An Analysis of the Life of Srinivasa Ramanujan through his *Ajna*

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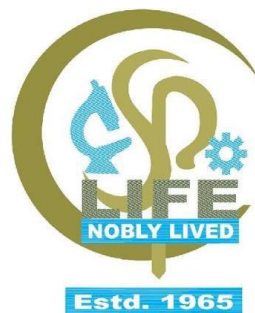partial recognition of the requirements for the award of the Degree of

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Declaration

I do hereby declare that the project **An Analysis of the Life of Srinivasa Ramanujan through his *Ajna*** is the record of genuine research work done by me under the guidance of Dr. Salia Rex, Assistant Professor and the Head of the Department of English, St. Paul's College, Kalamassery.

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Certificate

This is to certify that the project work **An Analysis of the Life of Srinivasa Ramanujan through his *Ajna*** is a record of the original work carried out by Sidharth Joseph under the supervision and guidance of Dr. Salia Rex, Assistant Professor and the Head of the Department of English, St. Paul's College, Kalamassery.

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      Sidharth Joseph

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Introduction

Deconstruction is a literary theory widely associated with Jacques Derrida, who found a method in decoding or unveiling the deeper meaning of a text. To deconstruct is to take apart or to undo, in order to seek out and display the greater ideas or meaning of a text. In particular, deconstruction involves the dismantling of hierarchical binary oppositions such as speech/writing, reality/appearance, nature/culture and so on, which serve to guarantee truth through excluding and devaluing the inferior part of the binary. This makes the reader to examine a text based on different perspectives.

Srinivasa Ramanujan, the genius born in Madras, India was a person who was in most part of his life not at all recognised properly. All of his sufferings and efforts led the way for him to be recognised on his merits making Ramanujan the second Indian citizen to receive the fellowship from the Royal Society of England and also the first Indian citizen to receive the Trinity College fellowship. But even though all of this, most of Ramanujan's theories and formulas were used more than a century later in the fields of polymer chemistry, computer and even cancer. This makes it evident that Ramanujan possessed futuristic knowledge which weren't utilised at the time he was alive but later in the future. Being a Brahmin himself, Ramanujan maintained a spiritual life. His family deity Namagiri, the goddess of Namakkal is to whom Ramanujan owes his theories and formulas. Most of his time he would indulge in prayers making himself be in a state of tranquility to receive knowledge of greater understanding.

This is an attempt to view Ramanujan's way to greater understandings which was paved through his deeper belief and how he kept it till his death, with the help of the *Ajna Chakra* considered to be the sixth *chakra* of our body that gives the mind insights of the future. Viewing Ramanujan through *Ajna Chakra* involves decoding his evolution to be

recognised in his life time and in the future as an outcome of his beliefs, insights and

intuitions.

Chapter 1

Ramanujan – The Gifted Genius

The year 1887, the time at which the British rule in India was at its peak. It was on December 22nd of 1887, Ramanujan – the gifted genius in mathematics from India was born to Srinivasa Iyengar and Komalatammal. The new born child was named Srinivasa Ramanujam Iyengar. The first name was his father's name and the last name was the name of his caste. The name Ramanujam was his own and a very telling name which consisted of two parts – '*Ram*' and '*Anujam*'. Rama or Ramacandra is the seventh incarnation of Lord Vishnu and is a part of the Indian epic *Ramayana* and '*Anujam*' means younger brother. So 'Ramanujam' literally means 'Ram's younger brother'. But later when Ramanujan pursues his education in England his name 'Ramanujam' gets transliterated into 'Ramanujan'. Ramanujan was born to an Iyengar family and he is a *Vaishnavite* Brahmin, a devotee of Lord Vishnu who is one among the Hindu Trinity. Brahma – the creating force, Shiva – the destructing force and Vishnu – the preserving force, forms the Hindu Trinity.

According to the Hindu belief system there are four castes. The Brahmins are at the top. Then comes *Kshatriyas* or Warriors; *Vaisyas* or Merchants and the *Sudras* or Menials accordingly. There is a fifth category called the untouchables who doesn't fall in the caste system. The Brahmins, *Kshatriyas* and *Vaisyas* are considered twice-born and can wear the Sacred Thread. The *Sudras* are denied this but are allowed to enter the temple whereas the untouchables are denied the entry into the temple as well. The first birth takes place at the time when the mother gives birth to the child and the second takes place when the child takes the Sacred Thread. Ramanujan solemnized his twice born status as a Brahmin by taking the Sacred Thread during *Upanayanam* ceremony and visited the Uppiliapan *Koil* of Thirunageswaram annually to renew his sacred thread.

The family deity of Ramanujan was the goddess Namagiri of Namakkal the consort of the lion-god Narasimha. After Ramanujan's birth at Erode the place of his mother's family, Ramanujan comes to Kumbakokanam from where he starts his education and life itself in the most spiritual manner. It was in the Sarangapani Sannidhi Street Ramanujan's house was located and here Ramanujan, his father, mother and his two siblings stayed. Srinivasa Iyengar, Ramanujan's father was a clerk and earned just twenty rupees each month. As a clerk, he would have to start his day early in the morning and didn't return until it turned darker. Komalatammal was part of the *bhajan* group in the nearby temple and earned an extra five or ten rupees for the family. There were other families in the Sarangapani Sannidhi Street who earned lesser than this but what bothered Ramanujan's family was their status as Brahmins and how they had to move forward with the meagre amount of money the family earned.

Ramanujan after his *Akshara Abhyasa*, a ritual when the child is made to write the letters of his mother tongue in a thick bed of rice, started his former education at Kangayan Primary School at *Vijayathasami* – The traditional opening day of school. At Kangayan, Ramanujan learned English, Tamil, arithmetic and geography and completed his primary education scoring first in the district. Ramanujan later moved to the English language high school, Town High. It is at Town High, Ramanujan started receiving a quality education. The headmaster of Town High at Ramanujan's time, S. Krishnaswami Iyer was one among the good teachers who taught Ramanujan. In Robert Kanigel's *The Man Who Knew Infinity,* Kanigel notes that while Krishnaswami Iyer taught Grey's "Eton College", "one student imagined little Town High was Eton, the irrigation ditch crossing the campus as the Thames" (Kanigel 38). Ramanujan formed himself at Town High, understanding knowledge which was higher than the knowledge he was supposed to understand, winning volumes of English poetry as scholastic prizes and becoming a minor celebrity around Town High. At last when

Ramanujan was awarded the K. Ranganatha Prize for mathematics, Krishnaswami Iyer, the headmaster of Town High remarked Ramanujan as "a student who, were it possible, deserved higher than the possible maximum marks" (Kanigel 39).

After Ramanujan's studies at the Town High, he enrolls himself to the Government College at Kumbakonam with a scholarship for his further studies. It was at this place, the Government College of Kumbakonam, the rift in Ramanujan's life took place. Ramanujan got his hands upon a book by George Shoobridge Carr titled *A Synopsis of Elementary Results in Pure and Applied Mathematics*, which was a compilation of five thousand or so equations written one after the other. Carr's book will never be a work of a genius or will never be an interesting one for a reader as it was just a collection of theorems, formulas, geometric diagrams and other mathematical facts which was already proved written one after the other."The book is not in any sense a great one", it was later remarked "but Ramanujan had made it famous" (Kanigel 48). Ramanujan but saw before him a new world itself. His mind was dragged into those equations that he lost interest to study anything but mathematics. At the end things turned upside down for the brightest student as he started failing in exams and had his scholarship taken away from him. It might be out of shame that Ramanujan dropped out of college and ran away.

Ramanujan later realising of what will become of his life without a degree gave a second try for college at Pachaiyappa's College. His studies at Pachayappa's were more or less like before. Ramanujan for most of his time indulged himself into mathematics maybe this time paying lesser attention to other subjects rather than paying no attention to them. But what came more difficult to him was 'physiology'. Physiology is the study of normal function of living things and for Ramanujan being a Brahmin it was a branch of science to which he felt extreme disgust. The little attention which Ramanujan gave to other subjects

never helped him this time as well. At last Ramanujan was left with no other choice but to drop out from college again as he failed in subjects he was supposed to study.

Ramanujan after dropping out of college twice lost all faith in him in achieving a degree. He settled himself before the *pial* of his house and started to focus more on mathematics and what he can contribute. Based on what he acquired from Carr's *Synopsis*, Ramanujan began discovering new formulas and theories in mathematics. He wrote his first notebook consisting of formulas on hypergeometric series, continued fractions, singular moduli and so on. But most of all Ramanujan was deeply obsessed about infinite series and its possibilities.

Life with all of his pressures taken away never actually turned easy for Ramanujan. His mother Komalatammal wanted him to get properly settled without giving most of his time to mathematics which none understood and for this she arranged Ramanujan's marriage with a girl named Janaki from Rajendram. At the time of Ramanujan's marriage Janaki was just ten years of age and after marriage Janaki was sent back to Rajendram in order to return back after reaching puberty and also after mastering the duties of a wife. Now it was Ramanujan's part to act – he had to find a job so as to become capable in sustaining his family. But finding a job as a person without a degree will be very hard for a person like Ramanujan and to cope this he made a second notebook which was a well refined copy of his first notebook. The second notebook was well written, pristine and proceeded chapter wise, so a person looking into it might understand what Ramanujan was trying to prove through his formulas and theories. But it took long for Ramanujan to understand that his work wasn't something which could be easily understood by anyone gazing through his notebook. He would walk from person to person for a job but being a person with no degree Ramanujan was titled 'unemployable' and his work titled as 'unaccountable'.

Ramanujan went from house to house, person to person and would try to convince them of his mathematical research and accomplishments. At the mean time he would tutor students of the Madras Presidency College. It was from the relation with the students of the Presidency College, Ramanujan came to know of V. Ramaswami Iyer, the founder of the Mathematical Society in India who was also a deputy collector. Ramaswami Iyer saw the brilliance in Ramanujan's work but wasn't ready to give a normal clerk job for a genius like Ramanujan. He was introduced to R. Ramachandra Rao, the collector of Nellore district and also the secretary of the Mathematical Society in India. It was at his meeting with Ramachandra Rao, Ramanujan for the first time was able to convince a person of his genius. Ramanujan spoke of elliptic integrals, hypergeometric series and divergent series. At the end of the meeting Ramachandra Rao made arrangements for the financial support for Ramanujan and he was assured all the necessities for his mathematical research. Later Ramanujan took a clerkship in the Accountant Generals office for a few weeks and finally decided to take a permanent clerk job at Port Trust under the Chief Accountant there, S. Narayana Iyer and the Chief Engineer, Sir Francis Spring who were to play important roles in Ramanujan's later life. Ramanujan wrote a letter,

Sir,

I understand there is a clerkship vacant in your office, and I beg to apply for the same. I have passed the Matriculation Examination and studied up to the F.A. but was prevented from pursuing my studies further owing to several untoward circumstances. I have, however, been devoting all my time to mathematics and developing the subject. I can say I am quite confident I can do justice to my work if I am appointed to the post. I therefore beg to request that you will be good enough to confer the appointment on me (Kanigel 98).

At the end of his entire search for a job, Ramanujan was able to secure a permanent job at the Port Trust leaving most of his problems behind. By this time Ramanujan found himself to be capable in fulfilling the needs of a family, that he finds a house at the Saiva Muthiah Street bringing his mother, Komalatammal and wife, Janaki there.

Life for Ramanujan started to get better, but still his mind was restless as his notebooks have not found its place. Narayana Iyer with whom Ramanujan had evening sessions discussing his mathematical researches would find Ramanujan's work truly astonishing. When Ramanujan discussed on his works he would present a world of mathematics which required higher knowledge of understanding. "You must descend to my level of understanding", Narayana Iyer would say, "write at least ten steps between the two steps of yours" (Kanigel 103). It was Narayana Iyer who gave Ramanujan the idea of seeking an audience who will really understand his work. Madras as Narayana Iyer would say was a name derived from the word 'Mandarajya' meaning 'the realm of the stupid' (Kanigel 88). Sir Francis Spring also gets Narayana Iyer and Ramanujan in touch with England scholars in mathematics. Ramanujan wrote to H.F. Baker and E.W. Hobson both of whom were renowned mathematicians, about his mathematical research and attached a nine page copy of some of his findings. Both of them returned Ramanujan's letter without commenting on it. And at last in Ramanujan's third attempt to an English figure named G. H. Hardy, Hardy replied to Ramanujan positively crediting him of his brilliance and findings which were valid.

Hardy along with his colleague, J. E. Littlewood went through the nine pages of Ramanujan's letter and intended to bring Ramanujan to England. But as a Brahmin, he had a caste barrier. Crossing the sea meant to his caste as the same as "publicly discarding the sacred thread, eating beef, or marrying a widow" (Kanigel 180). Eventhough after neglecting Hardy's interest of bringing Ramanujan to England, Hardy went forward to reach out into the

offices of India in order to make Ramanujan a research scholar so as to provide him with the perfect atmosphere for conducting his researches.

The real turn of events in Ramanujan's life took place later. Ramanujan in his visit to the Namagiri Temple of Namakkal along with Narayana Iyer had a vision regarding his travel to England. His mother Komalatammal too had a similar vision where Namagiri came to her vision and asked her "to stand no longer between her son and the fulfilment of his life's purpose" (Kanigel 183). Ramanujan at this point decides on what Hardy had told of his presence in England. On 17th March of 1914 Ramanujan started his journey to England where Ramanujan awaits to be evolved and recognized at the same time.

Chapter 2

An Evolution through *Ajna*

The *Ajna* or the Third Eye *Chakra* is one among the seven *chakras* of our body. The place where these *chakras* are located is often referred to as energy centres. *Muladhara*, *Svadhisthana*, *Manipura*, *Anahata*, *Vishudda*, *Ajna* and the *Sahasrara* constitute the seven *chakras* of our body. Of these seven *chakras*, the *Ajna* is credited for its ability to provide insights, intuitions and guidance which are often considered to be futuristic. Being located between the eyebrows, the *Ajna* becomes a point of concentration and it is only through meditation this chakra can be strengthened in order to receive insights and futuristic vision. Wisdom, knowledge, realisation are all gifts which *Ajna* provides the individual. Prayer is considered the best form of meditation and it is through his prayers to Namagiri of Namakkal, Ramanujan strengthened his *Ajna*. Insights, wisdom, realisation and guidance thus came as a blessing to Ramanujan.

England was the place for Ramanujan to truly understand his insights and also his work itself. April 14th of 1914, Ramanujan reached England from where he starts his journey in mathematics properly. Theodore Roosevelt, the former American President once said "Far and away the best prize that life offers is the chance to work hard at work worth doing" (*Forbes*) and Hardy offered this to Ramanujan. In England, the first thing Hardy asked Ramanujan to do was to keep doing proofs of his works and to attend lectures. The purpose Hardy asked him to do so was for Ramanujan to find a common language in his works. Hans Eysenk, the German born British psychologist would say,

"He [Ramanujan] tried to interest the leading professional mathematicians in his work, but failed for the most part. What he had to show was too novel, too unfamiliar,

and additionally presented in unusual ways, they could not be bothered" (Eysenk 197).

While Ramanujan attended lectures, Hardy and Littlewood, one among Hardy's colleagues, would go through Ramanujan's notebooks and measure its value. Hardy had already divided Ramanujan's theories and formulas into results which were already known or easily derived from known theorems, those which were curious and perhaps even difficult, but not very important and those which were promising to be important indeed, if they could be proved. But what left Hardy and Littlewood astonished was the fact that a person who never had a formal education on higher mathematics has come up with theories and formulas no one had ever imagined of. Hardy in his work *Ramanujan: Twelve Lectures on Subjects Suggested by his Life and Work* says,

> "Ramanujan had produced groundbreaking new theorems, including some that defeated me completely; I had never seen anything in the least like them before, and some recently proven but highly advanced results. A single look at them is enough to show that they could only be written down by a mathematician of the highest class" (Hardy 9).

Ramanujan's insights even while attending lectures helped him in perceiving the unfamiliar language in mathematics which was presented before him. At the time when one of Ramanujan's mathematics professors, Arthur Berry spotted Ramanujan not taking any notes and doubting if he was following it asked him to give his contribution. "Ramanujan stood, went to the blackboard took the chalk, and wrote down results Berry had not yet proved" (Kanigel 195). Berry later concluded the result which Ramanujan had already proved. Hardy, when Ramanujan worked on his proofs, asked Ramanujan about how he was

able to prove Berry's theory. "The answer came to my mind" (Kanigel 208) was Ramanujan's reply.

At the time when Ramanujan was in India, the Mathematical Society of India had already published his paper on Bernoulli Numbers, which was defined in terms of infinite series and now in England with the help of Hardy, the London Mathematical Society published Ramanujan's paper on highly composite numbers. Kanigel comments,

> "The wheels of Ramanujan's career, for ten years barely creaking along, now greased by Hardy's approval, began to whirr and whine like a finely tuned race car engine" (Kanigel 171).

This might be the reason why Ramanujan wrote in his reply letter to Hardy on his approval that "I have found a friend in you who views my labours sympathetically" (Kanigel 171). Ramanujan wasn't the first person to write a letter regarding mathematical findings. Jacobi wrote to Legendre on elliptic function and Hermite had written to Jacobi on Number theory. What Hardy saw in Ramanujan's work particularly was his work on the prime number theorem. Hardy who had already wrote a mathematical pamphlet named *Orders of Infinity*, saw something unique in Ramanujan's work that he went straight to Littlewood to check if Ramanujan's assertion was right. Littlewood's reply was that, "I can believe that he's at least a Jacobi" (Kanigel 198). Hardy too states, "I have never met his [Ramanujan] equal, and I can compare him only with Euler or Jacobi" (Kanigel 198).

Leonard Euler was the most productive mathematician of the 18th century. In his lifetime he has written over 800 hundred books and papers. Eulers's constant, Eulers's criterion, Euler – Maclaurin formula, Euler integrals and Euler numbers were all of Euler's contributions to mathematics. After Euler, Carl Gustav Jacob Jacobi pioneered elliptic functions and applied them to number theory. Jacobi's theorem, Jacobi polynomials were all

his contributions to mathematics. Both these mathematicians had one thing in common, the love of forms. Ramanujan saw patterns in everything and the patterns which he saw around him led to the discovery of his theories and formulas. In the biographical movie on Ramanujan and his life named *The Man Who Knew Infinity* directed by Matthew Brown, Ramanujan spoke, "In maths these patterns reveal themselves in the most incredible form, it's quite beautiful" (*The Man Who Knew Infinity* 00:11:43 – 00:11:53).

"Euler, Jacobi and Ramanujan had [along with deep insight] a knack for manipulating formulas, a delight in mathematical form for its own sake" (Kanigel 199). The *Synopsis* was what gave Ramanujan the way to higher knowledge in mathematics. The compilation of five thousand theories and formula was never of any interest to anyone. But "Ramanujan had found a home in mathematics, one so thoroughly comfortable he scarcely ever wished to leave it. It satisfied him intellectually, aesthetically, emotionally (Kanigel 72).

At the time of the First World War, the war had affected Trinity as well. The Neviles Court of Trinity was turned into an open-aired hospital and a military training camp. The atmosphere in Trinity had turned dark for everyone at Trinity particularly Ramanujan. The prime number theorem of Ramanujan by the time was proved wrong by Littlewood before he left for the war. Hardy told him,

> "You could try a thousand, you could try a million, you could try a billion, you could try a trillion, you could try a billion trillion, and it always came out the same, making all the forces of intuition argue that it was always so—and that a theorem embodying it would be a great one to run off and prove. But no such theorem could ever be proved. Because, intuitively obvious though it might seem, it simply wasn't true" (Kanigel 213).

Similar to the war which took place outside, Ramanujan had to fight his war to be recognised. The Trinity scholars and students, who saw Ramanujan and his take on the prime

number theorem as exceptionally genius, now saw him as a failure who has failed in his work. Everything for Ramanujan again turned upside down and even turned bitter as he was affected by advanced tuberculosis. The wisdom he possessed taught Ramanujan to accept the reality and move forward. Ramanujan wrote to S. M. Subramanian, his childhood friend, "I am publishing only my present researches as I have not yet proved the results in my notebook rigorously" (Kanigel 216). Hardy saw Ramanujan's work on partitions as a breakthrough in the field of partitions. Challenging Major Percy Alexander Macmohan, the Trinity College scholar in partitions Ramanujan came out successful.

The attempt to make Ramanujan a Trinity College fellow failed but through the efforts of Hardy and with the breakthrough Ramanujan has made, The Royal Society of England accepted Ramanujan to be tried on his merits. In Hardy's presentation before the Royal Society, he spoke,

"So now we see the work of partitions and the enormous breakthrough that has been achieved... by a man whose limitations and knowledge...was startling as was its profundity. Opinions may differ as to the importance of Ramanujan's work and the influence it may or may not have on the mathematics and its future but one gift it does show is it's profound and invincible originality...Despite everything in my being set to the contrary, Perhaps he is right. For is this not exactly our justification for pure mathematics. We are merely explorers of infinity in the pursuit of absolute perfection. We do not invent these formulas they already exist and lie in wait for only the very brightest of minds like Ramanujan ever to define and prove. So in the end I have been forced to consider, who are we to question Ramanujan..." (*The Man Who Knew Infinity* 01:31:27 – 01:33:07)

In the year of 1918, Ramanujan was made a Fellow of the Royal Society of England and in the same year he was made a Trinity College Fellow. Even when Ramanujan's prime

number theorem was proved wrong he believed in his insights and intuitions which brought him to newer understandings. Back in India, Narayana Iyer once told his wife Janaki, "Some people look upon him [Ramanujan] as ordinary glass, but they will remain to see him soon to be a diamond" (Kanigel 103). It was as Narayana Iyer said, Ramanujan became one among the diamonds that Trinity College has ever had.

Chapter 3

A Life Still Acknowledged

Ramanujan's success story in England was something great as the achievement was made by an Indian living in the colonial period. Even in the midst of subjugations and sufferings, he came out successful to become one among the great mathematicians of the world. After leaving England in the year 1919, promising Hardy that he will return back in a year's time, Ramanujan sets sail to his homeland. But what awaited him in India shocked everyone. In the year of 1920, Ramanujan passed due to severe health problems leaving only his mathematical researches which he conducted in the final year of his life.

The work of Ramanujan in his final year in India was found and the discovery was "comparable to the discovery of a complete sketch of the tenth symphony of Beethoven" (Kanigel 325). His work consisted of three notebooks and 4 pamphlets and this was collectively named *Lost Notebook*. Ramanujan's work a century later is now being used to study the behaviour of black holes.

In his life, Ramanujan contributed a lot to mathematics and also to other fields of study. During a lecture at IIT Madras on May 2011, the American mathematician and also a Ramanujan scholar, Bruce C. Berndt said,

> "Over the last forty years, as nearly all of Ramanujan's theorems have been proven, there had been greater appreciation of Ramanujan's work and brilliance and that Ramanujan's work was pervading many areas of modern mathematics and physics" (*Fox News*).

Ramanujan's life desperate in a lot of manner seemed more desperate when Ramanujan was not able to find a place for himself. "People, as individuals, appreciated and respected Ramanujan; but the System failed to find a place for him" (Kanigel 72). Before

sending Hardy his findings, Ramanujan had already seen a lot of English mathematicians and scholars to present his works. The lack of a degree rejected his place in the system. If a person was to study Ramanujan, it would have been easily identified that Ramanujan sacrificed his education for mathematics. It was "a determination to succeed and to sacrifice everything in the attempt" (Kanigel 74).

The *Lost Notebook* which contains the most groundbreaking formulas which Ramanujan has ever contributed to mathematics is considered as a work done by a mathematician of the highest class. For Ramanujan, "it wasn't what his equation stood for that mattered, but the equation itself, as pattern and form" (Kanigel 66). In the documentary by Christopher Sykes on Ramanujan's life titled *Letters from an Indian Clerk,* Dr S. Chandrasekhar, an American – Indian mathematician comments on Ramanujan's *Lost Notebook*,

> "Ramanujan must have felt that his life is coming to an end, of course I'm guessing because the speed with which he did work during the past year and which has been recorded in what is now called the *Lost Notebook*, according to everyone, was rated one of the most original pieces of mathematics and in some ways the very best which Ramanujan did" (*Letters from an Indian Clerk* 44:55 – 45:28).

All of Ramanujan's work had a particular form and pattern which Hardy once remarked as "the love of forms" (*The Man Who Knew Infinity* 00:39:11 – 00:39:22). Ramanujan compared most of his works to the patterns around him. But for most part of his life, Ramanujan had to remain unrecognised. After Ramanujan's death in 1920, Hardy wrote,

> "I suppose that it is always a little difficult for an Englishman and an Indian to understand one another properly. The real difficulty for me is that Ramanujan was my discovery. I did not invent him, like other great men he invented himself. But I was the first competent person who had the chance to see some of his work and I can still

remember with satisfaction that I could recognise at once what a treasure I had found" (*Letters from an Indian Clerk* 1:14 – 1:43).

The year after Ramanujan's death *Nature* a journal, honoured Ramanujan by enlisting his name among other distinguished scientists and mathematicians on a "Calendar of Scientific Pioneers" for his eminence in the field of mathematics (*Nature 107*, 252-254). By this time Ramanujan started to get recognised for who he truly was and what he represented. At his time in England, Hardy once told Ramanujan, "To live a legacy... after we are gone is the greatest" (*The Man Who Knew Infinity* 00:40:34 – 00:40:43). Hardy compared Ramanujan's work to Newton's *Philosophiae Naturalis Principia Mathematica* and stated that just as Newton's work represent the physical aspect Ramanujan's work represented the abstract. Hardy truly believed that Ramanujan's notebook will once find its place in the Wren Library. Ramanujan's *Lost Notebook* for fifty years was exhibited in the Wren Library until Prof. Andrews started working on it in 1976 (*Letters from an Indian Clerk* 46:45 – 46:56). Ramanujan still lives the legacy Hardy told of.

Posthumously Ramanujan was honoured with much recognition. Stamps picturing Ramanujan which were issued by the government of India came out in the years 1962, 2011, 2012 and 2016. In 2011, on Ramanujan's 125th birth anniversary, the government of India declared that 22nd of December will be celebrated every year as National Mathematics Day (*CNN IBN*, India). The same day is being celebrated as State IT Day in Tamil Nadu. The Government College of Kumbakonam and IIT of Madras celebrate 22nd December as Ramanujan Day. The Town High in Kumbakonam where Ramanujan did his schooling even named one of its buildings after Ramanujan's name on his 75th birth anniversary. Biographies of Ramanujan appeared in English in the years 1967, 1972 and 1988; in Tamil in the years of 1980 and 1986 and also in Hindi, Kannada, and Malayalam among other Indian languages (Kanigel 322). Ramanujan was indeed a genius that once an Englishman remarked,

"Srinivasa Ramanujan was a mathematician so great that his name transcends jealousies, the one superlatively great mathematician whom India has produced in the last thousand years. His leaps of intuition confound mathematicians even today, seven decades after his death" (Kanigel 16).

Conclusion

The *Ajna*, the sixth *chakra* of our body is of great importance and for Ramanujan being a Brahmin Hindu was of utmost importance. The *Ajna Chakra* lies between the eyebrows where Hindus apply their *thilak* or *thilaka*. Ramanujan was a *Vaishnavite* Brahmin and he had a trident shaped *thilak* always on his forehead. What makes *Ajna Chakra* distinct from the other six chakra is its ability to provide insights about the future. This is the very reason why *Ajna Chakra* is also called *Guru Chakra* or Third Eye *Chakra* giving it a religious significance to Shiva who is one among the Hindu Trinity

Pilgrims and other Hindu saints have the practice of meditation and it is through these meditations they receive prophetic insights. Meditation is considered as the best way to strengthen your *Ajna* and it wasn't through the meditations but through the *Ajna Chakra* these pilgrims and saints received their insights. Prayer is considered to be the best form of meditation and it is through his prayers, Ramanujan strengthened his *Ajna* to receive futuristic insights.

Ramanujan's family deity was the Hindu goddess Namagiri of Namakkal. Namagiri is the consort of the Lion – God, Narasimha and it is to Namagiri, Ramanujan credits or bestows his mathematical insights. It is only because of the presence of Namagiri in his life; Ramanujan takes the decision of crossing the seas neglecting his caste barrier which considered crossing the seas as "publicly discarding the sacred thread, eating beef, or marrying a widow" (Kanigel 180). Ramanujan's three nights stay in the grounds of the Namakkal temple and the vision he and his mother receives regarding his presence in England makes it evident how his life got changed through Namagiri or maybe through his *Ajna chakra*.

"Immensely devout" (Kanigel 43), R. Radhakrishna Iyer one of Ramanujan's classmates told of Ramanujan. Most of his mathematical talks involved Ramanujan to compare or evaluate a formula or an idea through spiritual means. He once spoke in England of an equation with much spiritual reference. Ramanujan compared 'zero' to 'absolute reality' and 'infinity' to 'myriad manifestation of that reality' and their products as individual acts of creation. None understood the significance of what Ramanujan's formula was but only could title it as metaphysical.

> "One idea Ramanujan bruited about dealt with the quantity $2^n - 1$. That a friend remembered him explaining, stood for the primordial God and several divinities. When n is zero the expression denotes zero, there is nothing; when n is 1 the expression denotes unity, the Infinite God. When n is 2, the expression denotes Trinity; when n is 3, the expression denotes 7, the *Saptha Rishis*, and so on" (Kanigel 73).

A former mathematical professor, R. Srinivasan could only call Ramanujan "a true mystic...intensely religious" (Kanigel 43). Ramanujan often would get so absorbed in his work that when he spoke or wrote something about his work, he would just keep doing it not giving any attention to anything. While at his home in Kumbakonam, during his last year in India, Ramanujan was so absorbed that he even didn't stop to take food. Janaki, his wife had to make rice into the shape of balls and keep it in his hand in order to make him eat. It was as if Ramanujan foresaw something and the need to finish his work as soon as possible.

It was not just Ramanujan who got so absorbed to his works but he had the ability to make people absorbed towards him through his work. While at Kumbakonam, Ramanujan visited an old woman who would often share snacks with him. Ramanujan would discuss his mathematical works with her and she even though a person without proper schooling would pay close attention to him. An Indian biographer later wrote,

"The gleam in the eyes of Ramanujan and his total absorption in something – it is these that had endeared Ramanujan to her and that unstudied absorption drew others to him too" (Kanigel 83).

Most of Ramanujan's work and what he spoke of it was too brilliant for others to even understand it. A friend of his once told, "We, including teachers rarely understood him" (Kanigel 39). Hardy's colleague Littlewood also mentions in his letter to Hardy that "the man [Ramanujan] exceeds any notion of brilliance that I have ever understood... I have come to believe that for Ramanujan every single positive integer is one of his personal friends"(*The Man Who Knew Infinity* 00:59:27 – 00:59:58). Insights and intuitions Ramanujan possessed were more or less futuristic. Most of his works were proven after his life. Perceiving mathematics in everything around him came as a gift for Ramanujan. Kanigel would write,

"If you don't know English, you can't write a job application, and you can't write King Lear. But just knowing English isn't enough to write Shakespeare's play. The same applies to Ramanujan's notebooks" (Kanigel 70).

At the time when Hardy and Littlewood got their hands upon Ramanujan's notebook, both of them were surprised by what a Tamil clerk from Madras who has never had a formal education in higher mathematics has come up with. "This would take a lifetime" (*The Man Who Knew Infinty* 00:30:35 – 00:30:46) was Littlewoods remark of Ramanujan's notebook. Arthur Berry, one among Ramanujan's professors had a similar experience with Ramanujan. Ramanujan when asked to give his contribution regarding a theorem was able to complete something which his professor was proving. Berry himself concluded Ramanujan's result later. The question to how Ramanujan was able to complete that proof was simply answered by him as "the answer came to my mind" (Kanigel 208).

"The answer came to my mind. That was the glory of Ramanujan—that so much came to him so readily, whether through the divine offices of the goddess Namagiri,

as he sometimes said, or through what Westerners might ascribe, with equal imprecision, to "intuition." And yet, it was the very power of his intuition that, in one sense, undermined his mathematical development" (Kanigel 208).

When Ramanujan's take on the prime number theorem, his life's work, was proved wrong considering that it was mere intuition which brought Ramanujan to those formulas, Ramanujan was able to understand it for the reason why it was held unaccountable but never even once distrusted his insights or intuitions. It was only because of Ramanujan's insights and intuitions he was able to come up with a formula for partitions. His formula was a major breakthrough and led way for a proper study of partitions based on his formula. From where does Ramanujan get his formulas is a question most of his friends and teachers have asked. "It was goddess Namagiri, he would tell friends, to whom he owed his mathematical gifts" (Kanigel 47).

His success in England made him both a fellow of the Trinity College and also of the Royal Society of England. But Ramanujan's fame resides in the *Lost Notebook* which he wrote in the final year of his life. Almost all of his theories were proved after his death. Posthumously Ramanujan is now known for his contributions like Landau – Ramanujan Constant, Mock Theta function, Ramanujan conjecture, Ramanujan prime, Ramanujan – Soldner constant, Ramanujan theta function, Ramanujan's sum, Roger – Ramanujan identities, Ramanujan's master theorem and Ramanujan – Sato series.

The *Lost Notebook* is the perfect example to prove that Ramanujan possessed futuristic knowledge. It was only after a century his formulas are being used to study the behaviour of black holes. While writing it Ramanujan might not have been aware of its application. Other formulas of his are also being used in other fields of study like polymer chemistry, computer, physics, and obviously mathematics. It is also being used in the field of cancer too. Insights and his intuitions itself led way to these formulas.

Ramanujan once also told Hardy that it was to Namagiri he owes his mathematical gifts. "She speaks to me, put formulas on my tongue when I sleep, sometimes when I pray"(*The Man Who Knew Infinity* 01:25:30 – 01:25:40). There was a particular incident in Ramanujan's life. In his prayers he was deeply enlightened with an insight and this led way to the formula for partitions. This is also why Ramanujan told others, "An equation for me has no meaning unless it expresses a thought of god" (Kanigel 73). He often paused between his presentation and this was to be considered as yet another murmered appeal to the goddess Namagiri.

E. T. Bell a Scottish born mathematician, in 1930s spoke of Ramanujan, "When a truly great algorist or formalist like the Hindu Ramanujan arrives unexpectedly out of nowhere, even expert analysts hail him as a gift from Heaven" (Kanigel 266), Ramanujan as everyone would say possessed supernatural insight and he as a person was a gift from heaven and the one gift his work has "which no one can deny is its profound and invincible originality" (Kanigel 200).

There are still arguments regarding the comparison of Ramanujan as a person with futuristic insights and his work to divine and spiritual matters. It is only because of Ramanujan's birth as a Brahmin Hindu, people compare Ramanujan with religious insights. This argument can only be stopped with Kipling's verse: "East is East and the West is West and never the twain shall meet" (*The Ballad of East and West*). Hardy also states that he will never understand the moral wisdom of the East because of his atheistic beliefs. But however far this argument goes, it is easily understood that Ramanujan possessed futuristic knowledge which are being used almost a century later and is being recognised and understood as formulas made by a mathematician of the highest class. E.W. Middlemast a professor at the Madras Presidency College thus remarked Ramanujan as "a young man of quite exceptional capacity in mathematics" (Kanigel 99).

Ramanujan can truly be considered as a pioneer in pure and applied mathematics and is indeed "a gift from heaven" (Kanigel 266).

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