



Homage

Sunday Class - A story of social justice in science

Joseph Prabagar*

Physics Community of south India have lost a great physics teacher on September 16, 2023. Prof. SVM Satyanarayana, fondly called “Satya Sir” was great source of motivation, inspiration for many hundreds of students for the past 30 years. Since 2022, he was struggling for his life against pancreatic cancer and finally left us on the early morning of September 16, 2023 at the age of 52. It is a very untimely demise and was a great shock to his students whose life got transformed by his mesmerized teaching style. He was a professor of Physics at Pondicherry Central University, Puducherry. He was not like a professor who teaches well in his workplace, rather his workplace was Tamilnadu, Kerala states. He travelled length and breadth of these states and gave wonderful set of lectures both in technical and popular level. He made a silent educational revolution called “Sunday Class” in Tamilnadu. It is unique achievement made by him and he will be remembered forever in the history of science education in India. We have heard that a single tree does not become a grove. But the story of Sunday class is not just about a single tree “Satya” that became a grove but about how it became a great forest.

He had been teaching postgraduate subjects in Physics on Sundays for over twenty-five years. Most of the students attending this class are post graduate physics students belonging to economically and socially disadvantaged sections. Characteristic of the man, the classes are free. This class is affectionately referred by students as the Sunday Class or, more to the point, Sunday Physics Class. Prof Satyanarayana started this class in 1996 at a seminar hall in the Department of Nuclear Physics, University of Madras, Chennai. He was then a PhD student at IGCAR, Kalpakkam. Till the covid pandemic, the class continues in the same seminar hall. During COVID, the classes were conducted through online. When Prof. Satyanarayana started the class in 1996, he was at the age of 25. Till 2021 (at the age of 50), i.e, his health become much deteriorated, he was teaching. The journey has been more of a scientific movement than a class. In the past, articles about the Sunday Class have appeared in newspapers and magazines such as The Hindu, Outlook, Puthiya Thalaimurai Kalvi, etc.

1. The genesis of the Sunday Class

Why did Satyanarayana choose to start such a class? It is necessary to understand the background story. There are more than 27 Union Government science research institutes

*Central Polytechnic College, Chennai, Email: josephprabagar@gmail.com



in India, especially for basic sciences such as Physics, Chemistry and Mathematics. For example, IITs across the country, Institute of Mathematical Sciences (IMSc) at Chennai, the Indian Institute of Sciences (IISc) in Bangalore, and the Tata Institute of Basic Research (TIFR) in Mumbai etc. If any student wants to do PhD at these premier science research institutes, which offer a monthly stipend of Rs 32,000, he/she has to pass the CSIR-UGC JRF-NET exam or the GATE exam or the JEST exam after completing their M. Sc Physics course. Such exams have been around for more than thirty years, not just yesterday or today, but it is seen that very few students from Tamil Nadu pass these exams. It is the same situation even today.

Each year, only a handful of students from all over Tamil Nadu pass the exams because most colleges, in their BSc and MSc courses, teach only theory. In NET, GATE and such competitive exams, questions which are asked to test one's understanding of the theory learnt, and one's ability to apply these concepts to solve problems. For students who have studied subjects by rote, solving such problems and passing such exams have always been a huge challenge. To pass, students have to join a private coaching center in Delhi or Hyderabad and spend lakhs of rupees in fees. This is beyond the reach of poor and many middle-class students. Their economic conditions do not allow this.

It was in this context that the postgraduate students who came to the summer Physics training camp at the IGCAR, Kalpakkam in 1996, seeing the way Satyanarayana (who was then a PhD student there) was taking classes and his ability to solve Physics problems, asked him if he could take training classes like this on weekends in Chennai.

Satyanarayana agreed wholeheartedly. When they were searching for a place to conduct the classes, Prof P R S Subramaniam, who was head of the Department of Nuclear Physics at the University of Madras, came forward and gave permission to take Sunday class in the seminar hall of the department. This was the first step in the journey of the Sunday class. Sudhakar, one of the students who attended the summer camp at Kalpakkam in 1996 and was among those who had invited Satyanarayana to teach in Chennai, is today a Professor of Physics at IIT Madras.

In the initial days, this class was held every Sunday from 10 am to 5 pm, with a short tea break around 11.30 am, a lunch break between 1 pm and 2pm, and another tea break

at 3.30 pm. The students who attend the Sunday class are mostly from colleges in and around Chennai, especially Government Arts and Science Colleges, and a few from other cities. Majority of the students are first generation graduates. In the initial years, Prof Satyanarayana alone handled the Sunday Classes from 10 am to 5 pm. It was a weekly Physics marathon. Given how hard it is to give a lecture continuously for 6 hours, that too, in difficult core theory subjects involving vigorous problem-solving sessions, he had been running these marathon sessions for so many years, displaying remarkable stamina and exemplary dedication and focus.

On some Sundays, when only four or five students come to class, undeterred by this, Prof Satyanarayana still would come to Chennai from Kalpakkam for these few, takes the Sunday Class as usual and return. Some years, when January 1st would fall on Sunday, class would still be held because students were ready to come even on that day. The students loved the Sunday Class that much.

Hundreds of students from 1996 till date have studied Physics in this class, passed the NET and GATE examinations, completed their PhDs at various research institutes of India and are now working as researchers or in the faculty positions at various universities and colleges in Tamilnadu.

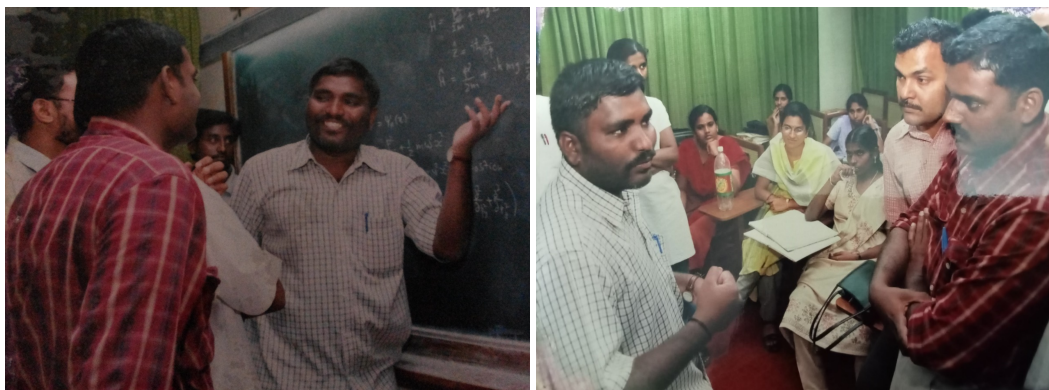
2. Sunday Class Students - Past and Present

The first generation of the Sunday Class was roughly from 1996 to 2001. Sudhakar Chandran, who studied from 1996 to 1997, is currently Professor at Department of Physics at IIT Madras. Thangadurai studied from 1998 to 2000 and is currently as Professor at Pondicherry Central University. Ramachandran is a senior scientist at the Baba Atomic Research Centre (BARC) in Mumbai.

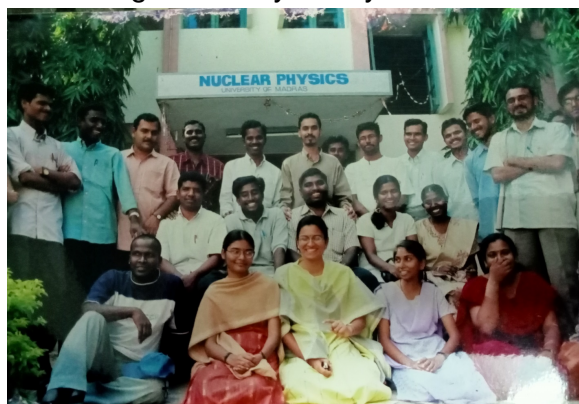
Ponmurugan, who studied from 1999 to 2000, is now an Assistant Professor at Central University of Tamilnadu(CUTN),Thiruvarur, Tamil nadu. He holds a Masters in Physics from Pachaiyappa's College and was the first student from that college to pass the NET exam. He later taught at the Sunday Class when Prof Satyanarayana was in Germany doing his post-doctoral research. Ranjith Ramadurai is a faculty member at IIT Hyderabad today. Both Chitra and Prabu are working as scientific researchers in Chennai.

2002 to 2007 saw the next generation of students attending the Sunday Class. Vijayakumar is a scientist at DRDO today. At his marriage he had asked Professor Satyanarayana to come and bless the marriage. This is just one great example of how this teacher, who devoted his Sundays to teaching Physics, found a place in the heart of every student of his.

A few other students dedicated their doctoral dissertations to him. In fact, one week before his death, one of his Sunday class students, Thirusenthil had submitted his Ph. D thesis and he dedicated to Prof. Satyanarayana. Unfortunately, he could not meet him and told this since Prof. Satyanarayana was in critical condition in hospital. On the day his demise, Thirusenthil brought a printout of front page of his Ph.D thesis and kept on Prof. Satyanarayan's body. It shows how Prof. Satyanarayana was close to heart of every student. Prof. Satyanarayana also became a family member to many of his students, going beyond the classroom and participating in the joys and sorrows of the lives of every student. Annalakshmi who attended his Sunday Class was the first PhD graduate from



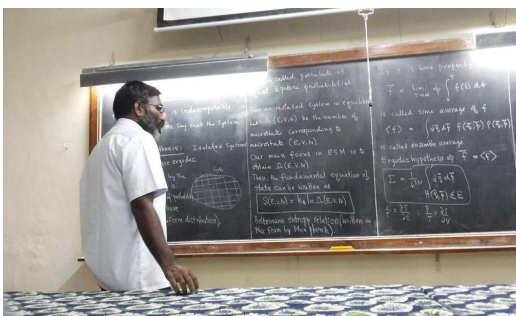
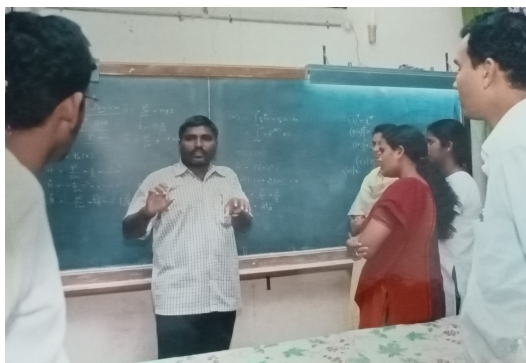
Young Prof. Satyanarayana in 2003



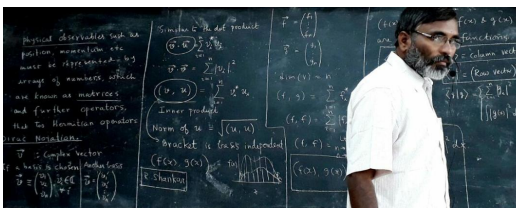
2003 -batch

her village and she is now a senior scientist at the IGCAR, Kalpakkam. She also had taught at the Sunday Class when Prof Satyanarayana was in Germany. S. Devashankar is today an Assistant Professor of Physics at Ponneri Government College. Kamal is a Senior Scientist at RRCAT (Raja Ramanna Center for Advanced Technology) Indore. Preethi Meher holds a PhD from IISc and is an Assistant Professor at the Central University of Tamilnadu(CUTN), Thiruvavur, Tamilnadu. S Ayyappan, who studied MSc at Presidency College, completed his PhD at IGCAR, Kalpakkam, and is today an Assistant Professor at the SASTRA University. Shankar is an Assistant Professor at the New College in Chennai. Naina Mohammad, who also studied in Presidency College, passed the NET exam after attending Sunday class and later he also taught at Sunday class during his Ph.D days. He is now Associate Professor in the Government College of Arts and Science, Udumalaipettai, Tamilnadu.

Basheeruddin is now an Assistant Professor at the Kamaraj University, Madurai. Dr.Meenkashi Sundaram who taught for some time at Sunday class, is now Assistant Professor at Vivekananda College, Madurai. Narayanan is a scientist at IGCAR, Kalpakkam. Murali, who cleared the NET exam twice consecutively, today is an Assistant Professor at the Central Government Institute of Information Technology in Kurnool, Andhra Pradesh. None of this would have been possible without the Sunday Class. It would not be an overstatement to say that the Sunday Class paved the way for students to enter such higher education research institutions.



In the year around 2003



In the year 2018

3. Uniqueness of the Sunday Class

What is the difference between the conventional Physics class and this Sunday Class? Here there is no pressure to complete the syllabus or obtain marks. Sunday Class explains theoretical concepts in detail as well as the real-world application of these concepts and nurtures problems solving skills. There is a Chinese proverb that says, “Give a man a fish, and you feed him for a day. Teach him how to fish, and you feed him for a life time.” Sunday Class not only gave his students fish, but, at the same time, taught them how to fish. If any student attends Prof. Satyanarayana’s class once, then even those who hate Physics will start to love it. His lectures will fascinate and charm anyone. An additional visual treat is one can also keep looking at the beauty of his writing style on the blackboard, a display of the fine art of handwriting.

One very special feature of the Sunday Class is that it accepts every student without any filtering. There is no minimum qualification or special skill required for anyone to enroll in this class. Anyone interested in learning Physics can attend. Students who join the class, come with different types of learning difficulties. Some students have problems with the English language. Some students come with little knowledge in Physics and they come to this class to learn more.

Most of the students who come have a very elementary level of knowledge in Physics. They will have to start learning from alphabets onwards. These problems often come from our unequal education system. The good quality education is available to the children of economically and socially elite which are not available to poor students. Many come from government schools and government colleges. If you ask any questions to students belongs to such backgrounds, then they will not continue to come to class because their ignorance is highlighted. If you want to retain them you have to make them feel comfortable.

Prof. Satyanarayana is very clear in allowing them to learn at their own pace or speed. Psychologically this is very important. In fact, he used to say this very often “I need to

create intellectual discomfort, but ensuring psychological safety of every student". He sees to it that no student is pushed into a situation where he/she feels he/she does not know anything. His students are allowed to learn little by little, taking their own time, and in six months they begin to ask questions in the class without hesitation. The main purpose of the education system should be to stimulate a culture of asking questions. The Sunday Class does this wonderfully in its own way.

The world-renowned educationist Paulo Freire says that the education system that exists today is the banking education system. The reason is that this education system treats the students as empty vessels and the teacher pours academic knowledge into it. Most of the time, our education system is rote memory based. It does not consider the inherent qualities of the students. Instead, he proposed that an "education system should nurture or bring out a sense of analysis in the student's mind". The Sunday Class is a perfect example of the latter.

4. Social justice achieved by the Sunday Class

In Indian society, it is very important that we represent people from all walks of life, regardless of their economic, social or cultural background. Inclusiveness and representation are very important in the field of science as well. In fact, the change that has taken place in other fields has not happened in the field of science. The figure below illustrates the social contribution of the Sunday Class.

Alumni who studied in the Sunday Class past and now working in various research institutes, universities and colleges were contacted recently and information collected from them through Google Form. 125 Sunday Class alumni responded. Due to time constraint, we could not reach out to all. Of these 125 students, 61% are first-generation graduates. Similarly, out of 125 students, 47.5% are from rural areas, 21.3% are from suburbs and 31.1% are from urban areas. This is a clear practical demonstration of how a significant social change could be brought about by a Physics class that takes place for free of cost on Sundays with an open-door approach. What a real social justice activity!!!

5. Contribution of Senior Professors

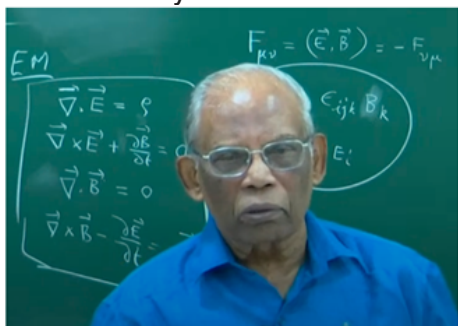
Professor G. Rajasekaran, the well-known particle physicist, retired from the Institute of Mathematical Sciences, who heard about the Sunday Class in 2008, and Professor H S Mani, who has retired from IIT Kanpur and who served as Director of the premier Harish-Chandra Research Institute (HRI) in 2001, both came to the Sunday Class to teach. Their contribution to the Sunday Class was enormous. Both are over 80 years old. In fact, Prof. Rajasekaran was a student of Nobel laureate Subrahmanyan Chandrasekhar and also had attended Nobel laureate Sir C. V. Raman's lectures when he was a student. He used to share his experiences in Sunday Class. Prof H S Mani had attended lectures of Abdus Salam, another Nobel laureate, and he used to share with the class his experiences with Abdus Salam. Prof.G.Rajasekaran, wrote in his auto biography that "Sunday class is unique effort and I never seen such a effort not only in India but in any part of the world". These two professors are renowned particle physicists in India, seeing that most of the students who come to Sunday Class came from socially and economically disadvantage

backgrounds, they came and took class for many years. The classes these two eminent professors took was a boon for the students, among whom were many who did not have the chance to study their undergraduate or postgraduate Physics at premier institutes like the IITs.

6. Students post-2009

After 2009, came the next generation of students like me (Joseph Prabagar), Iyyappan, Rajmohan, Thirusenthil, Ezhumalai, Shanmugapriyan, Kabilan, Karthikeyan, Roobala, Raja are part of a large group gravitated to the Sunday Class. Rajmohan would travel 450 km by train from Dindigul to Chennai on Saturday nights and arrive in Chennai the next morning, attend the class whole Sunday and the same night take the train back to Dindigul and reach there Monday morning. Today he is an Assistant Professor of Physics at Gandhigram University, Dindigul. Kabilan, too, used to travel from Trichy to Chennai every week to attend Sunday Class. Ezhumalai, is a government school teacher, would come to Sunday Class from Tiruvannamalai every week for more than seven years. Interestingly, he used to say he was not attending the class to clear any exam but he wanted to improve his Physics teaching skills, get deeper understanding of the subjects which would help him teach the children in the government school better. Thirusenthil, who was working in the software field after his M. Sc., attended the Sunday Class for a few years. Later he turned to do his PhD at INO (Indian Neutrino Observatory). Karthikeyan and Roobala were studied their M. Sc. at Pondicherry University. After completing their studies, they were also regular students of Sunday class and both of them cleared NET exam. Karthikeyan, completed his doctorate at IGCAR, Kalpakkam is now an Assistant Professor at the Government Engineering College, Bargur, Tamilnadu and Roobala, completed her Ph.D from IISc, Bangalore is now a Scientific Officer at NIT (National Institute of Technology), Trichy. Shanmugapriyan who cleared SET exam after attending the Sunday class, is now working as an Assistant Professor at Loyola College, Chennai.

When I wrote the CSIR-NET exam for the first time after my MSc, I got a negative mark. After I attended Sunday Class for a few years, I got 151th rank in the GATE exam, 55th rank in the JEST exam and 91st rank in the NET exam. I have to thank the Sunday Class for these achievements. After 2012, Prof. Satyanarayana gave me a chance to take class at the same Sunday Class where I entered as near Physics illiterate several years ago.



Prof. G. Rajasekaran



Prof. H.S.Mani

Since then, I have been continuing to teach, solve physics problems there and to help coordinate the classes. The Sunday Class changed my life completely. Everyone has a similar story to narrate.

Iyyappan completed his BSc Physics from Tiruvannamalai Government College. Today he has completed his PhD in Statistical Mechanics and also his post-doctoral fellowship (PDF) from IISER, Mohali. He is now a post-doctoral researcher at the Institute of Mathematical Sciences (IMSc). Entering as a first-generation student in Research Institutes teaching Theoretical Physics is a huge challenge. But, several of the students who studied in the Sunday Class are today either doing PhD or holding faculty positions in such institutes. This is the striking transformation made by the Sunday Class.

Two years ago, Tamil Nadu government introduced new textbooks for schools. Naina Mohammed, a Sunday Class student of 2002-2003 batch, and I (Joseph Prabagar) played a vital role in the writing of the 11th and 12th Standard Physics textbooks. It would not be exaggeration to say that the Physics we learned in the Sunday Class immensely helped us to write a good Physics textbook.

After 2012, the next generation of students like J.Ayyappan, Abuthahir, Krithika, Mrinaleni, Subashri, Shrithikantha Prasad, Rithish started attending the Sunday Class. After a couple of years, they all passed the NET or GATE exams. J.Ayyappan, is from Kallakurichi, hails from a very poor family. Today he is an Assistant Professor at the Government College of Engineering near Trichy. Abuthahir completed his PhD at IGCAR Kalpakkam and is an Assistant Professor at the Government College of Engineering near Theni. Mrinalini is a PhD student at Kalpakkam Atomic Research Station. Subashri is a PhD student at the Institute of Mathematical Sciences. Krithika works as an officer in the Airports Authority of India. Shrithikantha Prasad who is now a scientific officer at Kundankulam Atomic Power Station, goes to the nearby city of Nagarkoil to conduct a class similar to the Sunday Class. A matter of one good effort getting cascading effect.

Rithish, a Masters in Material Science, is currently doing a PhD in Physics. Prof. Satyanarayana and the Sunday Class have changed the lives and future of countless students, bringing about a silent educational revolution. Prof Satyanarayana and his Sunday Class made these changes single handedly, something that people believe only universities could do. After 2014, Kamaleskar, a retired Professor from Saha Institute of Nuclear Physics (SINP) in West Bengal, who happened to be staying in Chennai, also started taking classes in the Sunday Class. Similarly, K P N Murthy, who had retired from the University of Hyderabad, also took classes there for some time. Retired Professor A K Kapoor from University of Hyderabad has also taught there for some time. Thus, a number of the leading physicists in India have taught Physics in the Sunday Class in their spare time.

7. Prof. Satyanarayana's other facets of teaching

Prof. Satyanarayana's teaching activity did not stop with the Sunday Class. He has lectured at many colleges and universities in Tamil Nadu and Kerala during this quarter century. There are also stories of students who heard his lecture in their respective colleges and were inspired to later come to the Sunday Class. He was also chief resource person



and instrumental for successful conducting APT (Academy of Physics Teachers, Kerala) theoretical physics lecture series from 2014 to till COVID. He was also chief resource person and main pillar behind of running PTTS (Physics Training and Talent Search), a 15 days residential lecture-cum experimental training program for undergraduate students funded by Infosys and Triveni trust (of famous physicist's Ashok sen). It was started in the year 2015 with the help of Prof. Sivakumar (Retd) from HCU, and conducted yearly once in different states of southern India. He also used to train nearby village government school teachers where he lived through Reward trust. During COVID, Breakthrough Science Society (BSS-Tamilnadu chapter) organized set of online lectures in Saturdays (7.30 pm to 9.00 pm!!!!) for the students who prepare CSIR NET and the students from various parts tamilnadu were attended. He taught classical mechanics, quantum mechanics and problems solving sessions for several months. In the same 24 hours, he lived in multidimensional level and taught wherever possible. He is Prof. Satyanarayana, a Leonardo Davinci of "Physics Teaching". We can understand his passion for teaching and how he devoted his life towards teaching. In fact, he used to say "I gave my best to students and rest to my family!".

8. Sunday Class silver Jubilee Celebration

On Sunday, December 12, 2021, all the students of the Sunday Class came together to celebrate the twenty-fifth anniversary of the Sunday Class. The event had to be organized as an online-cum-offline event as per COVID norms. Out-of-state, out-of-town students attended online. The off-line event took place in the same seminar hall of the Department of Nuclear Physics, University of Madras.

The event was also arranged to be watched live online. Professors G Rajasekaran and H S Mani both attended in online. Prof Kamales Kar attended the programme in person and greeted the gathering. Most of the students, from 1996 to the present day, who benefited from this class attended the event. They expressed their gratitude to Prof Satyanarayana who had changed their lives. Everyone shared their experiences. Dr C Venkatesan, HOD, Nuclear Physics Department, University of Madras, presented a memento to Prof Satyanarayana on behalf of the Department, in appreciation of his long years of service and dedication to his students and to his subject.

Prof. Satyanarayana gave a wonderful talk on "A 25 Year Journey" on that day. He shared how this class started, what difficulties it went through, and what he learned from it. Two thoughts in particular, which he shared on the day, is very important to the teaching



community.

“The most important goal of a teacher is to create an attitude of readiness to learn in the student’s mind. Because a teacher cannot teach everything a student needs. Time limit may be the reason or the teacher may not know all the lessons that the student needs to know. There are various practical limitations to this. But if a teacher develops the attitude of readiness to learn in the student’s mind, he/she will be able to find and learn what he/she needs on their own.” What a most important fact this is about teaching and learning.

All these years of teaching, my intention has not been only to make students to clear exams or learn concepts well. I also wanted to bring about a behavioral change and develop scientific temper in the minds of students to make them better human being which, after all, is supposed to be the ultimate intention of education.

The achievement of the Sunday Class cannot be summed up as merely the story of the advancement of individuals. It should be seen also as a process of social justice that has given much needed confidence to students from both socially and economically marginalized sections to get access to India’s top research institutes, universities.

What should the government do to emulate this example, which is the need of the hour? Every district needs an activity like Sunday Class. The government should identify teachers genuinely interested in teaching and start Sunday Classes at nearby government arts and science colleges or universities. Training centers should be started for students aspiring to go for scientific research institutes as the government runs a training centers in every district for exams like the Civil Service like IAS, IPS. Training should be given to students who want to go to higher research institutes. If the government takes the example of what Prof. Satyanarayana has done his own initiative and vision, and implements it in every district, it will benefit thousands of students. Representation of people from all section of society should be there not only in the field of administration, business, politics, economics but, very importantly, in the field of science. That is the road to progress of society as a whole and to the true meaning of equality.

What Prof. Satyanarayana did for more than quarter of the century, is a social change in the field of Physics education. “Sunday Class” is a bench mark example of how education should be inclusive to all. He was like a great banyan tree and so many student birds were sat on this tree and benefited. They are all spreading the seeds of his teaching in their working place. It is a cascade effect and multiply like nuclear chain reaction. During his

last funeral march towards crematorium, his body was carried by his students (including me). It is the saddest and most painful moment of my life and every of his student life. He is now no more, but he will live in our heart forever and his service to Physics Community will be remembered forever. We, as Sunday class students, consider Prof. Satyanarayana as eternal as his most beloved equation " $S = k \ln \Omega$ ".

Note: After the demise of Prof.Satyanarayana, Dr.Kamal (one of the sunday class student) who is now working in RRCAT has been continuing the sunday class in online every sunday from 10.00 am to 1.00 pm. Few other sunday class students are also helping in it.