSINAH TASNEEM	tasneemphil@yahoo.co.in
	P.G.Center, P.B. Siddhartha college of arts and science.	
	Vijayawada	
14	RAMESH GOVINDARAJAN	drrameshsrirangam@gmail.com
	Karpaga Vinayaga College of Engineering & Technology	
	Chennai-603308	
15	AYANA BHADURI	ayana.bhaduri@gmail.com
	Amity University Haryana	
	Gurgaon	
16	SOWNDHARYA P	sownd94@gmail.com
	National Institute of Technology	
	TIRUCHIRAPALLI	
17	DEEPAK KUMAR BEHERA	deepakb.behera@gmail.com
	Room No. 29, KBP Boys Hostel, MUMBAI UNIVERSITY	
	Kalina, MUMBAI	
18	ONKAR SINGH	onkardav@gmail.com
	JC DAV College Dasuya	
	Dist. Hoshiyarpur, Punjab	
19	APPASAHEB WALI	appasowali@gmail.com
	Devchand College, Arjunnagar	
	Dist. Kolhapur, Maharashtra	
20	UDAY BHATYE	udaybhatye@gmail.com
	ASP College	
	Devrukh dist Ratnagiri	
21	NIRAJ PANDYA	nirajpandya2@gmail.com
	Tolani college of Arts and Science	
	Adipur, Kachchh, Gujarath	
22	AP BIRUNDHA	birundha07@gmail.com
	PSGR Krishnammal College for Women	
	Coimbatore	
23	RAJESHKUMAR HYAM	rajeshkumarhyam@gmail.com
	Physics Department, Goa University	
	Taleigao Plateau	
24	AKASH KUNDAIKAR	akashkundaikar.ak@gmail.com
	Chowgule College, Margao	
	Goa	
25	NINOSHKA RODRIGUES	ninoshka2398@gmail.com
	Chowgule College, Margao	
	Goa	
26	DEEPAK KAPSE	deepakkapse13@gmail.com
	Room no 14 navjeevan chwal committee kajupada pipe line, Near ganesh maidan kurla (W) mumbai 400 072.	



Group Photo

Photographs of participants working in the IASc -GU laboratory for Experimental Physics.



