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Prof. Naya Raj Pant As an Institution of Mathematics

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Abstract:- In this article, the contribution of Naya Raj Pant in mathematics are examined in the wake of the earlier studies of the ancient mathematics, astronomy, Jyoutisha, cube roots, trigonometry, sumatitantram, Kalchakra's Jyoutisha part based in Bouddhatantra and analysis of manuscripts of mathematics.
Key words:- Cube roots, trigonometry, sumatitantram, trijoidicle rule.

1. Introduction:-

Naya Raj Pant occupies a central but singular position in history of mathematical sciences in Nepal. In the pathway to enduring, meaningful, creative mathematical research, Pant had incomparable contributions based on ancient development of mathematics.

Professor Pant was born on 26^{th} Shravan 1970 B.S. as the son of Krishna Datta Pant and Yagyapriya Pant at Piyusvarsiya, Ausadhalaya, Mahabaudha in Kathmandu but his paternal home was at Gorakha district but he and his mother did not go there to claim their own property.

His father was died when he was one and half years old then, his mother stayed in her birth home with him. She was very friendly in her family consequently she was highly adjusted with all the members of family. At her home she was called by the name Chinee Maya [18]. She also died in 2023 B.S at the time Nayaraj was 53 years old. He had married Budh Kumari in B.S. 1983 and had two sons and three daughters. his two sons (Prof. Mahesh Raj Pant and Prof. Dinesh Raj Pant) are working in the field of teaching and research and are renowned professors.

When Nayaraj was 5 years, he started his education with recognizing letters (akshravyas) with his maternal grandfather (his mother's father) Jyoutishist Bhuwan Nath Pande through the Amar Kosh. Bhuwan Nath also a highly educated in Jyoutisha and he had knowledge of formation and revision of Panchanga. This work encouraged to Nayaraj to learn Jyoutisha and Mathematics. He was motivated with his auntie's son Indira Prasad, who was his elder brother and form him he had gain knowledge of English and about a great dramatist and poet Shakespeare.

He was as an orphan due to lack of his father but he never feel that by the affection of his mother Yagyapriya with his maternal grandfather Bhuwan Nath Pande and his family's lovely care. In this way he is impressed from Bhuwan Nath and he became as a great mathematician. Consequently he can be able to research and published about Laxmipati [15], his Jyoutisha education and his old manuscripts and publications. When Nayaraj was 7 years, he was admitted in Bhasha Pathashala at Kumarichock in 1977-1978 B.S. He was very interested in mathematics so within one to two years he was learned factorization and factors of mathematical expressions from his Guru Pandit Kabi Raj Pande. In 1980 B.S at the age of 10 years he was admitted at Shresta Pathashala at where his uncle (mama) Meru Nath Pande was a teacher. Pant was learning English from Tirtha Prasad and algebra (bijganit) from his uncle (mama). He also learned kaumudi at his home. In 1984 B.S. he was admitted at Rani Pokhari Pathashala in class 5. In this way his formal education was started and his certificate level in Sanskrit education. He was reached in Banaras for Bachelor degree education (Shastri) and Master's degree (Acharya). Thus his formal education ws completed as,

1. Prathama in Jyoutisha in 1986 B.S. at Ranipokhari Sanskrita Pathashal
2. Madhyama in Jyoutisha in 1988 B.S.
3. Bachelor in Jyoutisha in 1991 B.S. in Banaras
4. Master's degree in Jyoutisha 1995 B.S. with Sidhanta Jyoutisha from Rajkiya Sanskrit pathashala, Banaras [18].

2. Review of Literatures

The over views about Prof. Nayaraj Pant given by many of the scholars are explained with illustrating the sources as follows with Pant's contributions. In 2039 B.S. Pant had written a book "Comparisons between ancient Mathematics and new Mathematics [10]" with expressing real differences between them with giving evidences. Similarly he was compared between Hindu Sidhant-Jyoutisha and Greek Sidhant-Jyoutisha with expressing real contribution of the development Mathematics in his popular book Comparison between Hindu Sidhant Jyotish and Greek Sidhant Jyotish [14]. In this book he had given very lucid meaning of angle, triangle, perpendicular, base and hypotenuse of a right angled triangle. He expressed that perpendicular and base are competitor to each other. It is very nice; actually, if any of them is erect the other is sleep. In this book he explained the ancient scholar's process of finding area of a rhombus with giving length (1) of a side. For this he had given in his own Nepali language here it is explained as with preserving his themes.

1. Imagine a diagonal of the given rhombus; let it be say 'd'.
2. Multiplying the square of side of the rhombus by 4 (let it be equal to $4l^2$). Subtract the square of the length of the imaginary diagonal from the value obtained in no. 2 i.e. $(4l^2 - d^2)$.
3.Take square root of the value obtained from no. 3 $(i.e.\sqrt{4l^2 - d^2})$ which is another diagonal.
4. Divide the multiple of imaginary diagonal and the diagonal obtained in no. 4 by 2 which gives the area of the rhombus having either equal or unequal diagonal [14].

He had another contribution for review Gopal Pande's concept of calculation of cube roots from Trizoidiacle rule. He had written hundreds of a papers including various fields; history of mathematics, literature, astronomy etc. His many scientific thoughts and mathematical creations are unique.

The Ganganath Jha Kendriya Sankrit Vidyapeetha, Allahabad published an article of Naya Raj Pant entitled in Sanskrit name 'Pascalen swapagymiti prakhyapitam patiganita-tribujam vreettaratnakarotaikdwadi logcriyaiv-shree Naya Raja: Pant: Nepalastha' Concude that,

" The west believes in that Pascal is the originator of the theory of Permutation (aṅkapâsa) and combination (prastâra) in mathematics. Refuting this claim, the author, in the present paper, has tried to prove with evidence that the Arithmetical triangle of Pascal is indeed the lagakriya mentioned in the Vrttaratnakara of Kedarbhatta and that the Indians were not only familiar with this theory but they also particularly used it in mathematics as well as Ayurveda, Chandah Sastra, Silpa Sastra and Sangita Sastra."

The theme expressing above indicates the capacity of Naya Raj Pant in determination of actual contributions. Besides this he had done so many comparative and analytical studies in ancient mathematics.

Sharma (2055:p75-78) has given Pant's biography, personality, and creations with expressing the books written by him. The books mentioned here are, Jyotish part of kalchakra and its descriptions (first part), trigonometry, Pandit Gopal Pande and his techniques of finding the cube root, comparisons of ancient and newly (contemporary) mathematics, sumatitantram, Ratna Deep and their publishing date and institutions. On the other hand she has expressed to exposing his contributions in mathematics. Thus she is expressing him as an analyst and a creature of

mathematics [18].

A book entitled 'Asadaran Vidwan Naya Raj Pant' Nityaraj Pandeya (2063: 12-21) [4] has expressed as, 'Pant as a scholar with expressing views of two books of Pant and said that Pant as a very of the best analyst of Jyoutisha thinker laborious, a best reviser of mathematics.' Pandeya has highlights the capacity of pant for correcting and revising of mathematics. Pandeya explained him as a researcher of mathematics with two books 'Pandit Gopal Pande [4] and his techniques for finding the cube root, (2037)' and 'Bishranti first part, (2050)'. The first book contains the new phenomena of calculation of cube root of a number by rule of three and the second book is based on Pant's creations which were written at his rest time when he was tired in mathematical calculations and thinking; it is related to culture and religion.

Manandhar in his article " Contribution of Pandit Naya Raj Pant in the history of modern Nepal" expressed that he was not a person, but a personality; he was not an individual but an institution. An American scholar Mary Slusser in her book ' Nepal Mandul' admire to Prof. Pant as uncompromising teacher and author.

In a book ' Nayaraj Pant: Socrates of Nepal, Paudel (2055: p 86-89) has expressed him as ' Asia's specific scholar Nayaraj Pant [1]' and Hanspure Suibedi (p 93-105), has expressed Pant as an Academy or an institution. Subedi highlights the capability of Pant [1].

The book entitled, ' Condolence for Nayaraj Pant' in article ' Scientific teacher Nayaraj Pant' Pradhananga has written that Nayaraj Pant used to believe any matter on the basis of proof and used to express his insight confidently. (2059: 105-106) [17]' has mentioned that, without understanding the traditional value belief and theory in depth we can't understand the matter that we read and listen.Keeping these them in mind and Prof. Pant has established he trend for necessity of study in the field of history mathematics, language, astronomer etc.

In the book entitled ' Asadharan Bidhwan Nayaraj Pant, 2063' (p 25-29) (ed. by Sheshraj Shiwakoti), Nayaraj Pant himself said in his own that, ' archives found in formularise form of history has to be analysed in descriptive [4].

Shayam Khanal (2062 B.S.) has explained about his valuable contribution in Astrology (Sidhanta-Jyotish) with expressing him as an astrologer and a great mathematician [2].

He has very important contribution in inscriptions also. On reviewing about pant's creations of mathematics and thoughts from different aspects we see that he is one of the popular scholars in mathematics and Jyoutisha Mathematics not only in Nepal among the Asia.

3. Contribution of Naya Raj Pant in Mathematics

He is a pioneer contributor in Mathematics, Jyoutisha mathematics, history, culture, etc. Now it will be better to illustrate his research publications to the points.

1. Jyoatisha

2. Vidhya-Rakshya (bhaga 1-15): These collections describe the very peculiar elementary mathematical treatments.

3. Sumatitantram [8]: It is a very important book that contains the very rare part of ' Surya Siddhanta'. It is based on the manuscripts written in palm leafs. This book was published by Curriculum Development Center of Tribhuvan University in 2035 B.S.

4. Golabodha [7]: It is a very important book published by Curriculum Development Center of Tribhuvan University in 2034 B.S. In this book pant very lucidly explained the rotation of the Earth, its effects to human beings, living creatures together with giving the astronomical concepts.

5. Pandita Gopal Pandey Ra Unako Ghanmula lyaune Riti [9]: This is a mathematical book in which part illustrate the Gopal Pande's discovery on the Trijoidicle rule for calculation of cube

roots. This rule is illustrated and published by Gopal Pande in his book ' Vyaktachandrika [3]' in 1971 B.S. This rule is very peculiar than Bhaskaracharya's rule for calculation of cube roots. Trizoidiacle Rule is useful for calculating square and cube roots, which is considered remarkable contribution to Nepali mathematics. Gopal Pande also wrote mathematics book in Hindi.
6. Prachin Ganit Ra Nabin Ganitko Tulana: This book compares various mathematical treatments among mathematicians and time period.
7. Trikonamiti (Jyotapatti) [11]: In this book Pant explained the very elementary concepts of trigonometry, Bhagan, quadrangle, rashi, etc.
8. Lichhavi Samvatko Nirnaya
9. Kalchakrako Jyoatisha Bhag ra Tyashako vivechana (1^{st} part) [13], Kalchakrako Jyoutish bhag 2^{nd} [16]... and 3^{rd} (manuscripts form).
10. Hindu Sidhanta Jyoatish ka Greek Sidhanta Jyoatishko Tulna.
11. ratnadipa (1^{st} part).
12. Ratnadipa (2^{nd} part). In this way he has written so many dozens of mathematical creations

Among them the Lichhavi Samvatko Niranaya [12], Kalchakra's Jyoutisha Part and its descriptions [5] are the very remarkable work. He had established Samasodhana Mandala in 2009 B.S. with the help of his students and published many comparative study of ancient mathematics, Itihasa Samsodhan, Savadhan-patra, Byakarana Samshodhan and Panchanga Samsodhan. The Samsodhan Mandala has published the famous journal " Purnima" from 2021 B.S. and he has written dozens of essays on mathematcs, astronomy, historical records of Nepalese history. Pant published mostly his mathematical reviews and papers in the famous journal Purnima, which is the very popular in every context of research either in mathematics or history of mathematics or any historical and archeological view of developments [5].

4. Awards and rewards

Pant had rewarded in different occasions in different fields. Very few are given below.
1. Judhapadaka in 1989 B.S.
2. Mahendra Vidhyabhushana in 2020 B.S.
3. Gorkha Dakshin Bahu 3^{rd} in 2029 B.S.
4. Gorkha Dakshin Bahu 2^{nd} in 2037 B.S.
5. Madan Puraskar in 2043 B.S.
6. Tribhuvan Pragya Puraskar in 2045 B.S.
7. Aadikavi Bhanubhakta Acharya Shodha Samman in 2053 B.S.
8. Dashusmriti Puraskar in 2055 B.S.
9. Itihasa Shiromani Baburam Acharya Shodha Samman in 2056 B.S.
10. Gorkha Dakshin Bahu 1^{st} in 2056 B.S.
11. Honorary of D. Lit. by T.U. in 2057 B.S.
12. Award from Nepal Mathematical Society.

In conclusion Prof. Nayaraj Pant as a mathematician, astrologer, researcher, historian and a great scientist was not a person, but a personality; he was not an individual but an institution.

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