**SIES COLLEGE OF ARTS, SCIENCE & COMMERCE**

Sion(west), Mumbai-400 022

2.5.2016

**YEARLY REPORT OF PHYSICS DEPARTMENT**

Physics Department organized the following events during the academic year 2015-2016.

1. **Bridge Course in Practicals**
   1. For TYBSc- Two day course for TY BSc Physics students was conducted on 16th and 17th June 2015 in handling measuring instruments, using bread board, function generators and CROs. From this bridge course, 28 students were benefitted.
   2. For SYBSc - Two day bridge course for SYBSc students was conducted on 25th and 26th June 2015 in using measuring
   3. instruments, handling function generators and CROs. From this bridge course, 59 students were benefitted.
2. **Training Programme**
   1. For TYBSc –
      * ***C++ programming***- Two day Training programme in C++ was conducted in the IT laboratory on17th and 18th November 2015. One computer system was made available for a pair of students. They were provided with study kit as a part of content learning free of cost. The kit contained various programs written by our faculty. Students were trained in using 3 logic structures namely, Sequence structure, Selection structure and Loop structure. The main purpose in conducting this programme was to develop and enhance programming skills.
      * ***Microprocessor 8085***- One day Training programme in 8085 microprocessor was conducted on 6th January 2016. One microprocessor kit was made available for a pair of students. They were given resource material free of cost, containing assembly language programs designed especially to be understood and executed by various methods. The main aim in conducting this programme was to enhance the logical thinking and programming skills.
   2. For MSc
      * ***Designing of Electronic Circuits and Etching on Printed Circuit Board***- This was a Demo-cum training programme held for the students of M.Sc. (Physics- E1) both Part I and Part II on 14th March 2016. All the tools and techniques of software (EXPRESS SCH and EXPRESS PCB) very useful to design any electronic circuits were explained. Schematic diagram of “Burglar alarm circuit” was designed. Students were taught to draw a positive mirror layout. The students printed layout on copper side of PCB. Then for etching they used FeCl3 solution to remove extra copper layer. After this process, Mr. Mahesh Falake trained them to drill at required places and made the PCB ready for the circuit.The resource person Mr. Maheshwar Falake was assisted by Ms. Naziya Shaikh. Both are Staff members of Physics Department. The main aim in conducting this programme was to help them in making circuits for their projects in embedded system.
3. **Workshops**
   1. ***Fun with logic gates & Secrets of Microprocessor***- This was a 5-day workshop organized for the students of FY and SY BSc students on 4th, 5th, 6th, 7th and 9th of April 2016. The main motive behind the organization was to make the students engage themselves in understanding logic expressions, simplifying them and building the circuits on a bread board. At the same time the students’ ability in understanding programming and developing the logic behind programming was also kept in mind. There were demonstrations of some live projects using logic gates namely “burglar alarm”, “water level controller” and “automatic tap water flow controller”. Principal Dr. Harsha Mehta appreciated and congratulated the entire teaching faculty and also the non teaching members in making this programme a great success.

1. **Exhibition –This exhibition is a method of Learning by experience.** Experiments in optics and   
    electronics were set up by the students under the banner “Gravity” and exhibited on 7th September   
    2015 during Utkarsha, the annual literary fest. Nearly 40 students participated in this   
    exhibition and 200 visitors witnessed. They all gave good feedback.
2. **Quiz** 
   1. **Physics Quiz**- This was a competition for students of all subjects. It was conducted on 8th September 2015 during Utkarsha, the annual literary fest . Three rounds were held. Questions were framed to enhance students’ analytical and logic skills. Thirty two (32) students participated.
3. **Remedial Course**
   1. For BSc- **Remedial Course in** Practicals was conducted after the completion of regular practical sessions for TY, SY and also for FY BSc classes. Students admitted late or who missed practical sessions due to ill health and or other valid reasons were permitted to perform experiments. A record of the course was maintained to ensure that the students completed all the required number of experiments as prescribed in the syllabus. Four (4) TY BSc students, thirty seven (37) SY BSc students and seventy six (76) FY BSc students were benefitted. Students were able to clear their default and were eligible to appear for practical examination.
   2. For MSc –The students of MSc, both Part I and II who were **reporting late for practicals** were counseled. They were made to prepare study material on some selected topics from the Paper of their choice and submit for correction within ten days. Head of the department Mrs. Pratibha Pai was the assessor and kept a keen watch on them. They were also made to write answers to the questions carrying 4 or 5 marks from the earlier question papers. This helped the students in studying regularly and steadily. Four students of MSc Part 1 and two students of MSc Part 2 were immensely benefitted.
4. **Assignments -** 
   1. Applied component Paper: For TYBSc students, 2 work sheets in C++ programming and 4 work sheets in microprocessor programming were prepared. Students were made to solve some of the problems in the class while others were solved by the students as home assignment and checked by the teacher in charge.
   2. Core Physics paper: In the subject “Special Theory of Relativity” for TYBSc students, four assignment sheets containing all varieties of numerical problems was prepared. A few problems were solved in the class, hints were given for some problems and students solved them at home. Any difficulty faced was discussed for better understanding.

These assignments helped the students in overcoming phobia and build self confidence.

1. **Methods adopted for Growth in Academic performance of TY students** -
   1. Regular tests were conducted for TY students by respective teachers. Their answer papers were evaluated and feedback was given.
   2. University question papers of earlier years were made available and students were encouraged to write the answers keeping the time duration into account.
   3. Question bank in each paper was made available to the students(FY,SY and TYBSc) in order to make them aware of the probable questions.
2. **Industrial Visit**
   1. Six Students of T.Y. BSc. participated in industrial visit to Jaipur jointly organized by various science departments.
3. **Innovative methods adopted by the Department in Teaching and Learning** 
   1. **whatsApp group** :The TY BSc Physics students formed a whatsApp group named “TY 2015-2016” in mobile phone where faculty were also the members. Faculty members posted recent news in research, some innovative and out of the box ideas and experiments. They also posted e-links and videos regarding the same.

Numerical problems and problems to improve analytical and logical skills were also posted.

On the other hand the students were responding positively and were able to understand some   
 of the principles and applications.

* 1. **Solving Crossword** **Puzzle-** This is an **innovative method of Teaching and Learning** freshly introduced for TY BSc Physics students of 2015-2016 batch. Puzzles were designed in such a way that it held the students’ attention on the subject. The subject was 8085 microprocessor of Electronic Instrumentation. A total of 6 puzzles were solved with Menu for 'Across' and 'Down' given on 8th and 10th February 2016. Students got completely engrossed into the subject. This helped them in better understanding of the subject. They enjoyed solving the puzzles. Although designing 6 crossword puzzles was very difficult and time consuming, all the faculty members were very happy and felt that this type of teaching may be implemented for the next year batch too.

1. **Student performance**
   1. MSc part II students (3 in number) were placed in International Schools.(Ms.Nadar Cristy, Ms. Eram Shaikh and Sudeep S Subudhi)
   2. TY BSc students(2 in number) passed the JAM exanination conducted by IIT and IISC. (Gaurav Jogal and Prathamesh Waghmare)with a score 23 and AIR(All India Rank)1731
   3. TY BSc student Ms.Anupama Nair is selected for the course “Introductory Summer School in Astronomy and Astrophysics” in IUCAA, Pune
   4. SY BSc student Ms.Ishwarya Kulkarni is selected to participate in 3 week Internship programme during summer vacation on “Radiation Physics” at BARC.
   5. SYBSc student Ms.Shalet Nelson passed the NPTEL examination conducted by IIT Madras. The course was “ Introduction to research”.
2. **Students’ involvement in Extracurricular activities**
   1. Ms. Vishaka Sonar of TYBSc – Secretary, College Gymkhana and – Student Council representative
   2. Mr. Rajesh Patil of TYBSc – Student Council representative from NCC
   3. Mr. Karthik Yadav of SYBSc - Student Council representative from NSS and member Gymkhana
   4. Mr. Prathamesh Kadam and Mr. Abhishek Karkera of SYBSc- active members in NSS
   5. Ms. Manju Mathew of SYBSc- NCC Cadet (Girls’ Wing)

1. **Target JAM**
   1. This programme captioned as “***Extra Physics***” was another activity shouldered by Physics Department during the academic year 2015-2016 and started from 2nd May 2016. Initially 6 students registered and slowly the number started increasing. In depth coaching in all the 7 modules was planned as per the syllabus for JAM examination and the coaching given by 6 of the faculty from the department. This coaching cum mentoring would help the students in preparing for any competitive examination.
2. **“By the Staff, for the Staff”(Talk)**

This was a newly introduced way of sharing knowledge wherein a talk would be delivered by a faculty member to the colleagues in the department. The talk might be on the research work undertaken or about the details of the seminar/workshop the faculty member participated. The first talk "Solid State Lighting" was by Dr. Aarti Muley on 30th April 2016 followed by yet another talk “ Waste and its management” by Dr. Vishal dev Ashok.

* 1. Talk on “ Solid State Lighting” by Dr. Aarti Muley

Lighting can be considered as an index of civilization. When the satellite photographs of the earth viewed, they showed that the areas which are intensely illuminated belong to the developed countries. The pictures of India, globally known as a fast developing nation shows scattered illumination. Hence the increasing demand of fossil fuel and the high environmental impact continue to exert pressure on the world energy infrastructure.

The history of lighting shows that the oil lamps, fossil fuel, gas mantle etc. are used in earlier days for domestic as well as commercial purpose. Such lighting sources were highly hazards at factories, fireworks, mines etc. They are replaced by the incandescent lamps which work on the black body radiation and are non-hazardous. Conventional incandescent and fluorescent lamps rely on either heat or discharge of gases. Both phenomena are associated with large energy losses that occur because of the high temperatures.

In 1996, Nichia Chemical Co., introduced a totally new lighting technology i.e solid state lighting (SSL) based on the phosphors. Advantages of SSL are high luminous efficiency, energy savings, environment-friendliness, small volume, and long persistence. Hence the commercially available phosphors possess the properties viz. efficient ultra violet (UV) absorption, visible light conversion, good color rendition (CRI), transparency in visible region, stability against mercury discharge etc. For the conventional incandescent lamps and fluorescent lamps, a large amount of energy is consumed as heat radiation for high-temperature tungsten filament lamps and mercury vapor discharge lamps and hence this lighting style based on LED which is the solid-state lighting is the next generation lighting source for common illumination. The Phosphor based white LEDs has high luminous efficiency can approach 200 lm/W by the year of 2020 which will be far greater than that of incandescent lamps and fluorescent lamps. The costs of white light generated by LEDs have been decreasing continually, which makes white LEDs more competitive for the future.

* 1. Talk on “Waste and its management” –

Vishal dev Ashok gave a chalk and board presentation on “Waste and its Management” on 30th April 2016. This presentation was inspired by the one day workshop he attended on “DAE clean technology” conducted by BARC on 29th April 2016. He discussed the various methods of identification management of biodegradable and non-biodegradable waste. Following points were discussed-

* The concept of smart city and the role of cleanliness in it.
* Structure of the landfills and limitations inherent in it, which leads to an urgent necessity of finding alternative modes of waste management.
* NISARGRUNA scheme which uses household (biodegradable) waste in a local region to extract biogas, for community kitchens and high carbon manure, for cultivation.
* Development of small scale cottage industries to convert saris into carry-bags.
* Radiation technology for the treatment of biodegradable sewage sludge and its use as manure after addition of nitrogen fixation organisms like rhizobium.
* Various methods and mechanisms of sterilization of water and food with the use of porous membrane, laser treatment, boiling, electron beam, gamma and UV radiation treatment.
* The use of porous membrane for the desalination and purification of water.
* Some concepts related to chemical identification of hazardous elements in ppm order and particulate matter of 2.5 and 10 micorn in air.

On non-biodegradable wastes Vishal dev discussed about the use of hot plasma to convert plastics, cotton and paper to usable fuel for the production of electricity. A brief introduction to hot and cold plasma was also given along with a use of cold plasma for environment friendly technology of nitridation of metals. In this process the mechanism involved in the toughening of metals via nitridation was also discussed. At the end of the presentation, the compression and restructuring of polystyrene (themrocol) to models and souvenirs was suggested as a DIY project.

1. **Healthy practices adopted**
   * + TYBSc students were counseled about the university practical examination. Probable questions for viva- voce were discussed.
     + Revision practical sessions for TYBSc students were arranged to make them confident about the experiments on 28th August 2015(for EI),3rd and 4th September 2015 (Physics)in Semester 5; on 14th March 2016 in Semester 6.
     + General instructions for EI and Physics in Semester 6 for TYBSc students were given on 30th January 2016
     + MSc Part I students were counseled on 20th April 2016, about the university practical examination. Probable questions for viva- voce were discussed.
     + A get-together along with lunch was arranged for the teaching and the non- teaching staff in the department.
     + Regular staff meetings, both teaching as well as non-teaching, were held to review and plan various activities in the department.

**STAFF ACHIEVEMENTS:**

1. **Presentations:**
2. Pratibha P Pai, Vinod Menon and Kiran Nabar
   * + Jointly Presented a paper titled “Learning through Engagement” at NAAC sponsored Two Day seminar organized by IQAC on “ Innovations in Teaching-Learning and Evaluation in Higher Education” conducted by SIES COLLEGE of Arts, Science and Commerce, Sion (W) on 26th and 27th February 2016
3. Swapnil Jawkar
   * + Presented a paper titled “Visuo-Spatial reasoning in projective star maps” at International Conference for Physics Education, held in Beijing, China on 13th August 2016.
4. Dr. Aarti Iyer Muley
   * + Presented a paper entitled “Photoluminescence in Anthracene and it’s Derivatives” in International Conference on Condensed Matter Physics ICC-2015, organized by Govt. College of Engineering, Bikaner on 30th -31st Oct. 2015.
5. **Publications:**
   * + 1. Pratibha P Pai, Vinod Menon and Kiran Nabar
     + Published a paper titled “Learning through Engagement” presented at NAAC sponsored Two Day seminar organized by IQAC on “ Innovations in Teaching-Learning and Evaluation in Higher Education” conducted by SIES COLLEGE of Arts, Science and Commerce, Sion (W) on 26th and 27th February 2016.(ISBN No. 978-81-931 391-3-4)
       1. Dr. Vishal dev Ashok

Published 3 papers in international journal

* Structural, electric and magnetic properties of La1-xSrxCo1-xRuxO3(0 <x < 0.6) solid solution, Biswajit Dalal, Babusona Sarkar, **Vishal dev Ashok**, S. K. De, Journal of Alloys and Compounds **2015**, 649, 1164-1173
* Carrier concentration dependent optical and electrical properties of Ga doped ZnO hexagonal nanocrystals. Manas Saha, Sirshendu Ghosh, **Vishal Dev Ashok** and S. K. De, *Phys. Chem. Chem. Phys.*, **2015**,17, 16067-16079
  + - Excitation dependent multicolor emission and photoconductivity of Mn, Cu doped In2S3 mono-dispersed quantum dots. Shirshendu Ghosh, Manas Saha, Vishal Dev Ashok, Arijit Chatterjee, S.K. De, *Nanotechnology,* **2016**, 27, 155708

1. **Minor Research:**

Dr. Aarti Iyer Muley

Title of the project: Nano phosphors for Solar Energy Conversion, Financial assistance by UGC Rs.1,75,000/- for a period of 2 years

1. **Others**:
   * + 1. Pratibha P Pai
     + Chaired a session at the NAAC sponsored Two Day National level seminar organized by IQAC on “ Innovations in Teaching-Learning and Evaluation in Higher Education” conducted by SIES COLLEGE of Arts, Science and Commerce, Sion (W) on 26th and 27th February 2016

* Was the resource person for the ICT workshop- Orientation on Secured social site handling held in SIES College of Arts, science & Commerce on 20th and 22nd July 2015.
* Was the resource person for the five day workshop titled “Fun with Logic gates and Secrets of Microprocessor” conducted by Department of Physics, SIES college, Sion(West) from 4th April 2016 to 9th April 2016.
  + - 1. Vinod Menon
  + Visiting Faculty for M.Sc. Sem III and IV at Post graduate centers: D.G.Ruparel College,   
     Matunga and B. N. Bandodkar College, Thane.
  + Appointed as L.I.C. Member to visit H R Kelkar College Devgad on 16th April 2016 (P.G. Physics Lab).
  + Mentor for one free online course (Electro-magnetic theory) under The National Programme on Technology Enhanced Learning(NPTEL), a project funded by the Ministry of Human Resource Development. NPTEL provides e-learning through online Web and Video courses in Engineering, Sciences, Technology, Management and Humanities. This is a joint initiative by seven IITs and IISc Bangalore.
    - 1. Kiran Nabar
  + Appointed as a Subject Expert, on the Interview Panel at Somani Degree College of ASC, Chowpatty, Mumbai (date: 13-05-2015)
  + Appointed as a Subject Expert nominated by Vice Chancellor of Mumbai university, on the Interview Panel at S.I.C.E. Society’s Degree College of ASC, Ambernath on 17-11-2015
  + Attended One Day Workshop on ’ Revised Syllabus of S. Y. B. Sc.’ Organized by B.O.S. in Physics in Vaze College, Mulund on 19-11-2015.
  + Visiting Faculty for M.Sc.Sem III and IV at Post graduate cetntres: D.G.Ruparel College, Matunga and B. N. Bandodkar College, Thane.
  + Nominated as Subject Expert on the Interview Panel at Dandekar-Apte-Mehta College, Palghar for the selection of Assistant Professor on 29th March 2016.
  + Was the resource person for the five day workshop titled “Fun with Logic gates and Secrets of Microprocessor” conducted by Department of Physics, SIES college, Sion(West) from 4th April 2016 to 9th April 2016.

3. Swapnil Jawkar

* + Team Leader for Team representing India at International Olympiad for Astronomy and Astrophysics, held at Semaarang Indonesia from 26th July to 4th August.
  + Visiting Faculty for Sem I and Sem II at Center for Excellence in Basic Sciences, Kalina, Mumbai.
  + Delivered a guest lecture titled “Physics in Astronomy” on 23rd August 2016.
  + Delivered a guest lecture titled “Physics in Astronomy” on 30th August 2016.
  + Delivered a guest lecture titled “Binary and Variable stars”
  + Member of INAO 2016 paper setting committee.
  + Member of INAO 2016 paper correction committee.
  + Invited as Moderator for SYBSC Paper III by St Xavier’s College, Mumbai.
  + Member of Executive Committee of Khagol Mandal, an NGO engaged in astronomy education in Maharashtra.
  + Member of Executive Committee of Mumbai Chapter of Indian Association of Physics Teachers.
    - 1. Anand Ambardekar
  + Completed M.Phil from Savitribai Phule Pune University in Physics, with topic   
     “Acquisition and wavelet analysis of visual evoked potentials”.
  + Invited as Moderator for SYBSC Paper II by K J Somaiya College, Mumbai.
  + Invited as visiting faculty for the course of Biophysics by Department of Physics, K J   
     Somaiya College, Mumbai.
  + Attended a lecture on “Nobel Prize for Physics 2015” by Professor Vivek M. Datar, India-based Neutrino Observatory Cell TIFR Mumbai organized by India Physics Association (IPA) Bombay Chapter in association with Department of Physics, Guru Nanak College of Arts, Science and Commerce on 20th February 2016
  + Moderator for practical examination Homi Babha Young Scientist Examination conducted by Mumbai Science Teachers Association on 10th January 2016.
  + Participated in the UGC sponsored Orientation programme conducted by University of Mumbai from 20th August 2015 to 16th September 2015.
  + Mentor for one free online course(MATLAB) under The National Programme on Technology Enhanced Learning(NPTEL), a project funded by the Ministry of Human Resource Development. NPTEL provides e-learning through online Web and Video courses in Engineering, Sciences, Technology, Management and Humanities. This is a joint initiative by seven IITs and IISc Bangalore.
  + Was the resource person for the five day workshop titled “Fun with Logic gates and Secrets of Microprocessor” conducted by Department of Physics, SIES college, Sion(West) from 4th April 2016 to 9th April 2016.

* + - 1. Dr. Vishal dev Ashok
  + Attended a one day seminar on “Scientific Writing” in K J Somaiya college Vidyavihar on 16th January 2016
  + Invited for evaluation of “Indian National Astronomy Olympiad 2016” on 7-February 2016
  + Attended the one day workshop on “DAE clean technology” conducted by BARC on 29th April 2016.
  + Attended a lecture on “Nobel Prize for Physics 2015” by Professor Vivek M. Datar, India-based Neutrino Observatory Cell TIFR Mumbai organized by India Physics Association (IPA) Bombay Chapter in association with Department of Physics, Guru Nanak College of Arts, Science and Commerce on 20th February 2016.
  + Visiting Faculty for M.Sc. Sem I at Post graduate center D.G.Ruparel College, Matunga.
  + Mentor for three free online course under The National Programme on Technology Enhanced Learning(NPTEL), a project funded by the Ministry of Human Resource Development. NPTEL provides e-learning through online Web and Video courses in Engineering, Sciences, Technology, Management and Humanities. This is a joint initiative by seven IITs and IISc Bangalore.
    - 1. Mahesh Falake
  + Attended a one day seminar on “How to become an effective teacher” in SIES campus Nerul, on 27 June 2015.
  + Resource person for the Demo cum Training program on “Designing of Electronic circuit and etching on Printed circuit board” at SIES college on 14TH March 2016.
  + Attended a lecture on “Nobel Prize for Physics 2015” by professor Vivek M. Datar, India-based Neutrino Observatory Cell TIFR Mumbai organized by India Physics Association (IPA) Bombay Chapter in association with Department of Physics, Guru Nanak College of Arts, Science and Commerce on 20th February 2016.
  + Participated in one day awareness workshop on “Intellectual Property & Innovation Management in Knowledge Era” under PAN India IPR awareness in Universities initiative held at Department of Physics(Autonomous), University of Mumbai on 23rd March 2016.
  + Was the resource person for the five day workshop titled “Fun with Logic gates and Secrets of Microprocessor” conducted by Department of Physics, SIES college, Sion(West) from 4th April 2016 to 9th April 2016.
    - 1. Seema Jadhav
* Participated in 2 day symposium “SYMPHY 2016” and lectures on “Gravitational Waves” organized by Research Scholars Association (RSA), Department of Physics IIT Bombay on 9th and 10th April 2016
* Attended a lecture on “Nobel Prize for Physics 2015” by professor Vivek M. Datar, India-based Neutrino Observatory Cell TIFR Mumbai organized by India Physics Association (IPA) Bombay Chapter in association with Department of Physics, Guru Nanak College of Arts, Science and Commerce on 20th February 2016
  + - 1. Naziya Sultana Shaikh
* Attended a lecture on “Nobel Prize for Physics 2015” by Professor Vivek M. Datar, India-based Neutrino Observatory Cell TIFR Mumbai organized by India Physics Association (IPA) Bombay Chapter in association with Department of Physics, Guru Nanak College of Arts, Science and Commerce on 20th February 2016.

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