Bulletin of

₹ 25/-

ISSN 2277-8950

THE INDIAN ASSOCIATION OF PHYSICS TEACHERS

A MONTHLY JOURNAL OF EDUCATION IN PHYSICS & RELATED AREAS

VOLUME 12 NUMBER 4 - 5 APRIL - MAY 2020

What's happening behind those clouds? Although the scene may appear somehow supernatural, nothing more unusual is occurring than a Sun setting on the other side of the sky. Pictured here are anti-crepuscular rays. To understand them, start by picturing common crepuscular rays that are seen any time that sunlight pours though scattered clouds. Now although sunlight indeed travels along straight lines, the projections of these lines onto the spherical sky are great circles. Therefore, the crepuscular rays from a setting (or rising) sun will appear to re-converge on the other side of the sky. At the anti-solar point 180 degrees around from the Sun, they are referred to as anti-crepuscular rays. Featured here is a particularly striking display of anti-crepuscular rays photographed in 2016 over Dry Tortugas National Park in Florida, USA. https://apod.nasa.gov/apod/ap200318.html

PHYSICS NEWS

Long-distance fiber link poised to create powerful networks of optical clocks

An academic-industrial team in Japan has connected three laboratories in a 100-kilometer region with an optical telecommunications fiber network stable enough to remotely interrogate optical atomic clocks. This type of fiber link is poised to expand the use of these extremely precise timekeepers by creating an infrastructure that could be used in a wide range of applications such as communication and navigation systems. "The laser system used for optical clocks is extremely complex and thus not practical to build at multiple locations," said Tomoya Akatsuka, a member of the research team from telecommunications company Nippon Telegraph and Telephone Corporation (NTT). "With our network scheme, a shared laser would enable an optical clock to operate remote clocks with much simpler laser systems." In The Optical Society (OSA) journal *Optics Express*, researchers from NTT, the University of Tokyo, RIKEN, and NTT East Corporation (NTT East), all in Japan, report the new low-noise fiber link. "Optical clocks and optical fiber links have reached the stage where they can be put into practical use," said Akatsuka. "Our system is compatible with existing optical communication systems and will help accelerate practical applications. For example, because optical clocks are sensitive to gravitational potential, linked clocks could be used for highly sensitive detection of early signs of earthquakes."

Read more at :https://phys.org/news/2020-03-long-distance-fiber-link-poised-powerful.html

Original paper : *Optics Express (2020).* DOI: 10.1364/OE.383526

High-tech contact lenses correct color blindness

Researchers have incorporated ultra-thin optical devices known as meta surfaces into off-the-shelf contact lenses to correct deuteranomaly, a form of red-green color blindness. The new customizable contact lens could offer a convenient and comfortable way to help people who experience various forms of color blindness. "Problems with distinguishing red from green interrupt simple daily routines such as deciding whether a banana is ripe," said Sharon Karepov from Tel Aviv University in Israel, a member of the research team. "Our contact lenses use metasurfaces based on nano-metric size gold ellipses to create a customized, compact and durable way to address these deficiencies."In The Optical Society (OSA) journal *Optics Letters*, Karepov and colleagues report that, based on simulations of color vision deficiency, their new metasurface-based contact lens can restore lost color contrast and improve color perception up to a factor of 10. The approach used to introduce new and tailor-designed functionalities to contact lenses could be expanded to help other forms of color vision deficiency and even other eye disorders, according to the researchers.

Read more at : https://phys.org/news/2020-03-high-tech-contact-lenses.html

Original paper:*Optics Letters (2020).* DOI: 10.1364/OL.38497020

Tiny double accelerator recycles energy

A team of DESY scientists has built a miniature double particle accelerator that can recycle some of the laser energy fed into the system to boost the energy of the accelerated electrons a second time. The device uses narrowband terahertz radiation which lies between infrared and radio frequencies in the electromagnetic spectrum, and a single accelerating tube is just 1.5 centimetres long and 0.79 millimetres in diameter. Dongfang Zhang and his colleagues from the Center for Free-Electron laser Science (CFEL) at DESY present their experimental accelerator in the journal *Physical Review X*. The miniature size of the device is possible due to the short wavelength of terahertz radiation. "Terahertz-based accelerators have emerged as promising candidates for next-generation compact electron sources," explains Franz Kärtner, Lead Scientist at DESY and head of the CFEL group that built the device. Scientists have successfully experimented with terahertz accelerators before, which could enable applications where large particle accelerators are just not feasible or necessary. "However, the technique is still in an early stage, and the performance of experimental terahertz accelerators has been limited by the relatively short section of interaction between the terahertz pulse and the electrons," says Kärtner.

Read more at: https://phys.org/news/2020-03-tiny-recycles-energy.html

Original paper:*Physical Review X (2020).* DOI: 10.1103/PhysRevX.10.011067

Sandeep Kaur
Department of Physics, PU Chd.

BULLETIN OF INDIAN ASSOCIATION OF PHYSICS TEACHERS (ISSN 2277-8950)

CHIEF EDITOR: U.S. Kushwaha, Chandigarh

EDITOR: Manjit Kaur, Chandigarh

ASSTT. EDITOR: Arvind K. Taneja, Chandigarh

EDITORIAL BOARD:
- L. Satpathy, Bubhaneswar
- H.C. Verma, Kanpur
- Pratip Kumar Chaudhari, Kolkata
- Vijay A. Singh, Mumbai

ADVISORY BOARD:
- Satya Prakash, Chandigarh
- Y.R. Waghmare, Pune

MANAGING EDITOR:
Sanjay Kr. Sharma
Flat No. 206, Adarsh Complex,
Awas Vikas-1 Keshavpuram,
Kalyanpur, Kanpur-208017
Ph.: 9415404969 Email: iaptknp@rediffmail.com

All communication regarding the contents of the Bulletin should be addressed to:
Chief Editor (IAPT Bulletin)
Indian Association of Physics Teachers
Dept. of Physics, P.U., Chandigarh - 160014
Email: iapt@pu.ac.in
Ph.: 7696515596 (USK), 9464683959 (MK)

The Bulletin is the official organ of the IAPT. It is a monthly journal devoted to upgrading physics education at all levels through dissemination of didactical information on physics and related areas. Further, the Bulletin also highlights information about the activities of IAPT.

INDIAN ASSOCIATION OF PHYSICS TEACHERS

REGISTERED OFFICE:
Indian Association of Physics Teachers
Flat No. 206, Adarsh Complex,
Awas Vikas-1 Keshavpuram,
Kalyanpur, Kanpur-208017
Ph.: 09935432990 | Email: iaptknp@rediffmail.com

EXAMINATION OFFICE:
Indian Association of Physics Teachers
15, Block II, Rispana Road,
DBS (PG) College, Chowk
Dehradun - 248001 (Uttarakhand)
Ph.: 9632221945
Email: iapt.nse@gmail.com, http://www.iapt.org.in

PRESIDENT:
Vijay A. Singh
UM-DAE Centre for Excellence in Basic Sciences
Vidyanagri Campus, Mumbai University
Santa Cruz (East), Mumbai 400098
Ph. : 022-26530228
Email : physics.sutra@gmail.com

GENERAL SECRETARY:
K. N. Joshipura
4, Punit Park, Anand-Vidyanagar Road, Anand-388001
Ph. : 02692-245042; 09825318897
E-mail ; gensecretary.Iapt1@gmail.com

CHIEF COORDINATOR (EXAMS):
B. P. Tyagi
23, Adarsh Vihar, Raipur Road,
Dehradun - 248 001
Ph. : +91 1352787020, 9837123716
E-mail : bptyagi@gmail.com

http://www.indapt.org

From the President's desk ...

Transferability of cognitive skills is an important topic of discussion as far as science education is concerned. Ideally, as educators, we want our students to use skills that they have learned in one context, in multiple other contexts within and across subjects. Whether this is actually happening and if yes to what extent and under what conditions has been a contentious issue within education research. To take a trivial example, if I can play table tennis well, will I be able to play badminton well? Here I discuss some issues pertaining to transferability of problem solving skills in science. My interest in transfer stems primarily from a pedagogical standpoint advocated by the well known physics textbook author, **Frederick Reif.** He argued for the explicit teaching of important scientific thinking skills in physics education, in particular with regard to problem solving. This prompted me to reflect on my own experience of teaching physics at various levels, which made me realise that indeed it would be possible to abstract out certain general cognitive skills from the process of problem solving in physics. We pursued this as Physics Education Research (PER) study with Dr. K. K. Mashood (faculty, HBCSE-TIFR). A review of the literature revealed that people have identified general cognitive skills concerned with problem solving in sciences, which are starkly obvious as far as physics is concerned. Some of these skills are: (i) Ability to reason as per definitions in contrast to everyday life reasoning. (ii) Effective re-description of the problem statement so that a solution process is facilitated. (iii) Re-evaluation or checking the solutions for debugging. (K. K. Mashood and Vijay Singh, 2013, Physics Education, pages 629-635, Vol. IOP-United Kingdom. Paper available on request via email).

Developing pedagogies that inculcate and nurture these problem solving skills would be an important contribution to science education in India. In our study we also proposed a methodological approach to draw preliminary inferences about transferability across subjects, based on correlation studies of large samples. The underlying idea is that a significant positive correlation of scores in two subjects point to the possibility of a common set of cognitive skills underlying performance in both of them. The advantage of being in a large country is we obtained massive sample of almost half a million students from JEE and related exams. This indicated that problem solving skills are indeed transferable. Once again I make a case for PER, and how being in a large and heterogeneous country, it allows us to evaluate claims of cognitive scientists.

Vijay A. Singh

STATEMENT OF SOLIDARITY FROM IAPT ON COVID-19 PANDEMIC

Indian Association of Physics Teachers expresses solidarity with the whole nation in the difficult times arising from the Covid-19 pandemic. A spectre is haunting the world – the spectre of the novel corona virus (COVID-19). Our nation is mobilizing resources to deal with this crisis. We at IAPT pledge our full support to the Government in its efforts to contain this menace. A statement expressing our solidarity has been submitted to Hon. Prime Minister Narendra Modiji and Hon. Minister of Human Resources Development, Shri Ramesh Pokhriyalji.

We realize that all communications must be almost entirely over phone and social media. Nevertheless, to the extent possible it is our duty as physics teachers to educate the public about the wisdom of certain measures such as **social distancing and hygiene.** In addition, to the extent possible, we plan to continue the task of scientific, technical and popular dissemination. We will strive to not let people be misled by rumours or therapies which have not been scientifically validated. Our members have continued academic webinars and similar online activities, with safety first.

A number of suggestions made by IAPT members are being considered by the Executive council of IAPT. All suggestions on how our organization should help out may be channelled to gensecretary.iapt1@gmail.com.

When the lockdown eases, we plan to address the crisis through all means available, i. e. our monthly IAPT Bulletin, Regional Councils, Special Centres such as Anveshika, our website etc. Above all, our personal initiative and commitment to science in the service of humanity is paramount – and it is evident in the large number of workshops and other programmes individual members organize or participate in, throughout our country, under IAPT.

With best wishes to the health and well-being of our nation,

Vijay A. Singh
President, IAPT

APPEAL
FOR INDIVIDUAL DONATION TO THE COVID-19 RELIEF-FUND, THROUGH IAPT

The country is facing an unprecedented crisis in the wake of the Covid-19 pandemic. This is therefore an appeal to all IAPT members to please send individual donation to the Covid-19 Relief Fund, through IAPT. We hereby request you to donate individually an amount of Rs. 500/1000 or so, by Bank transfer to the IAPT Account at Dehradun. The Bank details for sending the donation are given below.

* Account name: - Indian Association of Physics Teachers
* Account number: -3750324600 (Current Account)
* Bank: - Central Bank of India
* Branch: - DBS College, Dehradun
* Code: -CBIN0283283
* Address: - 23 Adarsh Vihar Raipur Road, Dehradun - 248001(Uttarakhand)
* In the subject/purpose for Bank Transfer, the member may please write his/her name for identification purpose.

Soon after the Bank transfer, the member should kindly share the Bank Transfer ID with Dr. Anand Singh Rana (Dehradun), at his mail id, <anandrana71@gmail.com>.Let us thank Dr. Anand Singh Rana in advance for this voluntary work. A receipt of the donation will be issued by IAPT in due course of time.

It is further requested to send donation as above by May 20th. Soon after that, the entire amount thus collected will be sent to PM CARES Relief Fund, as the DONATION FROM MEMBERS OF THE INDIAN ASSOCIATION OF PHYSICS TEACHERS.

While good response is being received to this appeal, we do hope that more and more of our members will come forward to contribute as above.

K.N. Joshipura
General Secretary, IAPT

Journey Of Ions - From Mass Spectrograph To Modern Mass Spectrometers

K. N. Joshipura

Sardar Patel University, Vallabh Vidyanagar (Gujarat)

knjoshipura22@gmail.com

Abstract*: This is a narrative account of the experimental developments leading to mass spectrometry, a veritable tool of multidisciplinary research nowadays. Mass spectrometer owes its origin to mass spectrographs designed by J. J. Thomson, F. W. Aston and others about a hundred years ago. Various applications of this tool including those in space and planetary missions are also mentioned briefly.*

Introduction: almost a century ago

21st century is a century of centuries…!

In the last two decades or so, we celebrated 100 years of epoch-making developments that have come up in Physics, such as Planck's quantum theory (1900), Einstein's theories of relativity (1905, 1915) together with his theory of stimulated emission (1917) which led to the advent of lasers, the discovery of atomic nucleus (1911), the Bohr atom model (1913) and many more; The list is long as you will see.Now, as we enter 2020 we also recall, among other things, the golden decade of Physics in India, 1920-'30, that brought about these minal contributions from the great trio M.N. Saha, S. N. Bose and C. V. Raman. That itself would be a very interesting subject of a separate article. About a hundred years ago, Physics at large seemed to be unfolding in a strange bizarre way, while bigger shocks were yet to arrive!

As we recall 100 years of significant developments in this subject, we are usually reminded of advances in theoretical Physics – some of them listed above – and the emergence of new physical concepts. A wonderful account of the eventful period 1900-1930 may be found in George Gamow's famous book *thirty years that shook Physics* [1]. However, it must be pointed out that a revolution was also taking place side by side, as new experiments based on novel ideas, designs and techniques were being carried out in those days. In this article we wish to highlight one such area of development in experimental Physics that was initiated by Aston, and separately by Dempster, in the form of mass spectrograph instruments in 1919-'20. The experimental field has now grown into a veritable tool of research and multidisciplinary investigations and is better known as *mass spectrometry*. At an elementary level the technique rests on the applications of electric and magnetic fields on beams of charged particles. A charge q placed in an electric field **E** experiences electric force $\mathbf{F}_E = q\mathbf{E}$. If we project a beam of charged particles (positive ions in the present context) normally into a region of uniform electric field **E,** it will chart a parabolic trajectory. Further, the force on charge q moving with velocity **v** in a magnetic field **B** is $\mathbf{F}_B = q(\mathbf{v} \times \mathbf{B})$. If the velocity **v** is normal to the magnetic field **B**, the magnetic force qvB acts as centripetal force and the charged particles move in circular motion in a plane perpendicular to the field **B**. The charge particles emerging from a source do not have a uniform velocity per se, and hence electric and magnetic fields are so employed as to obtain a particle beam well resolved in velocity **v**.

Thomson, Aston and beyond

Our story begins with J. J. Thomson's experiments performed on a beam of electrons (the *cathode rays* of those days) under crossed electric and magnetic fields. In these experiments carried out in 1897 he determined the charge-to-mass ratio e/m of an electron, and made a bold statement.

"I can see no escape from the conclusion that (cathode rays) are the charges of negative electricity carried by particles of matter."

The electron was thus established as the first ever fundamental particle of all matter. Soon thereafter, Thomson focussed his experimental investigations on the so-called *canal rays*, the beam of positive ions, and devised parallel electric and magnetic fields in such a way that the atomic ions with an identical charge to mass ratio q/M, would trace a parabola on the photographic plate as the detector. Employing this 'parabola' method, Thomson along with a young researcher F.

W. Aston as his assistant, discovered the two isotopes of neon viz., Ne^{20} and Ne^{22} in 1912. This was one of the first discoveries of isotopes on non-radioactive elements, while in heavy radioactive elements the isotopes were already known to exist at that time. This was also the period when Rutherford's nuclear model of atom was gaining a firm ground, and hence a search started for finding out isotopes in various other chemical elements, in particular for isotopic masses and their relative abundances. Lay hidden in the minds of physicists was the quest for the constituents of atomic nucleus. It was in this backdrop that Aston entered the arena as an independent researcher. Perhaps he had thought of focussing a beam of positive ions in a way similar to a beam of light. Later on the analogy was extended and the term *ion optics* also became common. Figure 1 shows the basic arrangements made in Aston's first spectrograph.

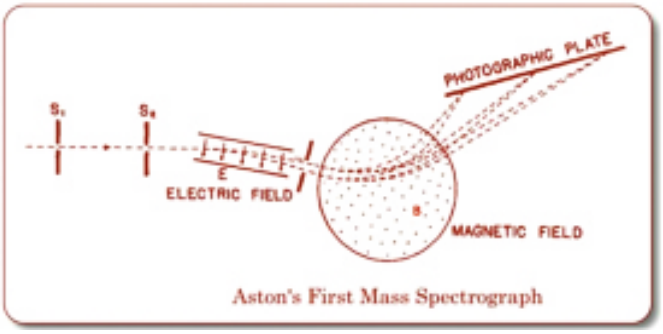


Figure 1:- Aston's mass spectrograph; Dashed lines show the path of positive ions.
https://www.eurlpesticides.eu/userfiles/file/History%20of%20mass%20spectrometry%20of%20organic%20molecules.pdf

Energetic positive atomic-ions produced in a gas discharge enter slits S_1 and S_2 from the left, from where a collimated beam emerges. Electric field between two parallel plates deflects the ion beam which spreads according to the velocity of the ions. The beam next passes through a diaphragm D and is collimated further. The emerging beam is then subject to a perpendicular magnetic field, which deflects the beam in the opposite direction. Finally all those ions having an identical mass for a given charge are brought to a focus at a point on the photographic plate. In this way, a mass spectrum of different isotopes of an element is obtained, as indicated by three pairs of dotted lines converging to the right in the figure 1. Aston found that a large number of non-radioactive elements also possessed isotopes. Around 1922, A. J. Dempster devised a new instrument in which, instead of detecting ions with a photographic plate, the ion current was measured electrically for a better quantitative analysis, and the instrument was called mass spectrometer. Sophistications have been introduced in the design of the fields applied to the ion beams, and many improvements, including magnetic sector and other arrangements, are brought forth in the working of the mass spectrometers. For details the readers are referred to an interesting historical account on this subject, given by Münzenberg [2]. During the last hundred years or so, these instruments have provided a wealth of data on stable - including rare - isotopes and their abundances over a large part of the periodic table. One of the earliest applications of the technique was in the isotopic separation of highly fissile U^{235} for the Manhattan Project [2].

Mass spectrometer, a multidisciplinary research tool

A mass spectrometer (MS) is an analytical instrument that determines the mass-to-charge ratio M/q of ions fed to it, and exhibits the results graphically as mass spectrum. The essential components of this instrument are the following. (i) The ion source, to produce the gaseous ions of the sample or the substance (mostly in molecular form now) to be examined. (ii) The analyser, in which appropriate electric and magnetic fields are arranged to sort out the ions as per their M/q. And,(iii) the detector, in which the ions are detected in terms of the charge induced or current produced by the ions, which are resolved into a mass spectrum. A mass spectrum consists of a graphical representation of relative abundance of different species in the sample, as functions of discrete values of M/q. It is important here that, the ions fly forward without suffering any collisions and scattering in their paths, and this requires a high degree of vacuum.

While we omit details of the instrument, we can dwell briefly on a question: how is the ionization produced in the source wherein the input sample (chemical compound) to be investigated is basically in the form of neutral molecules? One of the earliest methods of producing gas phase ions is the bombardment of fast electrons on neutral atoms or molecules. It would be of interest to note here that theoretical and experimental studies on electron impact ionization of atomic molecular targets have also been a century old field of research [3]. In the electron ionization method, electrons at energy typically of 70 eV are bombarded on the target (sample) molecules, resulting into the production of ion fragments. To understand this let us consider an example of water molecule as

the target. If the energy of the impacting electron just exceeds the first ionization energy 12.6 eV of water molecule, the electron-molecule collision produces the parent ion $(H_2O)^+$, but with increasing energy of the impinging electron, dissociative ionization also takes place, and ion fragments OH^+ or H^+ etc are also produced. For a bigger molecule larger varieties of fragments are released, and all these are ultimately recorded in the mass spectra. As a simple example of complexity, think of the mass spectrum of a protein molecule! Depending on the sample to be analysed, other methods of producing ionization are also employed in the mass spectrometry. Moreover, the liquid as well as solid samples can be analysed in the technique, and the terms like gas/liquid chromatography – Mass spectrometry *LC/GC-MS* are also in vogue.

In terms of applications, mass spectrometry has gone far beyond the analysis of isotopes, with which it began. Just click the words '*Mass Spectrometry*' in Google search, and within the fraction of a second you will get thousands of results, indicating the importance and applications of this technique in various fields of Science and technology. Physicists would be very happy to see the modern applications of these techniques in diverse fields such as chemical, biological, pharmaceutical and medical research, for example in the characterization of proteins and protein complexes. In essence, the basic purpose is to identify and quantify various chemical compounds. One more field of application is the Atmospheric Science in whichthe technique is employed to study aerosols. It is also a widely employed tool in Earth Sciences.

The MS has ventured out into space and planetary applications too! It all started more than sixty years back, when these instruments were carried up in rockets to study the composition and number density of constituents in our ionosphere. Modifications in the design were made to suit this kind of applications. In a laboratory on Earth the MS along with its paraphernalia like vacuum systems, electric and electronic installations, detection and analysis mechanisms etc occupies a sizable room. In satellites and space missions the 'space' is a major concern…! There are constraints on mass and volume, as well as the power/energy and data requirements of a payload, and this calls for important changes in the design of the instrument. But the MS has dared all these challenges over and above those of different gravity conditions, pressure variations, radiation hazards etc, and has established itself as a very reliable tool in outer space investigations. Let us quote here the investigations carried out by the planetary mission Cassini – Huygens, a joint space venture of NASA-USA, the European Space Agency ESA and the Italian Space Agency, launched in 1997. Giovanni Cassini (1625 – 1712) was an Italian astronomer who was the first to observe the divisions in planet Saturn's rings. *Christian* Huygens (1629 – 1695), famous for the wave theory of light, was the discoverer of Titan, Saturn's moon. In 2005, the Huygens probe was released from the Cassini space-craft to parachute down to Titan. As the Huygens floated down, the GC-MS arranged in the probe recorded complex organic compounds (precursors of amino acids necessary for life) to be present in Titan's atmosphere. Mass spectrometric investigations have also been carried out on planets Venus, Jupiter and the comet Halley. Mars is of great worldwide interest since exploring this planet is like trying to read its history book [4]. In 2008, NASA's Phoenix Mars Lander, employed MS for soil samples, and confirmed the existence of water ice on Mars. Currently, another mission Curiosity Rover, equipped with a quadrupole mass spectrometer, is located at Mount Sharp on this planet. As it climbs the foothills of the mountain, it is taking samples of the different rock layers for analysis.

Our ISRO's first mission to moon, Chadrayaan-1 carried a payload called 'Moon Impact Probe' (MIP), which had a planned crash landing on the lunar surface in November 2008.One of the payloads within the MIP was a state-of-the-art quadrupole MS, see figure 2 [5a]. The compact instrument on-board MIP housed the ionizer, mass analyser and ion detector along with the electronic unit. It measured the constituents of the thin lunar atmosphere during the MIP's descent, and in the mass spectrum major peaks corresponding to H_2O (18 amu), N_2 (28 amu) and CO_2 (44 amu) were observed [5b].

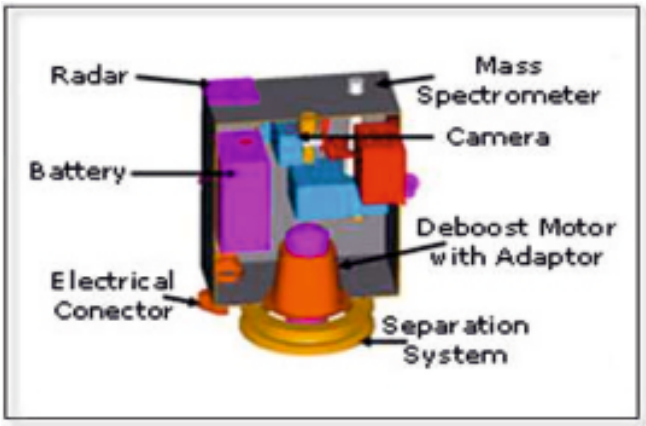


Figure 2:- Mass Spectrometer housed in Moon Impact Probe on-board Chandrayaan-1[5a, b]

A quadruple MS (similar to the one in the MIP) capable of analysing the neutral species composition in the Martian exosphere was sent up as a payload in ISRO's Mars Orbiter Mission, launched in 2013. Distribution of major atomic/molecular species in the upper atmosphere of Mars has been analysed by this instrument. Let us come back to the Earth from the outer space sojourn, and conclude.

It is amazing to see that the journey of positive ions that began in the mass spectrograph a century ago has come a long way. Mass spectrometry has become a veritable tool of multidisciplinary research nowadays, and it aims at investigating the molecular basis of materials, as also analysing atomic/molecular species in specific environments. One wonders at the diversity inthe applications of Mass Spectrometry, which has emerged as a broad scientific discipline. Thomson's parabola method and Aston's mass spectrograph are among the topics of our UG level Physics. Teachers can bring about more interest and excitement in these topics by mentioning about the modern developments as highlighted presently.

After reading this article, our readers, I am sure, would like to search for Mass Spectrometry based investigations going on in research institutions and industries in India. ….. Isn't it?!

References

[1] George Gamow, *Thirty years that shook Physics-the story of quantum theory,* first published by Doubleday & Co Inc. (1966), Dover edition (1985)

[2] G. Münzenberg, *Development of mass spectrometers from Thomson and Aston to present*, International Journal of Mass Spectrometry vol. 349-350, 09(2013).

[3] K. N. Joshipura and Nigel Mason, *Atomic-molecular ionization by electron scattering: theory and applications*, Cambridge University Press (2019)

[4] Please see, https://sciex.com/community/blogs/blogs/the-connection-between-mass-spectrometry-and-space-exploration

[5a] ISRO website; https://www.chandrayaan-i.com/index.php/chandrayaan-1/chandrayaan-1-payloads/mip-isro.html

[5b] Y. Ashok Kumar and MIP Project team, *The Moon Impact Probe on Chandrayaan – 1*, Current Science Vol. 25, 540(2009) .

ARTICLE

Higher Secondary Board Examinations (Physics) In India An Overview

R. Balakrishnan

A F1, Srinidhi Enclave Bangalore 76

balakilatha@gmail.com

Higher Secondary Examinations (HSE) in India, as well as elsewhere, play a crucial role in one's future career. They are considered for admissions, be it professional or academic courses. HSE marks serve as a qualifier and sometimes as a tie breaker. An attempt is made in this paper to compare the various HSEs in Indian Boards, particularly in Physics.

The present higher secondary education system (10+2+3 pattern) was implemented as per National Policy on Education (NPE 1968). Since then it has undergone several changes. The New National Education Policy (NEP) by the present government has been proposed with a 20 year vision (2020-2040). It is likely to be released and discussed shortly.

There are 51(**?**) Higher Secondary Boards in various states, recognized all over the country. The websites of the various state boards are given in Appendix 1. The National Institute of Open School (NIOS) has given a list of recognized boards of secondary and higher secondary education for admission at NIOS. In addition, there are the Central Board of Secondary Education (CBSE), Council for the Indian School Certificate Examination (CISCE), and the International Baccalaureate (IB).. All the Boards – state owned, autonomous or otherwise,

strive for imparting knowledge needed for shaping one's career. This paper deals only with the HS boards of the various states in our country.

Physics plays a vital role in various professional courses and hence in the entrance examinations for these courses. In order to assess the uniformity of the physics courses, the exam pattern of the various HS boards in India is analysed, taking the 2017 Physics HS examination question paper as a reference.(In some cases, the model paper (for 2019) has been considered . Various aspects of the question papers – duration, maximum marks, total number of questions, types of questions (MCQ , very short answer questions(VASQ), Short Answer Questions (SAQ) and Long Answer Questions(LAQ) and the slight variations in the overall pattern are given in Table 1. In all, 25 board question papers are compared. Some states and union territories like Sikkim, Puducherry, Andaman Nicobar, Daman and Diu do not have their own boards. They come under the CBSE or nearby state boards. The states of Karnataka and Andhra follow a 2 year Pre-University course (PUC) pattern. and Intermediate pattern respectively.

The analysis of the various HSE question papers in Physics is given in Table 1. The following observations are made:

- As for the duration of the examination, a 3 hour period is given. Some boards given an additional 15 minutes as warm up time – time to read the question paper
- Except, Tamil Nadu, UP, Haryana, Kerala, WB and Chhattisgarh, the maximum marks allotted for theory paper by other Boards is 70. All boards give an 30 marks for practical/continuous assessment. Tamil Nadu board has allotted 150 marks as max for the final examination, with 50 marks for practicals.
- The total number of questions to be answered varies from 20 to 60. Internal choices are given in varied ways.
- M.P. question paper has 4 types of VSAQs. – MCQ, fill in lanks, matching and one word answer type...
- Gujarat board allows the use of simple calculators for use in the examination hall, while all other state boards don't.

All the question paper patterns try to assess the knowledge, understanding, skills and applications ability of the examinees. However, with the rote based curriculum patterns, the questions are simple, repetitive and do not give a challenge to the students.

Though all the Entrance examinations are with MCQs, the HSE question papers have a low percentage of the MCQs. This pattern may not train the students for the various entrance examinations. Also, there is no effort made by the different boards to train the students for the online pattern of entrance examinations.

As for the availability of the past questions papers, all web sites give these, though not immediately. Also, several coaching centres give these on their websites with solutions. Some enthusiastic students, after their examinations, put the question papers with solutions as slides show in the YouTube web sites.

The academic or professional courses after the Plus2 / PUC/Intermediate courses have a totally different pattern of examination systems...The various degree courses give questions, more of LAQ type , which probably is needed when one joins a profession. The LAQ type may train, later for a career in life.. In a job, report writing, analyses and problem solving may be needed. In the author's opinion, the HSC pattern should be 50% MCQ type and 50% LAQ type, this will help for the tertiary level courses and for professional career in real life.

The question papers of the other three Boards, CBSE, ICSE and IB are always taken to be more difficult and challenging. But with All India level entrance examinations like the JEE and NEET, efforts must be made to bring in uniformity in syllabus and examination patterns.

To sum up, the analysis shows that there is uniformity of assessment in several aspects of the question paper pattern. There is still scope for improving standards and their usefulness for advanced courses and for real life situations.

TABLE 1: Overview of question paper pattern of various Boards

Name of board	Duration In hrs	Max marks	Total No. of Qns.	MCQ/ VSAQ	SAQ II	SAQ III	LAQ	REMARKS
			(NO. OF QNS * MARKS)					
Arunachal Pradesh	CBSE PATTERN							
Assam	3	70	30	8*!	10*2	9*3	3*5	No MCQ
Bihar	3+15 min	70	30	4*1 , 10*1	10*2	7*3	3*5	
Chhattisgarh	4	75	22	6*2	6*3	5*4	5*5	No MCQ
Gujarat	3	100	60	16*1	16*2	12*3		ord calculator allowed
Haryana	3	60	34	12*1	9*2	5*3	3*5	internal choice
Himachal Pradesh	3	60	27	8*1	8*2	8*3	3*5	
J &K	3	70	30	10*1	8*2	8*3	4*5	from model paper
Jharkhand	3	70	20	15*1	8*2	8*3	3*5	
Karnataka	3+15 min	70	37	10*1	5*2	5*3	3*5	puc pattern
Kerala	2+15 min	60	25	2*1	6*2	5*3	3*5	
Maharashtra	3	70	42	7*1, 7*1	6*2	3*3	1*7	21 qns each in 2 sections
Madhya Pradesh	3	75	20	20*1	4*2	4*3	5*4, 1*5	mcq, F.b, matching one word
Manipur	3+15 min	70	34	4*1,10*1	10*2	7*3	3*5	
Meghalaya	3	70	36		882	9*3	3*5	
Mizoram	3+15 min	70	53	30*1	10*2		3*5	internal choices
Nagaland	3+15 min	70	30	10#1	6*2	11*3	3*5	
Odessa	3+15 min	70	26	5*1	5*2	12*3	1*4,4*5	
Punjab	3	50	35	5*1	6*2	6*3	3*5	
Rajasthan	3+15 min	56	30	13*1	11*2	3*3	3*4	
Tamil Nadu	3+15 min	150	56	30*1	15*3	7*5	4*10	choices in sections
Tripura	3+15 min	70	30	8*1	16*2	9*3	3*5	choice in LAQ
Utter Pradesh	3+15 min	35	18	5*1, 6*1	9*2		1*6	
Uttarakhand	3	70	30	4*1, 4*1	10*2	9*3	3*5	internal choice
West Bengal	3	60	24	10*1	7*2	11*4	6*2	

APPENDIX 1

WEBSITES OF DIFFERENT HS BOARDS IN INDIA

Ref: https://schools.aglasem.com/state-boards

(This is a website which gives lot of details, board wise about, Timetable, results, etc.

https://www.jagranjosh.com – gives details on few boards)

1. Andhra Pradesh Board of Secondary Education: www.bseap.org/
2. Assam State Board of Secondary Education : https://sebaonline.org/
3. Bihar State Board of Secondary Education: http://biharboardonline.bihar.gov.in/
4. Chhattisgarh State Board of Secondary Education: http://cgbse.nic.in/
5. Goa State Board of Secondary Education: https://gbshse.gov.in/
6. Gujarat State Board of Secondary Education: http://www.gseb.org/
7. Haryana State Board of Secondary Education: http://www.bseh.org.in/
8. Himachal Pradesh State Board of Secondary Education: http://hpbose.org/
9. J & K State Board of Secondary Education: http://jkbose.jk.gov.in/
10. Karnataka State Board of Secondary Education: http://kseeb.kar.nic.in/
11. Kerala State Board of Secondary Education: http://www.education.kerala.gov.in/
12. Madhya Pradesh State Board of Secondary Education: http://mpbse.nic.in/
13. Maharashtra State Board of Secondary Education: https://mahahsscboard.maharashtra.gov.in/
14. Manipur State Board of Secondary Education: https://bsem.nic.in/
15. Meghalaya State Board of Secondary Education: http://www.mbose.in/
16. Mizoram State Board of Secondary Education: http://www.mbose.in/
17. Nagaland State Board of Secondary Education: http://www.nbsenagaland.com/index.htm
18. Odisha State Board of Secondary Education: http://www.bseodisha.nic.in/
19. Punjab State Board of Secondary Education: http://www.pseb.ac.in/
20. Rajasthan State Board of Secondary Education: http://rajeduboard.rajasthan.gov.in/
21. Tamil Nadu State Board of Secondary Education: http://tnresults.nic.in/
22. Telangana State Board of Secondary Education: http://bse.telangana.gov.in/physics
23. Telangana – HSC – Higher Secondary Education Website: http://hsc.co.in/tag/physics
24. Tripura State Board of Secondary Education: http://tbse.in/new/welcome.html
25. Uttar Pradesh State Board of Secondary Education: http://upmsp.edu.in/
26. Uttarakhand State Board of Secondary Education: http://www.ubse.uk.gov.in/
27. West Bengal State Board of Secondary Education: http://wbbse.org/

Some states and union territory such as Arunachal Pradesh, Sikkim, Puducherry, Goa, Jharkhand, Andaman and Nicobar, Daman & Diu, Dadar and Nagar Haveli, Lakshadweep do not have their own education boards.

They come under central or adjacent state boards.

Central Board of Secondary Education: http://cbse.nic.in/newsite/index.html

National Institute of Open Schooling: http://www.nios.ac.in/

Indian Certificate of Secondary Education: http://www.cisce.org/

INDIA - International Baccalaureate: http://ibo.org/about-the-ib/the-ib-by-country/i/India

National Science Day Celebrations

DAV College Bathinda (Punjab)

Date: February 28, 2020
Organized by: DAV College Bathinda (Punjab) in association with IAPT (RC-02)

Faculty of Sciences DAV College, Bathinda celebrated National Science Day on the theme 'Women in Science' by organizing poster presentation competition and an informative lecture on '*Pax Antarctica: To Save Antarctica We Must Act Now*' by Dr. Felix Bast, Associate Professor Botany, Central University of Punjab, Bathinda.

The procceding started with the Principal Dr. Sanjeev Sharma extending a warm welcome to Dr. Bast and Dr. Gurpreet Singh described in detail about the significance of the National Science Day to students.

In total 110 students presented posters. Dr. Gurpreet Singh, Prof. Aman Malhotra and Dr. Kriti Gupta acted as judges. The first prize was fetched by Priti Yadav (B.Sc. I NM) and Yojna Sharma (B.Sc. I NM), the second prize by Tania Goyal (B.Sc. I M). The third prize went to two teams Harsimran Kaur (B.Sc. III NM), Harpreet Singh (B.Sc. I NM) and Bansi Dhar Jha (B.Sc. I NM). Consolation prizes were given to Priyanka (M.Com. I), Anmol Goyal (B.Sc. III M) and Harpreet Kaur (B.Sc.III M).

Four winning posters are enlisted on page no. 126.

After that, Dr. Parveen Bala introduced the chief guest. Dr. Bast has done his Ph.D. from Japan. He is a recipient of "INSA-INSPIRE Faculty Award" from DST in 2012 and has also served as an invited in-residence intern with President of India as an "Inspired teacher" for one week at Rashtrapati Bhavan in 2015. Dr. Bast has spent four months (Dec'16 to Apr'17) as a member of Indian team at Antarctica.

In his lecture, Dr. Bast shared his experiences of the days spent at Antarctica. He motivated the youth to keep away from drugs, be fit by exercising, avoid mobile addiction, use bicycle and to reduce plastic pollution for saving the environment. Sharing his life experiences. Dr. Bast narrated many incidents which propelled him towards the enigmatic world of science. He also advised the students to read a lot of good books and be aware about the right to inquire about things.

The organizing secretary, Dr. Kulwinder Singh Mann expressed his deep sense of gratitude to Dr. Bast for delving upon certain unexplored areas and broadening students' knowledge vistas. He further stated that this is an occasion which brings to fore the activities and efforts undertaken in the field of science for human welfare.

Participation certificates and prizes were distributed to students by the faculty of sciences. At the end, Dr. Mann proposed the vote of thanks.

Kulwinder Singh

Workshop On
Physics Experiments Using Olympiad Equipment

Date: March 13-14, 2020
Venue: Akal University, Talwandi Sabo, Bathinda, Punjab
No. of participants: 8 Teachers and 35 students (undergraduate and postgraduate)
Resource Person: Dr. Ravi Bhattacharjee, Former Associate Professor,SGTB Khalsa College, New Delhi & Coordinator, IAPT APhO (Asian Physics Olympiad) cell.

On the occasion of 141st birth anniversary of Albert Einstein, Physics Association, Department of Physics, Akal University, Talwandi Sabo (Bathinda, Punjab) organized two-days workshop on Physics Experiments using Olympiad Equipment in association with IAPT (RC-02). The aim of the workshop was to expose students and faculty members to high-end experiments of the Olympiad with a vision to promote excellence in experimental work at undergraduate and postgraduate level.

The experiments performed during the workshop are:

1. Earth's Horizontal Magnetic Field (APhO 2010 Thailand)
2. Friction (APhO 2012 India)
3. Air Core transformers (APhO 2012 India)
4. The speed of Ultrasonic Waves in Water (APhO 2014 Singapore)
5. Piezoelectric Effect and Application (APhO 2015 Hangzhou)
6. Reflected Optical Diffraction from 1-D structures (APhO 2016 Hong Kong)
7. Understanding Giant Magneto-resistance (APhO-2018 Hanoi)

The participants were divided into seven groups with five students in each group and the experiments were performed on the rotation basis. The experiments in the workshop were of advanced level and students learnt many concepts from one

Students performing the experiments

Prof. Ravi Bhattacharjee, while interacting with students

single experiment. The students got ample time and good support from the resource team to clear their doubts and queries.

In the inaugural session Dr. Sukhjeet Singh, Head, Department of Physics welcomed all the participants and resource persons. The session was presided over by Prof. Gurmail Singh, Vice Chancellor, Akal University. He focused on the need of experimental skills and precautionary measures to be taken while performing the experiments. Prof. Bhattacharjee then conducted the workshop with the students.

In the concluding session of the event on day 2, Prof. M.S. Johal (Dean Academic Affairs) appreciated the efforts of the participants and the organizing committee members. Dr. Sawarn Singh (Registrar, Akal University) and Dr. K. K. Johal (Dean Student Welfare) were present on this occasion. The organizing team led by Dr. Sukhjeet Singh (Director IQAC & Head Department of Physics) with guidance from Prof. Manjit Kaur, Vice President (North Zone, IAPT) contributed to make the workshop successful. Certificates were distributed to all the participants. Dr. Ramandeep Kumar, Convenor, read the report of the event and shared the feedback provided by the students. Dr. Ramandeep Kaur thanked all the participants, resource persons, and guests.

Ramandeep Kumar
Convenor

Varadi Anveshika Report (RC–06)

Seminar on
Science Through Experiments

Date: March 6, 2020
Venue: St. Xavier's School, Nevta, Jaipur
Class: VI to XI
No. of teachers- 8
No. of students- 100
Resource Person: Dr. G.S.Menaria , Regional Coordinator Anveshika , Jaipur.

The event was organized to demonstrate various low cost models and projects that the students may take up as a part of their curriculum.

Concepts, such as, Conservation of momentum, reflection and total internal reflection of light , damped and undamped oscillations, capillarity , pressure difference due to radiation, eddy currents, magnetic field lines, locating center of mass, and many more ,were demonstrated with the help of simple materials.

Dr.Menaria motivated the students to enjoy physics by feeling it in every walk of life and 'learning by doing.'

Anuja Agarwal
Coordinator

National Workshop on Innovative Experiments in Science
University of Kota, Kota

The Department of Pure & Applied Physics, University of Kota, Kota organized two days 'National Workshop on Innovative Experiments in Science' during 28th and 29th February, 2020. Prof. N.K. Jaiman, Director IQAC presided, Prof. R.K. Jain was the chief guest, Prof. S. N. Joshi, CEERI Pilani was keynote speaker and Prof Y.K. Vijay, President, RC-

Inauguration of the Innovative Lab at University of Kota, Kota

workshop on the Science day i.e. February 28, 2020. Dr. Suarabh Dalela and Dr. N.L. Heda were the convener and organizing secretary of the workshop respectively.

The Department of Physics has established 25 experiments in the newly developed Innovation Hub. A total of 150 College / University teachers and students attended the workshop. Prof. Y.K. Vijay the resource person conducted 06 technical sessions. He demonstrated the innovative experiments such as mechanical transmission line, Lorentz oscillator, magnetic dipole interaction in a line and a plane, alpha spectrometer and laser diffractions etc. during the workshop. The participants performed experiments and discussed their observations during the technical sessions.

Ghanshyam Sharma
HOD Pure & Applied Physics

Participant and resource person during the technical session

Report (RC-08)

Activity 1

Awareness Seminar on the NSEs and Basic Study Skills

Date: February 27, 2020
Venue: Yaswant Vinayan Mandir, Deopur, Dhule
Organizing institute: Marathi Vidnyan Parishad, Dhule Division.

For the students, parents and teachers of high school & Jr. College in Dhule city, one day "Awareness Seminar about the NSEs and Basic Study Skills" was organized on Feb. 27, 2020 at Yashwant Vinayan Mandir, Deopur, Dhule. Inauguration was held in the presence of Prin. Dr P. H. Pawar (Z B. Patil College, Dhule) and the chief guest was Mr Pramod G. Patil (Vice Chairman, Jai Hind Ed. Trust, Dhule and life member of MVP Dhule Division).

Main idea of seminar was to give information about NSEJS & NSEs as well as to give certain information about the basic study skills. The resource persons were Dr R. M. Shewale (IAPT Life member &Asso. Prof. Z B Patil College, Dhule), Mr M. S. Patil (Life member of IAPT & Jr. College Teacher of Jai Hind High School & Jr. College, Dhule) and Mr V Y Dabke (Retd Principal, New City High School and Treasurer, MVP Dhule Div.).About 140 students, 50 parents and 20 teachers from various schools and colleges of Dhule city attended the seminar.

R. M. Shewale
EC Member

Activity 2

Opportunities in Physics

Date: February **5**th, 2020
Venue: Annasaheb Waghire College Otur
Organized by: Annasaheb Waghire College Otur and RC-08
Participants:- Thirty five students and ten teachers
Resources persons:- Ex.Vice.Prin Dr.Aghav S.D. Pune and Dr.Sandeep Kakade Pune.

In the inaugural speech, Dr. Aghav S.D talked about the importance of understanding the Physics as well as the concepts of projects for undergraduate and post graduation students. He delivered lecture on "Popularization of Physics" wherein he pointed out the use of basic physics concepts in technological application and gave some basic tricks to create the interest in physics. 32 participants attended the workshop

In the second session Dr.Kakade Sandeep delivered a talk on "Importance of NGPE exam and Scope of Physics in Research" in different Research Institutions, Industries and Government organizations and how to prepare for their interview and entrance exams.

The vote of thanks was proposed by the convener Dr. Dhakane S.F.

Dhakane S.F.
Convener

Report (RC-13)

Activity 1

One day Workshop on Learning Concepts of Physics through Experiments

Date: February 19, 2020

Venue: Sri G.V.G Visalakshi College for Women, Udumalpet, Tamilnadu

A Workshop on "Learning Concepts of Physics through Experiments" was organized by Department of Physics, Sri GVG Visalakshi College for Women, Udumalpet, TN, and RC-13 on February 19th, 2020 to motivate students by presenting Physics as a perceivable and enjoyable pursuit. Mrs B. Nirmala, Convener of the workshop welcomed the participants and explained the purpose and the background of the workshop. Dr. C. Vijayan, Professor of Physics, IIT, Madras, and President, RC-13, IAPT inaugurated the workshop and delivered an interactive lecture on 'Adventure with Physics', outlining several interesting aspects of Physics and introducing useful and fun resources for students and teachers. Dr. N. Harish Kumar, Professor of Physics, IIT, Madras and Secretary, RC-13, demonstrated several experiments related to Mechanics, Properties of Matter, Electromagnetism, Acoustics etc., revealing the concepts of physics behind the experiments. Demonstrations were conducted for college and school students in two separate sessions.150 students from Sri G.V.G Visalakshi College for Women and 85 students from Government Arts College, Udumalpet, Arulmigu Palaniandavar College, Palani, PSGR Krishnammal College for Women, Coimbatore, Kamalam College, Udumalpet, STC, Pollachi, and Nirmala College, Coimbatore attended the workshop. The afternoon session for schools was attended by 116 students from various schools in and around Udumalpet (Shaanthi International School, Srinivasa Public School, RGM School, RKR Gricks School, SKP School, SVG School). The workshop helped College and School students of this geographical region to get motivated, to develop interest in the conceptual understanding as well as in experimentation and to critically examine new ideas through questioning. At the end of the workshop, prizes were distributed to the winners of various competitions. Dr. B. Kavitha Assistant Professor of Physics proposed the vote of thanks to the gathering.

Prize Distribution

Activity 2

One-Day National Seminar on 'Emerging Trends in Physics'

Dated: December 13th, 2019

Venue: Jayaraj Annapackiam College for Women

A One-Day National Seminar on 'Emerging Trends in Physics' was organized on December 13th, 2019 at Jayaraj Annapackiam College for Women (Autonomous), Periyakulam, Theni Dist.,Tamilnadu, sponsored by IAPT RC-13. About 150 outstation participants consisting of teachers and students at PG and PhD level attended the seminar, apart from local participants.

The seminar was inaugurated by Dr. Anandavadivl, Associate Professor, Department of Physics, Sri Venkateswara College of Engineering, Chennai, He outlined the activities of IAPT and called for larger participation from the region. Rev. Sr. Dr. S. Jesurani, Principal, J. A. College, Periyakulam presided over the inaugural session and highlighted the importance of research in recent years in emerging areas of Physics with particular emphasis on its usefulness to the society. Rev. Sr. Dr. B. J. Queensly Jeyanthi, Secretary and Mother Superior, J. A. College addressed the audience and highlighted the need to improve the quality of life by providing basic understanding and developing instrumentation techniques for medical applications.

In the technical sessions, D A Anandavadivel talked on 'Recent Advances in Condensed Matter Physics' and explained the energy demands for the future generation and aspects of slow and fast dynamics in molecular systems. Dr. K. K. Ashok, Scientist, IRO/VSSC explained the scope of electromagnetic ceramics for space applications. He also outlined the classification schemes for ceramics and relevant crystal systems, highlighting the role of flexible ceramics in applications related to phase shifters, isolators and absorbers. Dr. M. Beaula Ruby Kamalam, Assistant Professor of Physics, The American College, Madurai delivered a talk on 'Novel material -- Graphene and its applications' and outlined production techniques, properties and applications of different types of Graphene-related materials. The seminar was very successful in increasing interest and awareness of some of the fascinating frontier areas of Physics to young students and teachers at PG and research level, in the interior region of Tamilnadu, apart from spreading the message of IAPT.

C. VIJAYAN

IAPT Seminar at Periyakulam, Theni, Tamilnadu

FOCUS –IAPT Anveshika & RC-11 Activities

Govt. Degree College, Salur, Vizianagaram Dist. Andhra Pradesh

Activity 1

Solar Eclipse (Eclipses and Myths)

On Decmber 22, 2019 at Municipal High School, Kaspa (63 Students 21 Teachers)
On Decmber 23, 2019 at GDC-Salur
(44 Degree Students and 6 Teachers)
On Decmber 24, 2019 at Vasavi Jr. College, Bobbili
(40 Students and 9 Teachers)
On Decmber 26, 2019 at Govt. Degree College, Salur, Vizianagaram(26 Students)

Catalyzed and supported by: IAPT RC 11 & National Anveshika Network of India (NANI)
Resource Persons: Dr. Joga. Chandrasekhar Rao, HOD Physics, GDC Salur, Vizianagaram.

Programme Details: While discussing with our students about the Solar Eclipse, which was to take place on December 26, 2019, large number of students raised several doubts such as 1) Don't go outside during the Eclipse, 2) Don't cook and don't eat any food during the Eclipse, 3) Put grass pieces in milk and food material, 4) If pregnant women go outside during eclipse their child to be born with various deformities such as blindness, cleft lips, birth marks, women are told to lie straight in bed, 5) We do not do our daily activities as usual during Eclipse, 6) Wooden pestle, if placed in brass bowl with turmeric water or milk then it stands straight during Eclipse but after Eclipse automatically it will fall down, etc., To clarify all the doubts we explained the formation of Eclipse and its effects scientifically through presentations in various institutions and also told the do's and don'ts of viewing the Eclipse. Also we watched Solar Eclipse at open field of Govt. Degree College, Salur on 26th December 2019, took some photos with solar filters and with No. 12 solar glass plate. Especially we observed wooden pestle placed in brass bowl and ordinary bowl with water, without water, with turmeric water, with milk, before eclipse, during eclipse and after eclipse. From this finally, students realised that these were all superstitions only. Photos show solar eclipse, using solar filters during different times in Vizianagaram District

Activity 2

SIKKOLU SRUJANOTSAVAM – Content Enrichment Program

On February 8, 2020 at Premasamajam, Phool Bhaugh, Vizianagaram (Vzm) Dist.
On February 23, 2020 at Govt. College for women, Srikakulam (Sklm) Dist.

Participants: 98 Teachers from VZM Dist. & 150Students + 173 Teachers from SKLM Dist.
In collaboration with: Andhra Pradesh Physical Science Teachers Forum (APPSTF)
Catalyzed and supported by: IAPT RC 11 & National Anveshika Network of India (NANI)
Resource Persons: Dr. Joga Chandrasekhar Rao, GDC, Salur, Vzm.
Sri. K. Hara Gopal, J L in Physics, Govt. Jr. College, Rajam, Sklm.

Program details: Andhra Pradesh Physical Science Teachers Forum (APPSTF) conducted Content Enrichment Program (CEP) for Physical Science Teachers working in Government and Zilla Parishad High Schools at Vzm district and Sklm district separately as well as conducted Proficiency Advancement Test for 10th class students simultaneously. In the morning session students were writing the test and teachers participated in CEP. We demonstrated Snell's law derivation, Rectilinear propagation of light, Refraction of light when light incidents normally, using of sine conventions in the derivation of Lens makers formula and also in solving problems, Lateral shift, Real depth - Apparent depth and relation between them, Finding refractive index of glass and water, Total internal reflection, Physical phenomenon involved in Rainbow formation, Spectrum and visible region etc. In the afternoon session teachers evaluated question papers and students participated in the demonstration program. Here we showed simple physics experiments like upthrust, centre of mass, centre of gravity, Newton's 3rd law using magnets, Pascal's law, Bernoulli's principle, creating resonance using transparent pipe, wave motion using spring etc. After evaluation prizes were distributed. . In this program Smt. G. Naga Mani, DEO, Dr. B. Narendra, Vizianagaram, Smt. K. Chandrakala, DEO, Sri. A.Prabhakar Rao, Ex. DEO, Srikakulam, Sri. Sai Srinivasa Sharma, State Hon'ble president, Dy. DEO'S, Science Officers, MEO's, HM's participated.

Content Enrichment Program at Premasamajam, Vzm Dist for High School PS Teachers

Activity 3

National Science Day Celebrations-2020

On February 27, 2020 at Govt. Degree College, Salur, Vizianagaram Dist.
Participants: 200 B. Sc Students and 21 Lecturers.
Catalyzed and supported by: IAPT RC 11 & National Anveshika Network of India (NANI)
Resource Persons: Dr. Joga Chandrasekhar Rao, GDC, Salur, Vzm. Sri. P. Chanti Babu, Lecturer in Physics, GDC, Salur,Vzm.

Program details: National Science Day was celebrated at the college with the main theme of program as 'WOMEN IN SCIENCE'. Essay writing, elocution and working models competitions were conducted for the students of the degree college, Salur Mandal. The Principal addressed the students and conveyed that every student must learn each concept by learning-by-doing method. He advised the students to think innovatively and perform a task scientifically to improve scientific attitude and serve the society. Sri P. Chanti Babu delivered Life Story of Sir C V Raman through presentation. Mr. P. Raja final year student, spoke on about role of women in development of science. Students presented their working models like 1) drone, 2) formation of rainbow, 3) grass cutter, 4) wave motion, 5) hydraulic bridge, 6) hydraulic machine, 7) water clock, 8) solar smoke absorber, 9) walking robot, 10) wind energy, 11) water alarm, 12) homemade projector etc. In the afternoon session some experiments in mechanics, waves and oscillations, optics, solar energy and wind energy were demonstrated. Valedictory function was organised to give prizes to winners and also felicitating women science lecturers working in the college.

National Science Day Celebrations at Govt. Degree College – Salur, Vizianagaram Dist.

J. Chandrasekhar Rao
Secretary, RC-11

Report (RC-16)

National Science Day Celebration

Date- February 28, 2020
Venue- N M Institute of Engineering & Technology, Bhubaneswar.
Students- 107 **Faculty members**- 16

National Science Day was observed in the memory of famous scientist & Nobel Laureate in Physics Sir C.V. Raman at N.M Institute of Engineering &Technology, Bhubaneswar on 28th February 2020. Director of the Institute Dr. K.C. Singh talked about the significance of the day. Principal Dr. P.K. Swain delivered the welcome address. Dean, Computer Science Dr. Manas Ranjan Senapati, as chief guest, spoke on contribution of Dr. C.V. Raman & Madam Curie to the world of science. Dean, Students' Affairs Prof. B. R. Mohapatra spoke about the theme 'Women in Science'. Convenor Prof. Ashutosh Mohapatra proposed the vote of thanks. The resource person, Mrs. Rajashree Mohapatra, Joint Secretary IAPT RC-16 demonstrated hands-on physics experiments on scattering of light, Total Internal Reflection, Refractive Index, Electromagnetic Induction, Polarization etc. On this occasion, she was conferred with NM Bigyan Prativa Sanman.

Rajashree Mohapatra

Report (RC-22)

Activity-1

Understanding Basic Concepts of Physics through Experiments

Date: March 12, 2020

Venue: St. Thomas High School, Nirmal, Nirmal District, Telangana

Participants: High School Teachers of Nirmal District of Telangana

Organized By: RC-22 in Association with Forum for Physical Science Teachers (FPST),

Resource person: Mr. BS Achutha, VVS Sardar Patel PU College, Bengaluru.

One day workshop was organized on 12th March,2020. The resource person, Mr. B.S. Achutha explained the concepts related to mechanics and sound by performing some experiments. The program was conducted in two sessions. About 160 Physical Science teachers from Nirmal district attended the work shop. The district DEO also attended the programme and appreciated the workshop.

Activity-2

Understanding the nature of Light

Date: February 28, 2020

Venue: i) Kamala Institute of Technology & Science, Singapur, Huzurabad, Karimnagar (Dt.), Telangana

ii) Government School, Bheemadevarapally, Warangal (Urban), Telangana

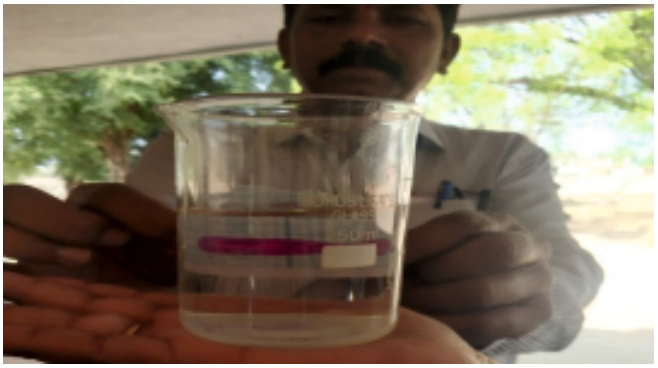
Participants: i) B.Tech II semester students

ii) High School students, Government School, Bheemadevarapally

Organized By: RC-22 and Department of Physics, KITS, Singapur, Huzurabad,

Resource person: Dr. S. Somashekara, Retired Professor of Physics and former Academic Director, Agasthya foundation, Kuppam

On the occasion of National Science Day, in the morning session, a talk on 'Understanding the nature of light' was organized at KITS, Huzurabad, Karimnagar (Dt.), Telangana.



About 150 B.Tech II semester students attended the program. The speaker talked about the discovery of Raman Effect and its applications. He explained various latest developments that are taking place in optics like bio-photonics, quantum entanglement, controlling the speed of light etc. The students received the session quite well.

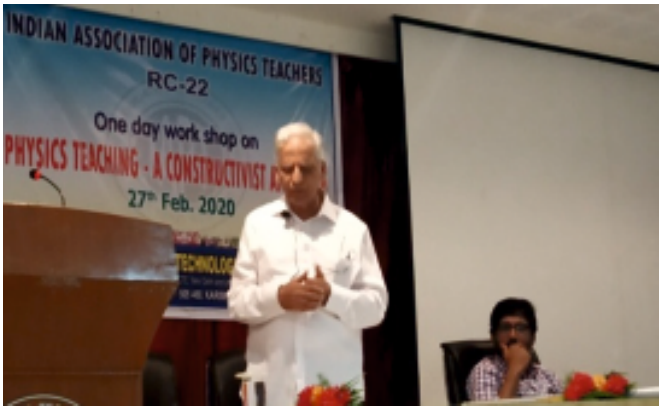
In the afternoon session, experiments related to light like reflection, refraction and total internal reflection were demonstrated to about 100 students of 7th, 8th and 9th class of rural Government High School, Bheemadevarapally, Warangal (Urban)

Activity-3

Physics Teaching – A Constructivist Approach

Date: February 27, 2020
Venue: Kamala Institute of Technology & Science, Singapur, Huzurabad, Karimnagar (Dt.), Telangana
Participants: High School Physical Science, Teachers of Telangana.
Organized By: (RC-22) and Department of Physics, KITS, Singapur, Huzurabad,
Resource person: Dr. S. Somashekara, and Dr. Ch. Rama Krishna, Secretary, RC-22.

Constructivism is 'an approach to learning that holds that people actively construct or make their own knowledge and that reality is determined by the experiences of the learner'(Elliott et al., 2000:256). IAPT RC-22 proposed to conduct a work shop on this approach to the High School Physical Science teachers of Telanagana. Total 160 teachers from different parts of Telangana participated in the work shop. In the forenoon session, after inauguration, theory sessions were conducted. In the afternoon session, two concepts, one on Archimedes Principle and the other on basic mechanics were taken and discussed in detail. The teachers have given a very good feedback on this work shop. They felt that they need two to three day work shop to deal with more number of topics.



Activity-4

National Science Day Celebration - Interaction with an Eminent Person

Date: February 26, 2020
Venue: Greenhood High School Warangal and Erragattu Gutta,Warangal (Urban) Telangana
Target Participants: 8th and 09th Class students
Organized By: IAPT (RC-22)
Resource person: Dr. S. Somashekara

On the occasion of National Science Day, an interaction session was conducted with 8th and 9th class students. Dr. S. Somashekar was invited to interact with students. In the forenoon session, the interaction was conducted at city premises and about 250 students attended the programme. The speaker explained the Raman effect. After the talk for more than 1 hour, an interaction

session was conducted. The students interacted well to clear their doubts. In the evening session the session was conducted at the residential campus. More than 350 students attended the program and about 2 hours interaction session was conducted.

Activity-5

Application oriented Electricity & Magnetism experiments

Date: February 4, 2020
Venue:
1, ZPHS Sangempally, Dist: Jagtial – Forenoon session
2. GHS (Girls), Dist:Jagtial – Afternoon session
Target Participants: High School students
Organized By: IAPT (RC-22)
Resource person: Mr. Budhavarapu Mallesh, Inno hub Technologies, Karimnagar

The activity was conducted at two government high school in rural area of Telangana. In the forenoon session it was conducted at Zill Parishath High School, Sangempally and in the afternoon session it was conducted at Government High School for Girls at Jagtial. In the first school 70 students and in the second school 110 students attended the program. The resource person introduced various concepts of electricity and magnetism and demonstrated the experiments like Ohm's law, various factors influencing the resistance, Kirchoff's laws verification, House hold electrical connections, Magnetic field lines, Magnetic field due to circular coil and solenoid, Electric motor , Faraday's laws etc. A feedback of all the students and their Physical Science teachers was also taken and it was known that they all had enjoyed the programme a lot. The Head Masters of the schools appreciated the concept of the programme.

ZPHS Sangempally

GHS (Girls), Jagtial Town

V. Rajeshwar Rao
President RC-22

To our readers

For change of address and non-receipt of the Bulletin, please write (only) to:
our New Address :

The Managing Editor

Flat No. 206, Adarsh Complex,
Awas Vikas-1 Keshavpuram, \
Kalyanpur, Kanpur-208017
Email : iaptknp@rediffmail.com
Mob. : 09935432990

National Toppers, NGPE - 2020

Sr.no.	Centre No.	Roll No.	Name of student	Father	Gen	Class	Name of Examination Centre
1	G-1111	20003	Akash Maurya	YP	M	BSc III	St. Stephen's College, Delhi University, Delhi
2	G-1111	20016	Dhruv Tiwari	AKT	M	BSc II	St. Stephen's College, Delhi University, Delhi
3	**G-1111**	**20508**	**Krishan Joshi**	**PJ**	**M**	**BSc III**	**St. Stephen's College, Delhi University, Delhi**
4	**G-1111**	**20509**	**Manav Beniwal**	**VV**	**M**	**BSc III**	**St. Stephen's College, Delhi University, Delhi**
5	G-1112	20102	Vivek Singh	VS	M	BSc III	Sgtb Khalsa College, Dehli University, Delhi
6	G-1420	20004	Rahul Narang	VN	M	BScIII	Dept. Of Physics Guru Nanak Dev University Amritsar (Pb)
7	G-1603	20015	Abhay Singh Dulta	KSD	M	BSc III	Department Of Physics, Panjab University Chandigarh
8	**G-1603**	**20024**	**Shivaye Modi**	**SM**	**F**	**BSc III**	**Department Of Physics, Panjab University Chandigarh**
9	G-1603	20026	Vikas	RS	M	BSc III	Department Of Physics, Panjab University Chandigarh
15	G-2104	20012	Prakhar Vashishtha	IDV	M	BSc III	D B S (Pg) College, Dehradun
10	G-2129	20030	Harsh Nigam	AKN	M	BSc III	Department Of Physics, Banaras Hindu University Varanasi
11	G-2129	20060	Siddharth Jain	AKJ	M	BSc III	Department Of Physics, Banaras Hindu University Varanasi
12	**G-2129**	**20061**	**Sidhant Kumar Barik**	**KKB**	**M**	**BSc III**	**Department Of Physics, Banaras Hindu University Varanasi**
13	G-2142	20012	Shivansh Tiwari	PT	M	BSc III	Department Of Physics, Ddu Gorakhpur University Gorakhpur
16	G-2199	20042	Pradeep Deoli	OPD	M	BSc III	Sgrr Pg College Dehradun
14	G-2200	20004	Mata Prasad Sharma	KLS	F	BSc III	St John's College Agra (UP)
17	G-3117	20013	Raghvendra Rathore	NS	M	BSc III	Department Of Physics, University Of Rajasthan Jaipur
18	G-3119	20003	Chetan Shakti Pandey	JPK	M	BSc III	Regional Istitute Of Education Ajmer (Raj)
19	G-3120	20015	Himanshu Jha	AJ	M	BScIII	S S Jain Subodh Pg (Auto.) College Jaipur
20	G-3120	20092	Aayan Goyal	SG	M	BScIII	S S Jain Subodh Pg (Auto.) College Jaipur
21	**G-3120**	**20128**	**Sonu Kaswan**	**MK**	**M**	**BScIII**	**S S Jain Subodh Pg (Auto.) College Jaipur**
22	G-3120	20158	Ajeet Singh	MS	M	BScIII	S S Jain Subodh Pg (Auto.) College Jaipur
23	G-3127	20017	Akash Shukla	SKS	M	MSc I	Central University Of Rajasthan Ajmer
24	**G-3603**	**20028**	**Sharma Kshitij**	**V**	**M**	**BSc III**	**St. Xavier's College Navrangpura, Ahmedabad**
25	**G-4006**	**20070**	**Harsh Jain**	**LPJ**	**M**	**BSc I**	**Bits Pilani K K Birla Goa Campus Zuarinagar Goa**
26	G-4006	20080	Shravan Kumar Shetty	NS	M	BSc III	Bits Pilani K K Birla Goa Campus Zuarinagar Goa
27	G-4006	20105	Rahul Saxena	S	M	BSc III	Bits Pilani K K Birla Goa Campus Zuarinagar Goa
28	G-4006	20109	Verun Singh	AK	M	BSc II	Bits Pilani K K Birla Goa Campus Zuarinagar Goa
29	G-4104	20005	Prasad Pawar	N	M	BSc III	D G Ruparel College Mahim, Mumbai
30	G-4105	20028	Abhishek Kulkarni		M	BSc II	Fergusson College Pune
31	**G-4195**	**20125**	**Ghosh Abhijit**	**S**	**M**	**BSC III**	**Thakur College Of Science And Commerce Mumbai**
32	G-4199	20009	Sagar Ramchandani	S	M	BSc III	Ves College Of Arts, Science & Commerce Chembur, Mumbai
33	G-4213	20008	Kshitij Verma	V	M	BSc I	Indian Institute Of Science Education And Research Pune
34	G-4213	20016	Lokendra Singh Rahtore	V	M	BSc I	Indian Institute Of Science Education And Research Pune
35	**G-4213**	**20023**	**Johann Pernandes**	**M**	**M**	**BSc III**	**Indian Institute Of Science Education And Research Pune**

36	**G-4213**	**20034**	**Kushan Panchal**	**A**	**M**	**BSc II**	**Indian Institute Of Science Education And Research Pune**
37	**G-6848**	**20009**	**Varghese Reji**	**R**	**M**	**BSc III**	**Government College Kottayam (Kerala)**
38	G-7101	20015	Abhisek Barman Maji	BBM	M	BSc I	Rk Mission Residential (Auto) College Narendrapur, Kolkata
39	G-7101	20017	Sarthak De	SDE	M	BSc II	Rk Mission Residential (Auto) College Narendrapur, Kolkata
40	G-7101	20019	Sayan Sarkar	SS	M	BSc II	Rk Mission Residential (Auto) College Narendrapur, Kolkata
41	G-7101	20030	Samyabrata Paria	SP	M	BSc III	Rk Mission Residential (Auto) College Narendrapur, Kolkata
42	G-7101	20031	Ritwik Dhara	AD	M	BSc III	Rk Mission Residential (Auto) College Narendrapur, Kolkata
43	G-7101	20035	Suman Debnath	ND	M	BSc III	Rk Mission Residential (Auto) College Narendrapur, Kolkata
44	**G-7101**	**20037**	**Sayak Datta**	**KKD**	**M**	**BSc II**	**Rk Mission Residential (Auto) College Narendrapur, Kolkata**
45	**G-7101**	**20038**	**Niladri Ghorui**	**SGH**	**M**	**BSc III**	**Rk Mission Residential (Auto) College Narendrapur, Kolkata**
46	G-7101	20039	Subrata Maiti	SNM	M	BSc III	Rk Mission Residential (Auto) College Narendrapur, Kolkata
47	G-7101	20040	Shatanik Bhattachhrya	SB	M	BSc III	Rk Mission Residential (Auto) College Narendrapur, Kolkata
48	G-7101	20041	Sagnik Ghosh	GG	M	BSc III	Rk Mission Residential (Auto) College Narendrapur, Kolkata
49	G-7101	20043	Sownak Pal	EP	M	BSc II	Rk Mission Residential (Auto) College Narendrapur, Kolkata
50	**G-7101**	**20044**	**Souvik Kumar Naskar**	**KENA**	**M**	**BSc III**	**Rk Mission Residential (Auto) College Narendrapur, Kolkata**
51	G-7101	20045	Mrinal Kanit Sarkar	DS	M	BSc III	Rk Mission Residential (Auto) College Narendrapur, Kolkata
52	G-7101	20046	Soham Maiti	BM	M	BSc III	Rk Mission Residential (Auto) College Narendrapur, Kolkata
53	**G-7101**	**20047**	**Indranil Dey**	**BD**	**M**	**BSc III**	**Rk Mission Residential (Auto) College Narendrapur, Kolkata**
54	**G-7101**	**20048**	**Aditiya Kumar Mandal**	**DKM**	**M**	**BSc III**	**Rk Mission Residential (Auto) College Narendrapur, Kolkata**
55	**G-7101**	**20049**	**Rupak Majumder**	**GM**	**M**	**BSc II**	**Rk Mission Residential (Auto) College Narendrapur, Kolkata**
56	G-7101	20050	Akash Sinha	TKS	M	BSc III	Rk Mission Residential (Auto) College Narendrapur, Kolkata
57	G-7101	20052	Sourav Mandal	BM	M	BSc III	Rk Mission Residential (Auto) College Narendrapur, Kolkata
58	G-7101	20055	Santanu Mandal	SM	M	BSc II	Rk Mission Residential (Auto) College Narendrapur, Kolkata
59	G-7103	20001	Soumitra Kolya	TK	M	BSc II	Midnapore College Midnapore (WB)
60	G-7103	20002	Ramesh Sasmal	TS	M	BSc II	Midnapore College Midnapore (WB)
61	G-7103	20013	Abhinandan Pal	MP	M	BSc III	Midnapore College Midnapore (WB)
62	G-7103	20021	Lokesh Patra	BP	M	BSc III	Midnapore College Midnapore (WB)
63	G-7103	20026	Tania Patra	NP	F	BSc III	Midnapore College Midnapore (WB)
64	G-7103	20029	Debraj Debata	CD	M	BSc III	Midnapore College Midnapore (WB)
65	G-7103	20043	Tanushree Jana	TJ	F	BSc III	Midnapore College Midnapore (WB)
66	**G-7103**	**20071**	**Bikroam Pain**	**TP**	**M**	**BSc II**	**Midnapore College Midnapore (WB)**
67	G-7103	20080	Anjan Kar	AK	M	BSc III	Midnapore College Midnapore (WB)
68	G-7104	20002	C B S Socrates		M	BSc III	St. Xavier's College, Kolkata
69	G-7104	20006	Biju Saha		M	BSc III	St. Xavier's College, Kolkata
70	**G-7104**	**20013**	**Ayshi Mukherjee**		**F**	**BSc III**	**St. Xavier's College, Kolkata**
71	G-7104	20017	Aryaa Dattamunsi		F	BSc III	St. Xavier's College, Kolkata
72	G-7104	20019	Anindita Sarkar		F	BSc III	St. Xavier's College, Kolkata
73	G-7104	20021	Tamoghna Ray		M	BSc III	St. Xavier's College, Kolkata
74	G-7104	20022	Supritha Bhowmick		F	BSc III	St. Xavier's College, Kolkata
75	G-7104	20025	Debangan Maji		M	BSc III	St. Xavier's College, Kolkata

76	G-7104	20027	Ayantika Saha		F	BSc III	St. Xavier's College, Kolkata
77	G-7104	20037	Kaushik Pal		M	BSc II	St. Xavier's College, Kolkata
78	**G-7113**	**20003**	**Debsubhra Chakarborty**	**DC**	**M**	**BSc II**	**Ramakrishnan Mission Vidyamandira Beluremath Howrah (WB)**
79	G-7113	20004	Padmanabha Bose	DB	M	BSc II	Ramakrishnan Mission Vidyamandira Beluremath Howrah (WB)
80	G-7113	20005	Kaushik Kangsabanik	KK	M	BSc II	Ramakrishnan Mission Vidyamandira Beluremath Howrah (WB)
81	G-7113	20018	Rajdwip Bhar	LMB	M	BSc III	Ramakrishnan Mission Vidyamandira Beluremath Howrah (WB)
82	G-7113	20019	Niladri Sekhar Dan	MKD	M	BSc III	Ramakrishnan Mission Vidyamandira Beluremath Howrah (WB)
83	**G-7113**	**20021**	**Sandipan Manna**	**SM**	**M**	**BSc III**	**Ramakrishnan Mission Vidyamandira Beluremath Howrah (WB)**
84	**G-7113**	**20024**	**Abhijit Halder**	**GH**	**M**	**BSc III**	**Ramakrishnan Mission Vidyamandira Beluremath Howrah (WB)**
85	G-7113	20025	Pralay Chanda	PPC	M	BSc III	Ramakrishnan Mission Vidyamandira Beluremath Howrah (WB)
86	**G-7113**	**20026**	**Sayan Bhakta**	**SKB**	**M**	**BSc III**	**Ramakrishnan Mission Vidyamandira Beluremath Howrah (WB)**
87	G-7113	20027	Richeek Nayak	RCN	M	BSc III	Ramakrishnan Mission Vidyamandira Beluremath Howrah (WB)
88	G-7113	20028	Hironmoy Pratihar	MMP	M	BSc III	Ramakrishnan Mission Vidyamandira Beluremath Howrah (WB)
89	G-7113	20029	Deepan Santra	DS	M	BSc III	Ramakrishnan Mission Vidyamandira Beluremath Howrah (WB)
90	G-7119	20011	Siddhartha Bandyopadhyay	SB	M	BSc I	Indian Institue Of Science Education And Research Kolkata
91	G-7119	20050	Vikrant Kumar	SK	M	BSc III	Indian Institue Of Science Education And Research Kolkata
92	G-7120	20021	Aritra Mondal	SKM	M	BSc II	Burdwan Raj College Burdwan (WB)
93	G-7120	20027	Saikat Mondal	PNM	M	BSc III	Burdwan Raj College Burdwan (WB)
94	G-7120	20028	Shouvik Pal	SP	M	BSc III	Burdwan Raj College Burdwan (WB)
95	G-7120	20029	Arpan Pal	SP	M	BSc III	Burdwan Raj College Burdwan (WB)
96	**G-7120**	**20030**	**Sudip Chakarabarty**	**DC**	**M**	**BSc III**	**Burdwan Raj College Burdwan (WB)**
97	G-7120	20038	Aditi Garai	AG	F	BSc III	Burdwan Raj College Burdwan (WB)
98	G-7124	20003	Rupam Samanta	RS	M	BSc II	Rkm Vivekananda Centenary College Rahara, Kolkata
99	G-7124	20021	Soumya Roy	SR	M	BSc III	Rkm Vivekananda Centenary College Rahara, Kolkata
100	**G-7124**	**20023**	**Pritam Roy**	**GR**	**M**	**BSc III**	**Rkm Vivekananda Centenary College Rahara, Kolkata**
101	**G-7124**	**20024**	**Tamal Mukharjee**	**SM**	**M**	**BSc III**	**Rkm Vivekananda Centenary College Rahara, Kolkata**
102	G-7124	20026	Sujit Das	TD	M	BSc III	Rkm Vivekananda Centenary College Rahara, Kolkata
103	G-7124	20027	Sanju Kumar Manna	NM	M	BSc III	Rkm Vivekananda Centenary College Rahara, Kolkata
104	G-7129	20303	Saptarshi Sarkar	SKS	M	BSc III	Bangabasi College Bangabasi, Kolkata
105	G-7129	20404	Soumya Bera	TB	M	BSc III	Bangabasi College Bangabasi, Kolkata
106	G-7129	20417	Katha Ganguly	AGM	F	BSc III	Bangabasi College Bangabasi, Kolkata
107	G-7129	20421	Deepan Patra	ATP	M	BSc III	Bangabasi College Bangabasi, Kolkata
108	G-7129	20440	Sayak Guin	PKG	M	BSc II	Bangabasi College Bangabasi, Kolkata
109	G-7129	20553	Koushik Ghorai	KG	M	BSc III	Bangabasi College Bangabasi, Kolkata
110	G-7502	20011	Manoj Kumar Dutta	SSD	M	BSc III	Dept. Of Physics, Ravenshaw University Cuttack (Odisha)
111	G-7532	20001	Deeptipadma Mallick		F	BSc III	College Of Basic Science & Humanities Ouat, Bhubneswar
112	**G-7542**	**20002**	**Chinmaya Kumar Sahoo**	**SCS**	**M**	**BSc III**	**Nayagarh (Autonomous) College Nayagarh (Odisha)**
113	G-7542	20004	Abinash Kar	DNK	M	BSc III	Nayagarh (Autonomous) College Nayagarh (Odisha)
114	G-7543	20011	Ashish Panigrahi	HP	M	BSc II	Niser Bubaneswar Jatani, Dt. Khurda (Odisha)
115	G-7543	20026	Hiranmay Das	MD	M	BSc III	Niser Bubaneswar Jatani, Dt. Khurda (Odisha)

116	G-7550	20003	Sujata Das	AKD	F	BSc III	Kendrapara (Auto) College Kendrapara (Odisha)
117	G-7550	20004	Santosh Kunar Nayak	SCN	M	BSc III	Kendrapara (Auto) College Kendrapara (Odisha)
118	G-8125	20511	Rahul Mukharjee	HM	M	BSc III	Ram Lakhan Singh Yadav College Ranchi (Jharkhand)

The BOLD names are the top 27 students who are elligible for Part C examination (An examination in experimental skill) and to apply for direct admission for integrated Ph D (only BSc III students) to S N Bose National Centre Kolkata. For details see: http://bose.res.in/admission.html or write mail to nibedita.konar@bose.res.in OR admission@bose.res.in). The Part C Examination for final selection for NGPE - 2020 Gold Medal will be held at Department of Physics SGRR (PG) College Dehradun some where in June 2020. The exact date of examination shall be informed to each student in due course of time.

B P Tyagi
Chief Coordinator (Examination)
Ph: 9837123716; bptyagi@gmail.com

ANNOUNCEMENT

We regret to announce postponement of

C K MAJUMDAR MEMORIAL SUMMER WORKSHOP IN PHYSICS 2020

(originally scheduled to be held fromMay26to June 05, 2020)

Venue: S N Bose National Centre for Basic Sciences, Salt Lake, Kolkata

due to the unprecedented situation prevailing in the country and worldwide

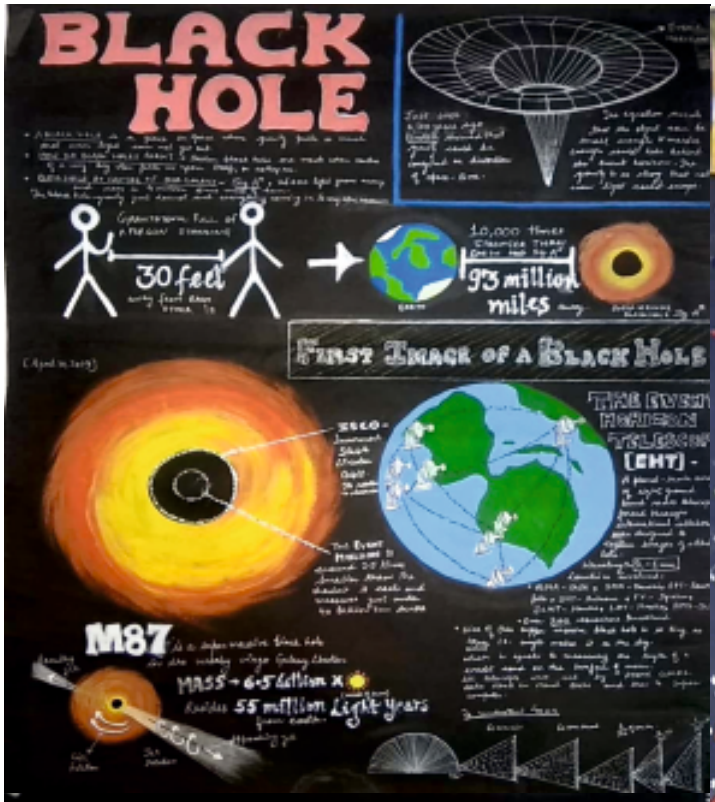
Fresh dates will be intimated as soon as the situation becomes conducive to holdingthe workshop

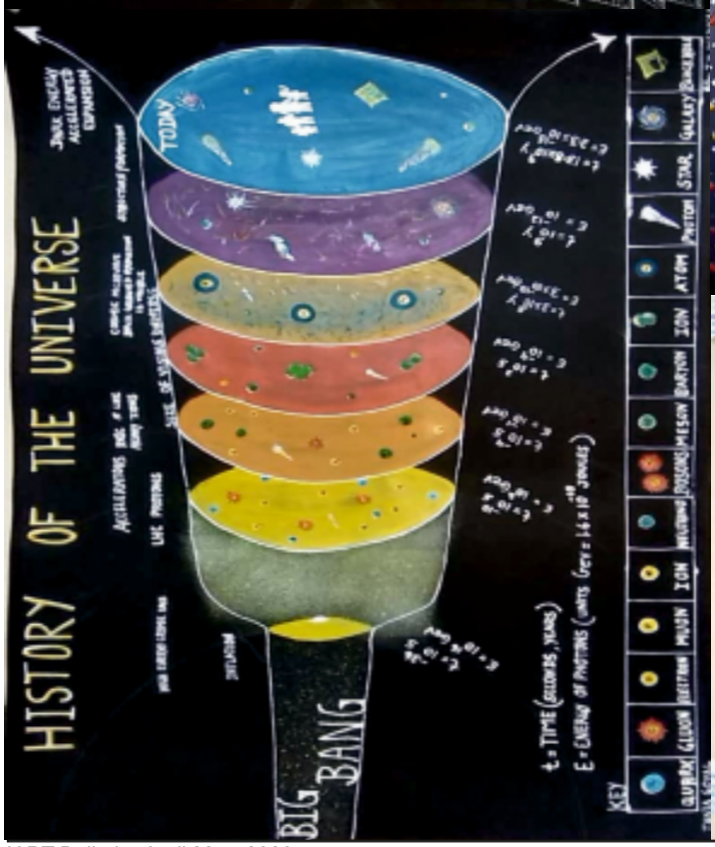
Contact persons:

1. Dr. Kalyan Mandal, SNBNCBS: kalyan@bose.res.in,09163958703
2. Prof. Sukla Chakraborty: sukla.amc@gmail.com, 09433061636
3. Dr. Saswati Dasgupta: saswati_dg@yahoo.com, 09836388638

IAPT, RC-15

Four prize winning posters.....ref p.109





DSMA

2020

Indian Association of Physics Teachers

IAPT established by (Late) Dr D P Khandelwal aims at upgrading Physics teaching and teachers at all levels.

IAPT DSM Award recognizes a Physics Teacher for his/her significant contribution to Undergraduate Physics Teaching in any institution affiliated to a University recognized by UGC.

IAPT Dinabandhu Sahu Memorial Award 2020

Eligibility Criteria

At least 5 years of Undergraduate Physics Teaching
Full time teacher as per UGC Guidelines

Not More than 50 years of age as on 30 June 2020

For details visit

https://sites.google.com/site/iaptdsma/home

For any clarification contact
iapt.dsm.award@gmail.com

Nomination (online) by an IAPT Member or Physics Faculty or Head of the Institution by 30 June 2020

https://www.cognitoforms.com/IAPTDSMANominationForm

Application (online) latest by 30 June 2020

https://www.cognitoforms.com/IAPTDSMAApplicationForm

The award consists of a citation and a cash Prize

Other competitions of IAPT: NCIEP, NCICP, NCEWP

Postal Regd. No. Kanpur City-28/2018-20 Date of printing 01-05-2020 Date of posting 07-05-2020 RNI No. UPENG/2009/29982

BULLETIN OF INDIAN ASSOCIATION OF PHYSICS TEACHERS

FOUNDED BY (LATE) DR. D.P. KHANDELWAL

VOLUME 12 **NUMBER 4 - 5** **APRIL - MAY 2020**

IN THIS ISSUE

If underlivered please return to :
Dr. Sanjay Kr. Sharma
Managing Editor
Flat No. 206, Adarsh Complex,
Awas Vikas-1, Keshavpuram,
Kalyanpur, Kanpur-208017

Published by R.N. Kapoor on behalf of Indian Association of Physics Teachers. For circulation amongst IAPT members/subscribers only.
L-117/302, Naveen Nagar, Kanpur-208025, Ph. 2500075. Printed at Sharda Graphics Pvt. Ltd., 123/766, Factory Area, Fazalganj, Kanpur-208012, Ph. 2212323
Chief Editor: Prof. U.S. Kushwaha