Ashutosh Mukherjee: A Pioneer of Modern Mathematics in India

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ABSTRACT

Being one of the architects of the modern Indian Education system, Sir Ashutosh Mukherjee is mostly known for his pioneering roles in higher education, when it was needed most. He was a mathematical genius. He began his life as a research student in mathematics. His important works in Mathematical Sciences indicate he could have been involved himself to be recognized as a distinguished scientist. But he preferred, to serve the nation, by broadening education, especially higher education. This paper intends to stimulate discussion related to some contributions of Ashutosh Mukherjee in mathematical sciences and the Academic Philosophy of Ashutosh Mukherjee. There is also some discussion about some contributions of Ashutosh Mukherjee to higher education in India.

Introduction

Sir Ashutosh Mukherjee, (29 June 1864 – 25 May 1924) was a prolific Bengali educator and the second Indian Vice Chancellor of the University of Calcutta for four consecutive two-year terms (1906–1914) and a fifth two-year term (1921–23). Perhaps the most emphatic figure of Indian education, he was a man of great personality, high self-respect, courage and towering administrative ability. But he started his carrier as a research student in mathematics. He was a mathematical genius. He came under the influence of brilliant mathematicians of the world and his capacity for mathematical research was firmly established and greatly enhanced.

The objectives of this paper are:

➢ To discuss the early life of Ashutosh Mukherjee
➢ To discuss related to some contribution of Ashutosh Mukherjee in mathematical sciences
➢ To discuss some contribution of Ashutosh Mukherjee to higher education in India
➢ To enlighten the Academic Philosophy of Ashutosh Mukherjee

Early Life: Sir Ashutosh Mukherjee was born on June 29, 1864, at Bowbazar, Kolkata to Jagattarini Devi and Ganga Prasad Mukherjee, a well-known doctor who founded the South Sub Urban School in Calcutta. Brought up in an atmosphere of science & literature at home, young Asutosh went to the Sisu Vidyalaya at Chakraberia, Bhowanipore, and showed an early aptitude for mathematics. When he was young, he met Pandit Ishwar Chandra Vidyasagar who was a major influence on him.

➢ In 1879, at the age of fifteen, he passed the entrance exam conducted by C.U. in the second position.
➢ In the year 1880, he took admitted at the Presidency College in Kolkata where he met P.C. Ray and Narendranath Dutta who would later become famous as Swami Vivekananda.
➢ Secured First position in B.A. exam at C.U. in 1883 and was awarded the Premchand-Roychand scholarship to complete a postgraduate degree in mathematics.
➢ In 1885, he completed an M.A. in Mathematics and 1886, a Master in Physical Science, making him the first student to be awarded a dual degree from Calcutta University.
➢ In the same year he married to Jogomaya Devi.
➢ Ashutosh turned down a job in the Department of Public Instruction to complete his Bachelor of Law degree. During this time, he continued publishing scholarly papers on mathematics and physics.
➢ At the age of 24, Ashutosh Mukherjee became a Fellow of Calcutta University and helped in its transformation from an examining body into a major center of learning and research in the Indian subcontinent.
➢ First Indian vice-chancellor of C.U. Founded Bengal Institute of Technology (1906), Calcutta Mathematical Society, and Calcutta University

College of Science (Razabazar Sc. College.) in 1914.

Contribution of Ashutosh Mukherjee in Mathematical Sciences: Ashutosh Mukherjee was a mathematical genius. His capacity for mathematical research become not only firmly established but also greatly enhanced. In the year 1880, he took admitted to the Presidency College in Kolkata. At that time many monthly magazines used to be subscribed to in the college library. In these magazines, many famous European Scholars sent their problems. Ashutosh also sends problems and their solutions. In this way, his original research in mathematics began.

➤ In 1881, he gave an elegant proof of the 25th proposition of the 1st book of Euclid and was published in the Cambridge "Messenger of Mathematics".

➤ In 1883, he wrote an essay on mathematics "Extension of a Theorem of Salmons" and was published in the Cambridge "Messenger of Mathematics".

➤ His 3rd paper was, "A note on Elliptic Functions" and has been referred to in Engineers, "Elliptische Functional".

➤ In this way he wrote 15 papers on pure mathematics (mainly on geometry and calculus) and 2 on applied mathematics (Fluid Dynamics).

➤ He tried to translate every geometrical proposition into algebraic-analytic analogs and vice-versa.

➤ He kept on systematizing differential equations' applications to some relevant conics.

➤ He delivered 125 lectures on mathematics in the Indian Cultivation of Science from the year 1887 to 1890. He also delivered lectures at the Bengal Association of Sociology, the Asiatic Society, the Calcutta Mathematical Society, and other institutions.

➤ It is no coincidence that the 1st set of the Ph.D. thesis was produced at Calcutta University since it had a great deal to do with the founding of the Calcutta Mathematical Society and its nurture and development by its dynamic leader Sir Ashutosh Mukherjee, who was its president during 1908-1928.

Mathematical papers by Ashutosh muKherjee

1. Proof of Euclid I, 25, *Messenger of Mathematics*, 1888, **10**, 122–123.
2. Extension of a theorem of Salmon's, *Messenger Math.*, 1883–84, **213**, 157–160.
3. A note on elliptic functions, *Q. J. Pure Appl. Math.*, 1886, **21**, 212–217.
4. On the differential equation of a trajectory, *J. Asia Soc. Bengal*, 1887, **56**, 117–120.
5. On Monge's differential equation to all conics, *J. Asia Soc. Bengal*, 1887, **56**, 134–145.
6. A memoir on plane analytical geometry, *J. Asia Soc. Bengal*, 1887, **56**, 288–349
7. A general theorem on the differential equations of trajectories, *J. Asia Soc. Bengal*, 1888, **57**, 72–99.
8. On Poisson's integral, *J. Asia Soc. Bengal*, 1888, **57**, 100–106.
9. On the differential equation of all parabolas, *J. Asia Soc. Bengal*, 1888, **57**, 316–332.
10. Remarks on Monge's differential equation to all conics, *Proc. Asia Soc. Bengal*, February 1888.
11. The geometric interpretation of Monge's differential equation to all conics, *J. Asia Soc. Bengal*, 1889, **58**, 181–185.
12, 13. Some applications of elliptic functions to problems of mean values; First and Second Papers, *J. Asia Soc. Bengal*, 1889, **58**, 199–213; 213–231.
14. On Clebsch's transformation of the hydrokinetic equations, *J. Asia Soc. Bengal*, 1890, **59**, 56–59.
15. Note on Stoke's theorem and hydrokinetic circulation, *J. Asia Soc. Bengal*, 1890, **59**, 56–61.
16. In a curve of aberrancy, *J. Asia Soc. Bengal*, 1890, **59**, 61–63.
17. Mathematical Notes (Questions and Solutions), *Educational Times, London*, 1890–92, **43**, 125–151; **44**, 144–182; **45**, 146–168.

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Contribution of Ashutosh Mukherjee to education:
Ashutosh Mukherjee had a vision of the kind of education he wanted young people to have, and he had the acumen and courage to extract it from his colonial masters. He tried to elevate university education in Bengal systematically and pragmatically.

1. He set up several new academic graduate programs at Calcutta University: comparative literature, anthropology, applied psychology, industrial chemistry, ancient Indian history, and culture as well as Islamic culture.

2. He also made arrangements for postgraduate teaching and research in Bengali, Hindi, Pali, and Sanskrit.

3. Scholars from all over India, irrespective of race, caste, and gender, came to study and teach there.

4. He even persuaded European scholars to teach at his university.

5. He emphasised on teaching and research.

6. He was one of the first persons to recognize the work of Srinivasa Ramanujan.

7. He also established Asutosh College in South Kolkata in 1916.

8. Sir Ashutosh Mukherjee was responsible for the foundation of the Bengal Technical Institute in 1906 and the College of Science of Calcutta University in 1914.

9. The Calcutta Mathematical Society was also founded by Mukherjee in 1908 and he served as the president of the Society from 1908 to 1923.

10. He was also the president of the inaugural session of the Indian Science Congress in 1914.

The academic philosophy of Ashutosh Mukherjee:
After studying his academic and administrative activities it is reflected that his academic philosophy was guided by the best of western and Indian Culture and education. His academic philosophy was relevant at that time as well as it is relevant today also.

➢ *Education for all:* He arranged Scholars from all over India irrespective of race, caste, and gender. It implies that he believed in education for all.

➢ *Holistic Education:* Ashutosh Mukherjee offered several new academic graduate programs at Calcutta University: comparative literature, anthropology, applied psychology, industrial chemistry, ancient Indian history, and culture as

well as Islamic culture It implies that he believed on a holistic approach in Education.

➢ *Medium of instruction:* Ashutosh Mukherjee was a firm believer that Indian students should learn science in English. But he also wanted to usher in vernaculars and extensive studies of Indian languages, Indian history, and philosophy. He also included Indian history in the matriculation examination. It implies that he believed in both Indian and Western Philosophy.

➢ *Model of teaching:* In higher learning and teaching he preferred to follow the western model. He was deeply impressed by the model of German University. He preferred all branches of human knowledge. It implies that he believed in internationalism in higher education teaching methods.

➢ *Emphasis on research: He* enhanced research activities. He arranged proper post-graduate teaching and appointed sound professors as he knew that active research involvement of faculty member is a prerequisite for proper post graduate teaching. It implies that he believed in independent research by Indians on every discipline.

Conclusion: Sir Ashutosh Mukherjee could have been a great teacher or a great researcher in Mathematics. If he devoted himself entirely to the pursuit of Mathematics, he would have been one of the greatest mathematicians in the world. His mathematical papers contributed in the short span of 1884 to 1890, reflected contemporaries and are still relevant today. Sir Ashutosh Mukherjee was a prolific Bengali educator and the second Indian Vice Chancellor of the University of Calcutta for four consecutive two-year terms (1906–1914) and a fifth two-year term (1921–23). Perhaps the most emphatic figure of Indian education, he was a man of great personality, high self-respect, courage, and towering administrative ability. Considered among the greatest and finest mathematicians of India, Ashutosh Mukherjee is known to have changed the prospect of Modern mathematics in India.

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