

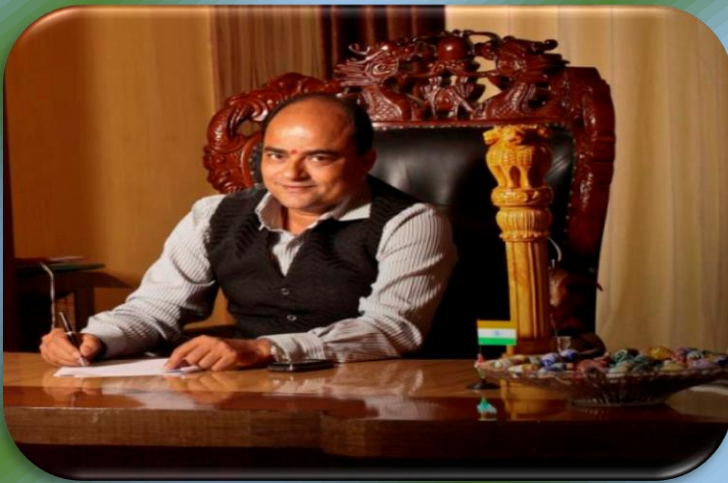
SANDIP FOUNDATION'S
SANDIP INSTITUTE OF
ENGINEERING &
MANAGEMENT
Nashik

STEF

E-BULLETIN

JUNE-JULY 2015

....MESSAGE FROM THE CHAIRMAN....



SANDIP FOUNDATION was established in 2005 with a vision of creating an education system from which the leaders of tomorrow emerge. Since our inception we have been aware of our strengths, motives and goals which we have set out to achieve. When we embarked on this journey, all we had was a dream and the tools of foresight and strategy. We combined these forces to pave a path of growth towards excellence and merit. Today it is our endeavour to be the most competitive

institution in the country with emphasis on efficiency in everyday operations, reliability for students and thrust on discovery and development of new technologies. We are an organization that combines the latest developments in the field of education with our scientific and operational skills to create an environment which nurtures and encourages the aspirations of students. It is our aim that the combination of these factors along with the state of the art infrastructure and a dedicated teaching staff will provide an impetus to the Indian educational system as a whole. Our first campus is set up at Nashik, Maharashtra where the college building is spread across a 200 acre area. Keeping pace with the times, the campus is Wi-Fi enabled. To ensure the complete educational experience, laboratories with the latest tools and machinery are provided along with a comprehensive library with RFID technology, a computer centre with complete internet connectivity a wholesome cafeteria, all set up in a green environment to give our students the most healthy and pleasant experience as they embark and pursue their professional goals. What does an International quality Education system consist of? That is the question we asked ourselves when we set out to build this Foundation. India as a country has no problem with unemployment but there are institutions which churn out a large number of unemployable students. Should we consider ourselves an exception to this? The search for the answer has resulted in the faculty and staff to come up with innovative methods in teaching to construct new knowledge in the classroom. Our motto is to always give our students the best of what is happening in and around so that they are always at the cutting edge of academics the world over. The cultural aspect has always been a strong-point of our College as it has an acknowledged role in moulding the personality, teaching soft-skills, developing leadership and management abilities and strengthening the EQ. Extra-curricular activities, participation in sports and other cultural activities has now become universal contributing to all-round formation which is much needed in the world today. Finally we look to create an Alumnus for inspiration and support so that our students have wonderful role models to emulate. Our faculty and students remain focused on a quality of education that is not just a college degree but a way of life.

HON. DR. SANDIP KUMAR JHA
CHAIRMAN
SANDIP FOUNDATION

.....MESSAGE FROM MENTOR & GM.....



GM Message

Sandip foundation was established with the core objective of rendering selfless and dedicated, service to higher education in the disciplines of Engineering, Sciences, Arts, management studies, Polytechnic and Pharmacy. It is our vision to provide education aided by the best infrastructure available in the most congenial atmosphere so that every student can aspire, achieve his dreams and succeed in life. The visionaries of Sandip Foundation have been involved in the field of higher education since the last fifteen years. During this period they have provided the most valuable service to thousands of students across the country. In the quest to enhance the cause of higher education, professional courses across various fields are designed and set up with the institution housed out of Nashik.

**Hon. Mohini Patil
GM, Sandip Foundation**

Mentor Message:

Sandip Foundation is an educational institution, which strives to form men and women who will build more than just a human world. It strives for an intellectual endeavour that focuses on critical and creative thinking, with the aim of social transformation. The college makes a preferential option for the marginalized and it seeks to give an all-round formation, inculcating both human and spiritual values. Competence, compassion and commitment are the hallmarks of the human person we seek to encourage. The infrastructure is world class with workshops, state-of-the-art Laboratories, overhead projectors in every classroom, an extensive library hostel facilities for outdoor students. The faculty and staff are dedicated in their task of making the Institution a world class learning centre and hence constantly look to improve the learning process.

**Hon. Prof. P. I. Patil
Mentor,
Sandip Foundation**

....FROM THE PRINCIPAL'S DESK....



On Behalf of the Management, faculty and staff of SIEM it is an honour to welcome you to this prestigious institution. We at SIEM are strongly committed to providing quality technical education to our students. Now what does quality consists of? Is it mere state-of-the-art laboratories and a well-furnished classroom or does it also involve the proactive participation of teachers and students alike? These are some of the questions we asked ourselves before embarking on this journey. In the ensuing years our faculty took up this task seriously, of trying to understand what international quality means and of making the effort to make this a reality. Of course we laid emphasis on educational infrastructure laboratories and libraries and other resources for teaching. But the core of our efforts centred on applying innovative methods to our teaching-learning and evaluation, in spite of the large numbers we deal with. If our students don't pick up the skills of analysis and critical thinking, all the memorisation and reproduction they may achieve in this Institution will be in vain in the global culture and economy. It is our belief that every student has an unending pool of talent and when nurtured properly can help bring out the best in that individual.

The approach of the Institution is holistic. It has called for learning methods that are more demanding both on the professor and student. It has led to a renewed emphasis on research for faculty and to initiating a taste for research among students. The monitoring of this process by Heads of Departments and by Academic Administrators, in order to encourage good practices and to evaluate their effectiveness, gives hope of a renewal of academic culture on campus. I want to congratulate you and wish you the best on this journey. It is our assurance that at SIEM you will emerge as tomorrow's leader, today.

**DR. R.G. TATED
PRINCIPAL
SIEM, NASHIK**

....DESK OF THE DEANS....



Prof. N. L Bhirud
Dean Admin(SIEM)



Prof. A. S. Dube
Dean Academic(SIEM)

The institute offer Undergraduate courses. From the time of its commencement, the institute have been seen remarkable growth with time, and the augmentation process is always on. The departments are dynamically active in imparting good eminence and value based education to the students. The present and the future prospect of the learning process and experimentation and exchange of ideas are continuously taking place. Each department has different laboratories, well equipped with modern instruments, classrooms, and separate computing facilities with licensed software and have ensured the needs of the undergraduate technical courses are provided. The departments have got their own collection of reference material, manuals, textbooks, magazine issues in its departmental library. It also facilitates the students with proper internet connections for reference on the internet. The departments also have a good history in the academic grades as well. It also actively conducted various events under the students association of their respective departments. The department encourages the students to attend seminars and workshops and also participate in extra-curricular activities. We once again welcome you all to the Departments of our college.

Department Of **MECHANICAL ENGINEERING**



Prof. Vikram A Kolhe
(HoD)

NATIONAL LEVEL WORKSHOP ON ROBOTICS

(In Collaboration with IIT-Madras from 24- 25th July 2015)

Mr. Aakash

Mr. Abhinav

ARK Technosolutions

Prof. S. S. Pote , Prof. S. B. Ambekar

Prof. H. B. Karkade, Prof. K. U. Shinde

SIEM



DESCRIPTION OF THE EVENT

In this workshop students learned basics of Robotics and Prerequisites of Robo-Making. Various tasks were given to students for competition through which three groups were selected for NRC-2016 Round II. Number of Students Participated in the event was 128. Winning teams selected for NATIONAL LEVEL ROBOTICS CHAMPIONSHIP 2016:

Prathamesh V. Muley	Joy S. Singh	Aakanksha Pawar
Anish B. Deore	Omkar P. Ugale	Kundan Phalak
Vedant V. Garge	Shubham D. Chaudhary	Karan Temgire
Akash D. Patil	Ketan Pratap	Ravi Waswani
Ruchita N. Sawale	Kaushal Tank	Mayur Patil

AWARENESS SEMINAR ON VALUE ADDED COURSES

Mr. Karthik Sundarraaj
Technical Manager –CFD
ARK Infosolutions Pvt.Ltd.

Mr. Srijit Jacob
Sales Manager
Mindbox Evolving Education

(Conducted on 16 July, 2015 for B.E Students)



DESCRIPTION OF THE EVENT

The seminar highlighted on various basic issues of the target students interested in working the Design and Development departments need to upgrade in the courses offered as mentioned above. Also the knowledge acquired would help the students in the selection of Topics for their Seminar and Final Year Projects to be completed as a part of curriculum.



INDUSTRIAL VISIT TO SEVA AUTO PVT.LTD. - DYNAMICS OF MACHINERY

Mr. A.D.Jadhav
Workshop Instructor

Prof.S.P.Kerhalkar
Prof. V.S.Gaikwad
SIEM Staff

(Conducted on 23 July, 2015 for B.E Students)



DESCRIPTION OF THE EVENT

Seva Auto Pvt. Ltd. Near Garware square, MIDC, Ambad, Nashik was visited as part of Industrial visit for concept understanding mainly such as wheel balancing and related machinery parts. In addition all the shops of premises were demonstrated to students regarding sales, service, repair & maintenance of Maruti vehicles. Shops visited were body shop, paint shop, paint mixing shop, etc. Seva Auto Ltd. Visit was conducted and completed for BE A & B division students.

EXPERT LECTURE ON CAD CAM – FINITE ELEMENT ANALYSIS

Prof.V.K.Jatti

**Symbiosis Institute of Engineering and Technology, Pune
(Conducted on 22 July, 2015)**



DESCRIPTION OF THE EVENT

Prof. V.K.Jatti is expertise in CAD/CAM and has experience of more than 5 years. His area of specialization is Computer aided design and analysis. He has published more than 25 papers in reputed National and International journals. His lecture on FEA and FEM was an introduction to the subject. It gave an exposure to students for FEA. Students became aware of the future career scope in CAD, CAM and CAE fields with the knowledge to enter the field.

Department Of ELECTRICAL ENGINEERING



Prof. Hemant R Kulkarni
(HoD)

APTITUDE COMPETENCY TEST

(Conducted on 13 July for S.E. Electrical)



Electrical Engineering Students Association, has organized a written examination on General Aptitude and English, to improve their skills. This will improve the general competitive behaviour of students.

WINNERS:

Narendra P Patil, Rohit M Kangne, Akshay N Pagar

BASIC ELECTRICAL TECHNICAL TEST

(Conducted on 14 July for S.E. Electrical)



Electrical Engineering Students Association, has organized a written examination on Basic Electrical Engineering questions, to test the technical competency of the students, which will help them to improve their level of technical abilities in the field.

WINNERS

Vaibhav Shinde, Sandip Gaikwad, Vikrant Avhad

ACTIVITY OF GROUP DISCUSSION

(Conducted on 14 July for T.E. Electrical)



Electrical Engineering Students Association, has organized group discussion competition on various topics like:

1. Kumbhmela for Nashik
2. Social Media
3. MBA or MTECH as PG
4. Ruling Govt. policies

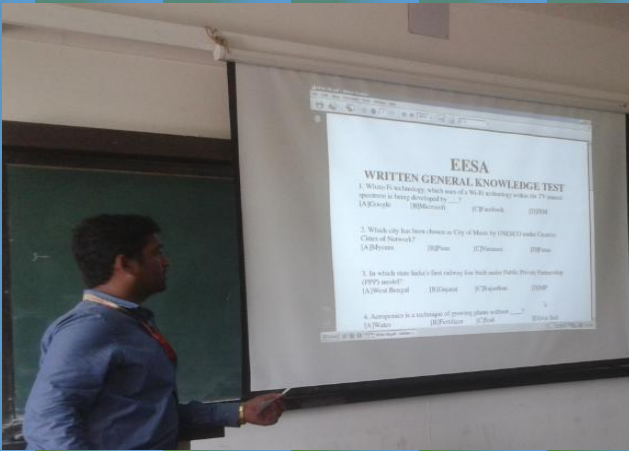
This activity was conducted to test and improve the speaking and debate approaching skills of the students, which will help them to be good at facing any competitive debates.

WINNING TEAM MEMBERS

Yogesh Saindane, Prathamesh Johore, Harshal Gurav
Kishore Pandit, Kiran Chavanke

TEST OF GENERAL KNOWLEDGE

(Conducted for 23 July for S.E & T.E. Electrical)



Electrical Engineering Students Association has organized a written examination on General Knowledge questions, to test the general knowledge of the students, which will help them to improve their level of general awareness and current affairs. Top 3 students were awarded for their excellent performance.

ACTIVITY OF EXTEMPORE

(Conducted for 23 July for S.E & T.E. Electrical)



Electrical Engineering Students Association has organized Extempore, in which the students were given the following topics to speak on:

- 1. Kumbh-mela**
- 2. Private-Public Sector jobs**
- 3. Yoga/Gym**
- 4. Tourism development in Nashik**
- 5. Get an internship in company**

Winner
Khusboo Sharma

Department Of CIVIL ENGINEERING



Prof. Kisan Bidkar
(HoD)

INDUSTRIAL VISIT PWD GUEST HOUSE, TRIMBAKESHWAR - STRUCTURAL DESIGN-I

(Conducted on 30 June, 2015 for T.E Students)



AUTO-CAD TRAINING PROGRAM

By Prof. S. R. Baviskar

(Conducted on 10 July 2015 for around 100 students from all divisions)



In this workshop, the participants were made aware of the most widely used design and drawing software in engineering field, i.e. AUTOCAD. It is a design software which is very helpful in precise diagrams of engineering equipment, plans, layouts of systems etc. Here, we can achieve very high accuracy by just selecting the required dimensions and guiding the diagram using some set of software instruction.

TREE PLANTATION PROGRAM

LOCATION: GHOTI

(Conducted on 15 July, 2015 in association with Samsonite Ltd.)



Department Of
**COMPUTER
ENGINEERING**

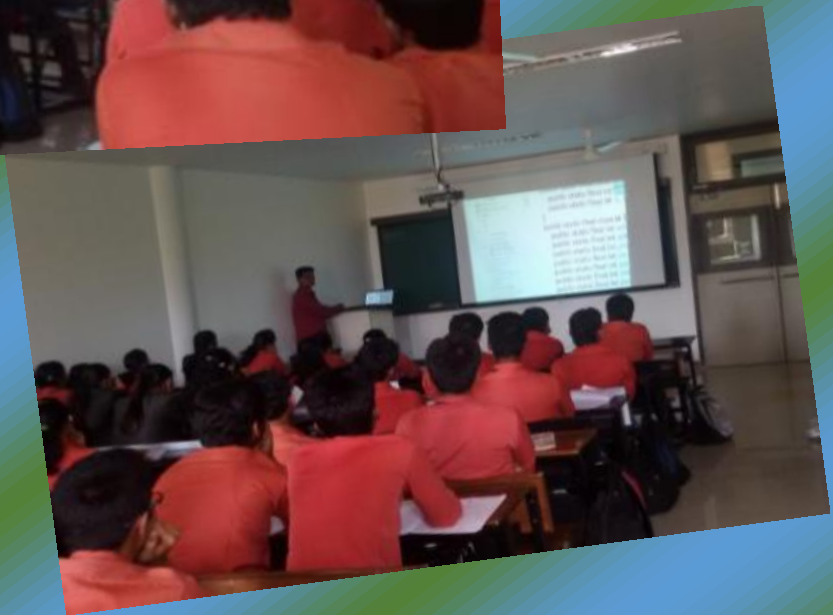


Prof. Umesh B Pawar
(HOD)

EXPERT LECTURE ON "ANDROID DEVELOPEMENT"

Mr. Prasad Pawatekar

(Conducted on 11-12 July, 2015 for B.E Students)



Computer department has organised a guest lecture on Android Development, which guided the students on Android Operating system, which is based on Linus kernel and presently being developed by Google. It widely used in smart phones and tablets. Android's source code is released by Google under open source licenses. Initially developed by Android, Inc., which Google bought in 2005.

A SEMINAR ON "HACKOLOGY"

**Mr. Sai Prasad; Ms. Amrin kaji
International Routing Technologies (IRT), Nashik
(Conducted on 24 July, 2015 for S.E & B.E Students)**



Computer department has organised guest lecture on Hackology which gave the students a lot of information regarding Hacking phenomenon, Internet security, processes involved etc.

GUEST LECTURE ON PERVASIVE COMPUTING

Prof.Naresh Tothum

(Conducted on 25 July, 2015 for B.E Students)



Computer engineering department has organised a lecture on Pervasive computing, also called ubiquitous computing. It is the growing trend towards embedding microprocessors in everyday objects so they can communicate information. The words pervasive and ubiquitous mean "existing everywhere." Pervasive computing devices are completely connected and constantly available

GUEST LECTURE ON “CYBER CRIME LAW”

Prof. Nikhil Kulkarni

(Conducted on 27 July, 2015 for T.E Students)



Computer engineering department has organised a lecture on Cyber Crime & laws related to this criminal activities. Students were informed about types of online activities that lead to online data infringement.

Department Of
ELECTRONICS
&
TELECOMMUNICATION
ENGINEERING



Prof. Dipak Patil
(HoD)

ALUMNI TALK

Ms. Anjali Singh

(Conducted on 8 July, 2015 for B.E Students)



- Miss .Anjali Singh is alumni for the A.Y 2013-14.
- Interactive session was held regarding her journey after completion of her B.E (E&TC) from SIEM, Nashik
- She is currently preparing for IES in Delhi.
- Motivational ideas were shared for the preparation of competitive examinations and different opportunities in the field of E&TC Engineering.

GUEST LECTURE ON SELECTION OF INNOVATIVE PROJECT TOPICS

Mr. Parikshit Jadhav

(Conducted on 16 July, 2015 for BE Students)

Under Student's Association, a lecture was conducted for the students of BE regarding Selection of projects for final year. The speaker guided the students about various scopes available in market regarding electronics engineering, commercialisation of project, and how to select a particular idea based on study for implementation.



GUEST LECTURE ON INDUSTRIAL EXPOSURE

Mr. Prashant Deshpande

Sr. Engineer, Maintenance, Gabriel India Ltd, Nashik

(Conducted on 30 July, 2015 for BE Students)

Under Student's Association, a lecture was conducted for the students of BE regarding industrial exposure and how it can orient a student's way of thinking and enable them to become a better PRACTICAL Engineer. The speaker guided the students about various scopes available in market and which sectors are about to boom in recent future.



REPORT ON CELEBRATION OF GURUPORNIMA

(Conducted on 31 July, 2015 by BE Students)



REPORT ON FELICITATION OF TOPPER STUDENTS OF E&TC FOR A.Y 2014 – 15

(Conducted on 31ST July, 2015)



Department Of
**APPLIED
SCIENCE
(FIRST YEAR)**



Prof. Rashmi J Nayak
(HoD)

FIRST YEAR INDUCTION PROGRAM

(Conducted on 20 July)

The Induction Program of newly admitted Engineering Students of First Year (Batch: 2015-16) was held at Sandip Institute of Engineering & Management, Nashik on 20/07/2015. In this program around 500 attendees were present.

Welcome speech was delivered by First Year HOD, *Prof. Mrs. Rashmi Nayak*. After that the attendees were addressed by *Dr. R. G. Tated*, Principal of SIEM, about various opportunities in the field of Engineering & Technology.

Prof. A.S. Dube , Dean academics of SIEM gave a brief introduction about academic structure of the course including examination pattern of University.

Prof. N.L. Bhirud , Dean Administration of SIEM gave a brief about the discipline and various mandatory rules and regulations of the institute to be followed by students.

In the program felicitation of all top rank holders of program of previous First Year batch was done by Heads of the various Departments.



STAFF CORNER

EVOLUTION OF INDIAN MATHEMATICS & ITS SIGNIFICANCE IN ENGINEERING

By Prof. Neetu M. Sharma, Assistant Professor, SIEM

लौकिके वैदिके वापि तथा सामायिकेऽपि य
व्यापारस्तत्र सर्वत्र संख्यानमुपयुज्यते ॥
कामतन्त्रेऽर्थशास्त्रे च गान्धर्वे नाटकेऽपि वा
सूयशास्त्रे तथा वैदो वास्तुविद्यादिवस्तुषु ॥
छन्दोऽलङ्कारकाव्येषु तर्कव्याकरणादिषु ।
कलागुणेषु सर्वेषु प्रस्तुतं गणितं परम् ॥
सूर्यादिग्रहचारेषु ग्रहणे ग्रहसंयुतौ ।
त्रिप्रश्ने चन्द्रवृत्तौ च सर्वत्राङ्गीकृतं हि तत् ॥

द्वीपसागरशैलानां संख्याव्यासपरिक्षिपः ।
भवनव्यन्तरज्योतिर्लोककल्पाधिवासिनाम् ॥
नारकाणां च सर्वेषां श्रेणीबन्धेन्द्रकोत्कराः ।
प्रकीर्णकप्रमाणाद्या बृध्यन्ते गणितेन ते ॥
प्राणिनां तत्र संस्थानमायुरष्टगुणादयः ।
यात्राद्याः संहिताद्याश्च सर्वे ते गणिताश्रयाः ॥
बहभिर्विप्रलापैः किं त्रैलोको सचराचरे ।
यत्किञ्चिद्विस्तु तत्सर्वं गणितेन विना न हि ॥¹

"All activities which relate to worldly, vedic or religious affairs make use of enumeration (*saṅkhyāna*). In the art of love, economics, music, dramatics, in the art of cooking, in medicine, in architecture and such other things, in prosody, in poetics and poetry, in logic, grammar and such other things, and in relation to all that constitute the peculiar value of the arts, the science of calculation (*gaṇita*) is held in high esteem. In relation to the movement of the sun and other heavenly bodies, in connection with eclipses and conjunction of planets, and in the determination of direction, position and time (*tripraśna*) and in (knowing) the course of the moon – indeed in all these it (*gaṇita*) is accepted (as the sole means)."

"The number, the diameter and perimeter of the islands, oceans and mountains; the extensive dimensions of the rows of habitations and halls belonging to the inhabitants of the world, of the interspaces between the worlds, of the world of light, of the world of the Gods and of the dwellers in hell, and other miscellaneous measurements of all sorts all these are understood by the help of *gaṇita*. The configuration of living beings therein the length of their lives, their eight attributes and other similar things, their staying together, etc. – all these are dependent on *gaṇita*."

Why keep talking at length? In all the three worlds involving moving and non-moving entities, there is nothing that can be without the science of calculation (*gaṇita*)."²

STAFF CORNER

EVOLUTION OF MATHEMATICS:

MATHEMATICS has played a significant role in the development of Indian culture for millennia. Mathematical ideas that originated in the Indian subcontinent have had a profound impact on the world. Swami Vivekananda said: 'you know how many sciences had their origin in India. Mathematics began there. You are even today counting 1, 2, 3, etc. to zero, after Sanskrit figures, and you all know that algebra also originated in India.'

In ancient time, mathematics was mainly used in an auxiliary or applied role. Thus, mathematical methods were used to solve problems in architecture and construction (as in the public works of the Harappan civilization) in astronomy and astrology (as in the words of the Jain mathematicians) and in the construction of Vedic altars (as in the case of the Shulba Sutras of Baudhayana and his successors). By the sixth or fifth century BCE, mathematics was being studied for its own sake, as well as for its applications in other fields of knowledge.

MATHEMATICS IN ANCIENT TIMES (3000 TO 600 BCE)

The Indus valley civilization is considered to have existed around 3000 BCE. Two of its most famous cities, Harappa and Mohenjo-Daro, provide evidence that construction of buildings followed a standardized measurement which was decimal in nature. Here, we see mathematical ideas developed for the purpose of construction. This civilization had an advanced brick-making technology (having invented the kiln). Bricks were used in the construction of buildings and embankments for flood control. The study of astronomy is considered to be even older, and there must have been mathematical theories on which it was based. Even in later times, we find that astronomy motivated considerable mathematical development, especially in the field of trigonometry. Much has been written about the mathematical constructions that are to be found in Vedic literature. In particular, the Shatapatha Brahmana, which is a part of the Shukla Yajur Veda, contains detailed descriptions of the geometric construction of altars for yajnas. Here, the brick-making technology of the Indus valley civilization was put to a new use. As usual there are different interpretations of the dates of Vedic texts, and in the case of this Brahmana, the range is from 1800 to about 800 BCE. Perhaps it is even older.

Supplementary to the Vedas are the Shulba Sutras. These texts are considered to date from 800 to 200 BCE. Four in number, they are named after their authors: Baudhayana (600 BCE), Manava (750 BCE), Apastamba (600 BCE), and Katyayana (200 BCE). The sutras contain the famous theorem commonly attributed to Pythagoras. Some scholars (such as Seidenberg) feel that this theorem as opposed to the geometric proof that the Greeks, and possibly the Chinese, were aware of. The Shulba Sutras introduce the concept of irrational numbers, numbers that are not the ratio of two whole numbers. For example, the square root of 2 is one such number. The sutras give a way of approximating the square root of number using rational numbers through a recursive procedure which in modern language would be a 'series expansion'. This predates, by far, the European use of Taylor series. It is interesting that the mathematics of this period seems to have been developed for solving practical geometric problems, especially the construction of religious altars. However, the study of the series expansion for certain functions already hints at the development of an algebraic perspective. In later times, we find a shift towards algebra, with simplification of algebraic formulate and summation of series acting as catalysts for mathematical discovery.

JAIN MATHEMATICS (600 BCE TO 500 CE)

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This is a topic that scholars have started studying only recently. Knowledge of this period of mathematical history is still fragmentary, and it is a fertile area for future scholarly studies. Just as Vedic philosophy and theology stimulated the development of certain aspects of mathematics, so too did the rise of Jainism. Jain cosmology led to ideas of the infinite. This in turn, led to the development of the notion of orders of infinity as a mathematical concept. By orders of infinity, we mean a theory by which one set could be deemed to be 'more infinite' than another. In modern language, this corresponds to the notion of cardinality. For a finite set, its cardinality is the number of elements it contains. However, we need a more sophisticated notion to measure the size of an infinite set. In Europe, it was not until Cantors work in the nineteenth century that a proper concept of cardinality was established.

BRAHMI NUMERALS, THE PLACE-VALUE SYSTEM AND ZERO

1	2	3	4	5	6	7	8	9
—	=	≡	+	h	५	७	५	७
Brahmi numerals around 1st century A.D.								

No account of Indian mathematics would be complete without a discussion of Indian numerals, the place-value system, and the concept of zero. The numerals that we use even today can be traced to the Brahmi numerals that seem to have made their appearance in 300 BCE. But Brahmi numerals were

not part of a place value system. They evolved into the Gupta numerals around 400 CE and subsequently into the Devnagari numerals, which developed slowly between 600 and 1000 CE. By 600 CE, a place-value decimal system was well in use in India. This means that when a number is written down, each symbol that is used has an absolute value, but also a value relative to its position. For example, the numbers 1 and 5 have a value on their own, but also have a value relative to their position in the number 15. The importance of a place-value system need hardly be emphasized. A place-value system of numerals was apparently known in other cultures; for example, the Babylonians used a sexagesimal place-value system as early as 1700 BCE, but the Indian system was the first decimal system. While addition, subtraction, and multiplication with zero were mastered, division was a more subtle question. Today, we know that division by zero is not well-defined and so has to be excluded from the rules of arithmetic. But this understanding did not come all at once, and took the combined efforts of many minds.

THE CLASSICAL ERA OF INDIAN MATHEMATICS (500 TO 1200 CE)

The most famous names of Indian mathematics belong to what is known as the classical era. This includes Aryabhata I (500 CE) Brahmagupta (700 CE), Bhaskara I (900 CE), Mahavira (900 CE), Aryabhata II (1000 CE) and Bhaskara II (1200 CE). During this period, two centers of mathematical research emerged, one at Kusumapura near Pataliputra and the other at Ujjain.

One of Aryabhata's discoveries was a method for solving linear equations of the form $ax + by = c$. Here a, b, and c are whole numbers, and we seeking values of x and y in whole

Distance of planets

The distance of planets from the sun in terms of earth to sun average distance known as Au (1.5×10^{15} Km) are:

Planet	Aryabhata's Value	Modern Value
Mercury	0.375	0.387
Venus	0.725	0.723
Mars	1.538	1.523
Jupiter	5.16	5.20
Saturn	9.41	9.54

STAFF CORNER

numbers satisfying the above equation. For example if $a = 5$, $b = 2$, and $c = 8$ then $x = 8$ and $y = -16$ is a solution. In fact, there are infinitely many solutions: $x = 8 - 2m$, $y = 5m - 16$, where m is any whole number, as can easily be verified. Aryabhata devised a general method for solving such equations, and he called it the *kuttaka* (or pulverizer) method. He called it the pulverizer because it proceeded by a series of steps, each of which required the solution of a similar problem, but with smaller numbers. Thus, a , b , and c were pulverized into smaller numbers. Amongst other important contributions of Aryabhata is his approximation of π to four decimal places (3.14146). By comparison the Greeks were using the weaker approximation 3.1429. Also of importance is Aryabhata's work on trigonometry, including his tables of values of the sine function as well as algebraic formulae for computing the sine of multiples of an angle. The other major centre of mathematical learning during this period was Ujjain, which was home to Varahamihira, Brahmagupta and Bhaskaracharya. The text *Brahma-sphuta-siddhanta* by Brahmagupta, published in 628 CE, dealt with arithmetic involving zero and negative numbers. As with Aryabhata, Brahmagupta was an astronomer, and much of his work was motivated by problems that arose in astronomy. He gave the famous formula for a solution to the quadratic equation.

MATHEMATICS IN SOUTH INDIA

Mahavira is a mathematician belonging to the ninth century who was most likely from modern day Karnataka. He studied the problem of cubic and quadratic equations and solved them for some families of equations. His work had a significant impact on the development of mathematics in South India. His book *Ganita-sarasangraha* amplifies the work of Brahmagupta and provides a very useful reference for the state of mathematics in his day. It is not clear what other works he may have published; further research into the extent of his contributions would probably be very fruitful.

Another notable mathematician of South India was Madhava from Kerala. Madhava belongs to the fourteenth century. He discovered series expansions for some trigonometric functions such as the sine, cosine and arctangent that were not known in Europe until after Newton. In modern terminology, these expansions are the Taylor series of the functions in question.

Madhava gave an approximation to π of 3.14159265359, which goes far beyond the four decimal places computed by Aryabhata. Madhava deduced his approximation from an infinite series expansion for π by 4 that became known in Europe only several centuries after Madhava (due to the work of Leibniz). Madhava spawned a school of mathematics in Kerala, and among his followers may be noted Nilakantha and Jyesthadeva. It is due to the writings of these mathematicians that we know about the work of Madhava, as all of Madhava's own writings seem to be lost.

MATHEMATICS IN THE MODERN AGE

Ramanujan (1887- 1920) is perhaps the most famous of modern Indian mathematicians. Though he produced significant and beautiful results in many aspects of number theory, his most lasting discovery may be the arithmetic theory of modular forms. In an important paper published in 1916, he initiated the study of the π function. The values of this function are the Fourier coefficients of the unique normalized cusp form of weight 12 for the modular group $SL_2(\mathbb{Z})$. Ramanujan proved some properties of the function and conjectured many more. As a result of his work, the modern arithmetic theory of modular forms, which occupies a central place in number theory and algebraic geometry, was developed by Hecke.

STAFF CORNER

Harish-Chandra (1923- 83) is perhaps the least known Indian mathematician outside of mathematical circles. He began his career as a physicist, working under Dirac. In his thesis, he worked on the representation theory of the group $SL_2(\mathbb{C})$. This work convinced him that he was really a mathematician, and he spent the remainder of his academic life working on the representation theory of semi-simple groups.

Manjul Bhargava (b. 1974) discovered a composition law for ternary quadratic forms. Identifying a set of importance and discovering an algebraic structure such as a composition law is an important theme in mathematics. Manjul Bhargava's stunning work in his doctoral thesis, published as several papers in the annals of mathematics, shows how to address this question for cubic (and other higher degree) binary and ternary forms. The work of Bhargava, who is currently Professor of Mathematics at Princeton University, is deep, beautiful, and largely unexpected. It has many important ramifications and will likely form a theme of mathematical study at least for the coming decades.

SIGNIFICANCE OF MATHEMATICS IN ENGINEERING

Mathematics is considered to be the base of all sciences. It has application in almost all the fields of scientific as well as non-scientific study. Mathematics is applied in elementary level subjects like Chemistry, Physics, Biology, etc as well as in complex studies like genetic analysis, cryogenics, etc. Both Mathematics and Applied Mathematics have a significant role in the first two years of any engineering degree course. The main topics in the first year are statics and dynamics of a particle, integration, and differentiation. In the second year, the importance is on differential equations and linear algebra. Engineering can be defined as a specialized branch of science which constantly monitors the changing needs of the world. It also deals with the designing and manufacturing of the products that could make life simpler, fast and efficient. From the definition itself it is clear that the application of mathematics becomes indispensable for engineering. It is impossible to engineer something without the help of mathematics. Since the applications of mathematics in engineering are so vast and varied, it is not possible to summarize them. The most important areas of Mathematics in Engineering are trigonometry, differential equations, geometry, and integral mathematics. The Civil Engineering depends greatly on the trigonometric and geometric logics. The Computer Science Engineering is largely dependent on numeric analysis, logic analysis, and algebra. Electrical Engineering entails a lot of critical analysis, crypto analysis, operation research and management. This branch of engineering heavily utilizes the mathematical principles, logic, formulae, and calculations. Mathematics is an important part of most branches of Engineering. They need to have the skill of solving mathematical models and interpreting the practical inferences. They can do this with the help of a computer. It is really necessary to keep up the correct balance between logical solutions and intuition, practice and theory, and analysis and synthesis. Thus, it can be concluded that in order to be a good engineer one should be capable of handling mathematical problems efficiently.

Team of **THE E-BULLETIN**





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