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AREVIEWONRAMANUJAN'SANDBHASKARACHARYA'SMATHE MATICAL WORK

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ABSTRACT

In the current paper we discussed an ancient Indian mathematician Ramanujan and Bhaskar Acharya and theircontribution in mathematics as they work a lot in science of mathematics they discovered many concepts ofmathematicsthatwasunknowntotheworld,bothofthemdidworkinalgebra,trigonometry,astronomy,findingvalueof Π,findingsquarerootandmanyotherswediscussedtheworkofRamanujanwhich includeRamanujan – hardy number, series of Π ,Goldbachconjecture ,Ramanujan's equations theory ,congruences ofRamanujan's same way if we see about Bhaskaracharyas work then it goes to the negative number zero andinfinity,ruleof zeroareaofsphere,calculus ,trigonometry.

KEYWORDS--*astronomy,trigonometry,calculus,infinity,conjectureGoldbachconjecture*

INTRODUCTION

in ancient India mathematics is supposedto be a separate category of knowledge.since it was seen thatin metaphysics andspirituallifeitplaysanimportantrolesoit has great importance. in the developmentofMathematicsAncientIndian Mathematicianshavecontributedalotandthese are as old as the civilization of thepeople of India. And it was observed thatthe improvement of civilization based onthe growth of the science of Mathematicsinthispaperwestudiedsomeancient Indian mathematician they were the greatRamanujanandBhaskarAcharya

AboutRamanujan

We all very well know the theoryof number system this well-known theoryisproposedbygreatIndianmathematicianRamanujan literally he is considered to bethephenomenonofmathematicsin twentiethcenturylikeothermathematiciangreatRamanujangotalltimepopularrank.On 22nd December 1887 he was born inthe family of Iyengar in the area of Erode,Madras.fromthemotherRamanujanstudied all education like, puranas, songsofreligion,traditionbutafterinhisscholdayhervirtuehispowerofmathematicstothegoddessofcreationandwisdomifanything is there which gives essence ofspiritualityisonlyimportantthingforhim. Later he was eminent with mathematics inthereality.Hewassuchgeniuslikethathewasbornformathematicsactuallyhethinksthatinallhisthoughtsandhisimaginationcompletesintheformofmathematicsactuallyhehasqualityofinterpretationofdreamsandastrology.

Because of his geniuses he wasable to solve the problems like $\sqrt{x+2\sqrt{x+3\sqrt{x+\cdots}}}$.whosesolution didn't get anyone but Ramanujan found itvery easily. In his notebook we studiedradicalproblems.

IntroductionofBhaskarachary–

BhaskaraIIisknownasBhaskar Acharyaheisconsidertobeoneofthe important figures in mathematics in 12th century,hehashisfoundationinmathematicshebornin1150ADinBijapurhisworkisspreadoverall.Heseparatedhisworkinfourpartsl ikeLilavati,Bijaganita,GoladhyayaandGrahaganita.Hewrotelilavatiafterhisdaughter Lilavati which was first volumeofsidhantsiromani.Whichincludetotal 13chapterscontainingmostimportanttopic like trigonometry, measurement andothers he also develop Bijaganita. Whichcontaintotaltwelvechapterswhichdescribe Algebrawhichcontainsquarerootofpositiveandnegativenumbers,quadratic equation, determination of surdsinthe3rd portofGanitadhyahegaveconcept related to astronomy, especiallysolar system, gravity law he also studiedmotionsofplanetshealsoplayanimportantroleinfindingthelengthofyear.

ContributionofRamanujan'sinMathematics–

(A) HardywasoneofthefriendofRamanujanhehaddailycometoseewhereRamanujanwashospitalizedhecame by the taxi whose number was 1729by Ramanujan developed this number asthe sun of cubes of two number which canbeassigningintwoseparateways.

$10^3+9^3=1729$

$12^3+1^3=1729$

(B) Seriesofπ(infiniteseries)–

Ramanujan invented some seriesof π which is considered as the infiniteseries of π which was nearest 1910 theseriesareasfollows.

$$\frac{1}{\pi} = \frac{2\sqrt{2}}{9S\,189} \sum_{n=0}^{\infty} \frac{(2^2 n!)(1103+26900)}{(n!)4(300+96)4}$$

He also find next digit up to Eightdecimalpointinthisprocedurethealgorithmwasinventedbythisnumberanddevelopedπserieswhichisinfinite.

(C) Goldbach'sConjecture–

ItisoneofthediscoveriesofRamanujanbeganonestatementwhichwas two is greater than every even integerwhich is addition of two prime numberwhichwas3+3=6

(D) RamanujanEquationtheory–

Hedevelopednewtheoryforsolving the equations which was cubic hegavehisownstepstosolveitbydevelopingformulaofequationwhichwasbiquadratic.

(E) Ramanujan'sNumber:

Highly Composite if any numberhave large factors, then we can say thatnumber is highly composite: If we takehaving factors of k by K(x) then only wecansaythatx€Nwhichwashighlycompositenumber.

Ex.Ifx=96ishighlycomposite because

Because k (96) = 16 & 6 smaller numberswhicharenaturalhavelessnumbero factorsif.

$IdK=2^{x2}3^{x3}\ldots\ldots s^{kp}$

WhichwasnothingbuttheArithmeticfundamentaltheorem.

(f) CongruencesofRamanujan's–

Ramanujan'sdevelopedsomeimportantcongruencetheyareasfollowers.

$x(5y+4)=0(\mathrm{mod}5)$

$x(7y+5)=0(\mathrm{mod}7)$

$x(11y+6)=0(\mathrm{mod}11)$

$\forall y€N$

(G) Asymptotic formula ofRamanujan–Hardy

Inthefieldofseparationofnumberhedidmajorworkhediscover

someformulaalongwithHardyforthe calculationofseparationofnumbers.

Firstheinventedfunctionfork(x)

Whichleadstogive Asymptoticformula.

$$K(9x)\cong \frac{}{{}^{2}S\sqrt{3}^{\,1(2)}} \varsigma^{\pi\frac{\sqrt{2S}}{3}}$$

ContributionofBhaskaracharyainMathematics–

(1) NegativeNumbers–

He was well famous for the workinnegativenumbers.Whichheconsideredaslossesandalsoworkyouarithmeticand measurement.Heeasilysolvestheequations andproblemofarithmeticmathematics along with negative numbersin the field of Bijganit he started to put adot(.)abovethenumbers.Whicharenotationsofnegativenumbers.

(2) ZeroandInfinity–

Hewasthefirstpersonwhostarted the concept of infinity which wasobtainbydividingthenumberbyzero.

(3) RuleofZero-

He has strong hand in the mathoperationslikemultiplication,addition subtraction but later he recognized somedrawbacksofBrahmagupta'sideadividingthroughzero.

Ex. P+0=P

P–

0=PPx0

=0

Hefoundthatforanynumberstherearetwosolutions.

(4) Areaofsphere–

Forthevolumeofspherehefoundthe formula

∴ Areaofsphere=4xareaof circle

Volumeofsphere=sphere areax$\frac{1}{6}$ ofitsdiameter.

(5) Trigonometry–

In trigonometry he has moreinteresthegavemanyimportantresults

sin(a+b)=sinacosb+cosasin b

sin(a–b)=sinacosb+cosasin b

(6) Lilavati-

Inlilavatihe gavetwotypesofmultiplicationitis giventhat(p, 0)/0= PItisoneoftheresultscurrentlyit isassemblewithadvanceconceptofnon-zeroinfinitesimal.

(7) Calculus–

In many of his work we got someagreementsastronomicalconceptespeciallySiddhantShiromaniinthisbookheproposedsuchabigconceptwhichwasnot seen in recent work. He also works oninfinitesimalcalculusandanalysisofmathematicswithdifferentialcalculusandinterredgotspecialinterest.

(8) QuadraticEquation–

Forsolvingthequadraticequation,heappliesthemethodof chakravala for the indeterminate equationhisPell'sequationgotmuchmoreimportancebygivingtheequation.

$Np^2+1=q^2$

BhaskarAcharya'scontributioninanothermathematicalfield.

(1) healsoworksforPythagorastheorem he finds the area by twovariableways&bycancellingthemforobtaining$p^2+q^2=r^2$

(2) HisinventionsinDiophantineequationofordersecondlike$6ly^2+1=x^2$thiswaspresented.

(3) HestudiedPell'stheorem;hedevelopsgeneralmeanvaluetheorem from the concept & Rollstheorem.

(4) HisworkinAlgebrawasreallyremarkable especially in Bijganita in thathe creates 12 chapters this was the firsttime which gives that a positive numberhavetwosquareroots.

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