

# Sci - Tech Newsletter

## Departments of Physics, Chemistry & Mathematics



Volume 3

Issue 1

November 2018

### Vision and Mission of the Institute

#### **Vision**

To be one of the premier Institutes of Engineering and Management Education in the country

#### **Mission**

- To provide Engineering and Management Education that meets the needs of human resources in the country
- To develop leadership qualities, team spirit and concern for environment in students

### Department of Physics

#### **Vision**

To be a department to address the needs of application of Physics in Engineering

#### **Mission**

- To provide knowledge of Engineering Physics needed for understanding engineering courses
- To provide a platform to keep abreast with current happenings in Science & Technology
- To engage faculty members in research, to enrich teaching-learning process

### Department of Chemistry

#### **Vision**

Impart concepts of Engineering Chemistry for students to comprehend its applications in engineering solutions

#### **Mission**

- Provide understanding of applications of Chemistry in Engineering
- Develop concern for environmental issues and responsibility for preserving green environment
- To engage faculty members in research, to enrich teaching-learning process

### Department of Mathematics

#### **Vision**

Mould the students to acquire mathematical skills required for Engineering Education

#### **Mission**

- Provide platform to acquire abilities to evaluate problems using analytical/numerical/graphical techniques
- Provide a background for relating mathematical techniques to solve real life problems
- To involve faculty in research which enriches teaching-learning process

### **CONTENTS**

*About Departments*

*Nobel Prize*

*Article Gallery*

*Mysteries & Discoveries*

*Faculty & Students achievements*

*Science Forum Activities*



*B. N. M. Institute of Technology*

(Approved by AICTE, Affiliated to VTU, Accredited as grade A Institution by NAAC)

All UG branches - CSE, ECE, EEE, ISE & Mech.E Accredited by NBA for academic years 2018-19 to 2020-21 & valid upto 30.06.2021)

Post box No. 7087, 27<sup>th</sup> Cross, 12<sup>th</sup> Main, Banashankari II Stage, Bengaluru-560070, INDIA

Ph: 91-80- 26711780/81/82 Email: principal@bnmit.in, www.bnmit.org

## Message from the Editor

Dear Readers,

We are delighted to present the current issue of our newsletter ‘*Sci - Tech*’ which was previously named as ‘*BNMIT Sciencia*’. It is an effort to share the knowledge through articles by our students and faculty members and some new mysteries and discoveries in science. The issue carries informative articles on Nobel Prizes, NASA’s audacious endeavor to touch the Sun, Black Holes, Neutron Stars and White Dwarfs, Cryptocurrency and Graph Theory - a branch of Mathematics. ‘*Sci - Tech*’ also throws light on the achievements of our faculty members, students and activities conducted by BNMIT Science Forum.

Hope you enjoy and feel enlightened!

- Editorial Team

## About Departments

The Department of Physics aims in training future engineers with various aspects of fundamental Physics that makes them understand, develop and innovate, contributing to the advancement of technology. The Department has a well-established laboratory to provide hands on experience in Physics Experiments to students and a dedicated research laboratory where faculty are actively engaged in research activities in the areas of Photophysics and Materials Science. It has full-fledged Research Centre, recognized by Visvesvaraya Technology University, Belagavi.

The Department of Chemistry aims to impart high quality education by inspiring students to compete globally. The Department has a well-equipped laboratory to provide individual attention on the students and also academically rich experienced and research oriented faculties in the areas of Corrosion, Medicinal Chemistry, Nano Technology and Pharmaceutics. It has a full-fledged Research Centre, recognized by Visvesvaraya Technology University, Belagavi.

The Department of Mathematics is equipped with full-fledged, experienced, academically rich and research oriented faculties in the areas of Fluid Mechanics and Graph Theory among others. The Department is witnessing excellent results consistently and every year, many students are scoring cent percent marks. It has a full-fledged Research Centre, recognized by Visvesvaraya Technology University, Belagavi.

## New Feathers on our Cap

B. N. M. Institute of Technology has won Overall Championship Trophy among 98 colleges which participated in VTU Youth Festival held at BKIT, Bhalki, Bidar during November 2-4, 2018.

All the UG programs CSE, ISE, ECE, EEE & Mech. E. are accredited by NBA for academic years 2018-19 to 2020-21 and valid upto 30.06.2021.

Nobel Prize is undoubtedly the most coveted award in the whole world. The award brings with it worldwide recognition that highlights one's lifetime contribution to the benefit of mankind.

Nobel Prize was founded by Alfred Nobel, Swedish, an inventor of Dynamite and other high explosives in his 'will' in 1896. He was best known for inventing Dynamite and making Bofors, a major arms manufacturer. Nobel's brother Ludvig died in 1888 and a French newspaper mistakenly thought Alfred Nobel had died and published an obituary titled "The Merchant of Death is Dead". Alarmed at this premature obituary, Nobel became apprehensive of his legacy and specified in his 'will' that his fortune be used to create a series of prizes for those who contribute "For the greatest benefit to Mankind" in Physics, Chemistry, Peace, Physiology or Medicine, Economics and Literature. The executors of Nobel's 'will' established the 'Nobel Foundation' to take care of the fortune and organize the awarding of the prizes.

The first Nobel Prizes were awarded in Stockholm, Sweden, in the fields of Physics, Chemistry, Medicine, Literature, and Peace. The ceremony came on the fifth anniversary of the death of Alfred Nobel.

Presently, the award process takes the entire year before the awards are announced with the administrators of the awards inviting nominations from the Fall through January 31 of the next year. On February 1, the six committees begin considering nominees and make recommendations to the prize-awarding subcommittees in September and early October. The winners must be announced by November 15. Nobel week begins in early October. The Nobel Prizes are awarded on December 10, the anniversary of Alfred Nobel's death. The awards can be withheld if there are no worthy candidates or when a world situation makes awarding the prizes impractical. Because of World War II, no award was given from 1940–1942.

The top five countries with the most Nobel Laureates are all western nations - with the United States, the United Kingdom, Germany, France and Sweden

topping the tally for the best personalities in peace, literature, science and economics.

## Indian Citizens Who Won the Nobel Prize

- Rabindranath Tagore - Literature, 1913
- Sir CV Raman - Physics, 1930
- Mother Teresa - Peace, 1979
- Amartya Sen- Economics, 1998
- Kailash Satyarthi- Peace, 2014

## Indian-born Nobel Laureates

- Har Gobind Khorana - Medicine, 1968
- Subrahmanyan Chandrasekhar- Physics, 1983
- Venkatraman Ramakrishnan - Chemistry, 2009

## Nobel Laureates with Indian Links

- Ronald Ross - Physiology or Medicine, 1902
- Rudyard Kipling - Literature, 1907
- 14th Dalai Lama - Peace, 1989
- V. S. Naipaul - Literature, 2001

## Nobel Prize winners - 2018 in Physics

The Nobel Prize in Physics 2018 was awarded "for ground-breaking inventions in the field of laser physics" with one half to Arthur Ashkin, Bell Laboratories, Holmdel, USA, "for the optical tweezers and their application to biological systems", the other half jointly to Gérard Mourou, École Polytechnique, Palaiseau, France, University of Michigan, Ann Arbor, USA and Donna Strickland, University of Waterloo, Canada, "for their methods of generating high-intensity, ultra-short optical pulses".

Arthur Ashkin invented optical tweezers that grab particles, atoms, viruses and other living cells with their laser beam fingers. This new tool allowed Ashkin to realize an old dream of science fiction – using the radiation pressure of light to move physical objects. He succeeded in getting laser light to push small particles towards the centre of the beam and to

hold them there. "Optical tweezers," use the pressure from a highly focused laser beam to manipulate microscopic objects, including living organisms such as viruses and bacteria.



### ***Announcement of Nobel Laureates in Physics -2018***

Gérard Mourou and Donna Strickland paved the way towards the shortest and the most intense laser pulses ever created by mankind. Strickland and Mourou's newly invented technique, called chirped pulse amplification-CPA, soon became standard for subsequent high-intensity lasers. Its' uses include the millions of corrective eye surgeries that are conducted every year using the sharpest of laser beams. Dr. Strickland expressed hope that chirped pulse amplification might one day be used to cure cancer.

### **Nobel Prize winners - 2018 in Chemistry**

This year's Nobel Laureates in Chemistry have been inspired by the power of evolution and used the same principles - genetic change and selection - to develop proteins that solve mankind's chemical problems.

The Royal Swedish Academy of Sciences has awarded to the Nobel Prize in Chemistry 2018 with one half to Frances H. Arnold, California Institute of Technology, Pasadena, USA, "for the directed evolution of enzymes" and the other half jointly to George P. Smith, University of Missouri, Columbia, USA and Sir Gregory P. Winter, MRC Laboratory of Molecular Biology, Cambridge, UK, "for the phage display of peptides and antibodies".

Frances Arnold conducted the evolution of enzymes, leading to more environmental friendly manufacturing of chemicals, including drugs and in the production of renewable fuels. These are proteins that serve as catalysts, speeding up chemical

reactions without being used up in the process. In nature, enzymes do things like break apart long starch chains into sugars, assemble proteins, or transcribe DNA.



### ***Announcement of Nobel Laureates in Chemistry -2018***

Nobel Prize in chemistry of 2018 highlights the tremendous role of chemistry in contributing to many areas of our lives including pharmaceuticals, detergents, green catalysis and biofuels.

### **Nobel Prize winners - 2018 in other areas:**

- The Nobel Prize in Physiology or Medicine was awarded to James P. Allison, University of Texas MD Anderson Cancer Center, Houston, USA and Tasuku Honjo, Kyoto University, Kyoto, Japan, "for their discovery of cancer therapy by inhibition of negative immune regulation." The Laureates have shown how different strategies for inhibiting the brakes on the immune system can be used in the treatment of cancer.

- The Nobel Prize in Economic Sciences has been awarded to William D. Nordhaus, Yale University, New Haven, USA, "for integrating climate change into long-run macroeconomic analysis" and Paul M. Romer, NYU Stern School of Business, New York, USA, "for integrating technological innovations into long-run macroeconomic analysis."

- Nobel Peace Prize was awarded to Denis Mukwege, a gynecologist specializing in the treatment of women victimized by sexual violence in the Democratic Republic of the Congo and Nadia Murad, a Yazidi human rights advocate who survived sexual slavery by the Islamic State in Iraq.

## Article Gallery

### Parker Solar Probe

NASA's Parker Solar Probe launched from Florida on Sunday 12 August 2018, started its journey to the Sun to undertake a landmark mission. The spacecraft transmitted its first science observations in December 2018, beginning a revolution in our understanding of the star that makes life on Earth possible.

Roughly the size of a small car, the spacecraft lifted off at 3:31 a.m. EDT on a United Launch Alliance Delta IV Heavy rocket from Space Launch Complex-37 at Cape Canaveral Air Force Station. At 5:33 a.m., the mission operations manager reported that the spacecraft was healthy and operating normally.

The mission's findings will help researchers improve their forecasts of space weather events that have the potential to damage satellites and harm astronauts on orbit, disrupt radio communications and at their most severe, overwhelm power grids.

During the first week of its journey, the spacecraft was designed to deploy its high-gain antenna and magnetometer boom. It also performs the first of a two-part deployment of its electric field antennas. Instrument testing has begun in early September 2018 and last approximately four weeks, after which Parker Solar Probe begun science operations.

In the first two months, Parker Solar Probe flew towards Venus, performing its first Venus gravity assist in early October – a maneuver a bit like a handbrake turn – that whips the spacecraft around the planet, using Venus's gravity to trim the spacecraft's orbit tighter around the Sun. This first flyby placed Parker Solar Probe in position in early November to fly as close as 15 million miles from the Sun – within the blazing solar atmosphere, known as the Corona – closer than anything made by humanity has ever gone before.

Throughout its seven-year mission, Parker Solar Probe will make six more Venus flybys and 24 total passes by the Sun, journeying steadily closer to the Sun until it makes its closest approach at 3.8 million miles. At this point, the probe will be moving at

roughly 430,000 miles per hour, setting the record for the fastest-moving object made by humanity.

Parker Solar Probe will set its sights on the corona to solve long-standing, foundational mysteries of our Sun. What is the secret of the scorching corona, which is more than 300 times hotter than the Sun's surface, thousands of miles below? What drives the supersonic solar wind – the constant stream of solar material that blows through the entire solar system? And finally, what accelerates solar energetic particles which can reach speeds up to more than half the speed of light as they rocket away from the Sun? Scientists have sought these answers for more than 60-year but the investigation requires sending a probe right through the unrelenting heat of the corona. Today, this is finally possible with cutting-edge thermal engineering advances that can protect the mission on its daring journey.

Parker Solar Probe carries four instrument suites designed to study magnetic fields, plasma and energetic particles, and capture images of the solar wind. The University of California, Berkeley, U.S. Naval Research Laboratory in Washington, University of Michigan in Ann Arbor, and Princeton University in New Jersey lead these investigations.



Parker Solar Probe is part of NASA's Living with a Star program to explore aspects of the Sun-Earth system that directly affect life and society. The Living with a Star program is managed by the agency's Goddard Space Flight Center in Greenbelt, Maryland, for NASA's Science Mission Directorate in Washington.

The mission is named after Eugene Parker the Physicist who first theorized the existence of the solar wind in 1958. It's the first NASA mission to be named after a living researcher.

## Black Holes, Neutron Stars and White Dwarfs

Stars are the building blocks of the universe. They provide heat, light and the materials necessary for life. Without stars the universe would be bitterly cold, dark, desolate and lifeless. From the beginning to the end of a star's life there is so much to observe and so much to document. Stars are formed when immense gas clouds collapse. Gas clouds are quite stable but when galaxies cluster in large groups, they sometimes pass very close to each other or even collide. The immense gravitational shock of a galactic encounter disrupts the gas clouds in both galaxies. One part of the cloud becomes denser and its tranquil balance ends. The denser regions have stronger gravity which pulls surrounding matter which increases its mass and leads to gravitational collapsed formation of new cluster of stars.

Stars are mortal and they too pass with time. But it can be a very long time, from millions of years to millions of millions of years. The cosmos is an efficient recycler; the spectacular death of a star sets the stage for its new beginnings. Just a star mass is a key factor in deciding its life and death. It also determines it afterlife.

When the core of a dying star collapses, a phenomenal amount of Gravitational potential energy is released. The stars' outer layers are blown away and form what astronomers call the planetary nebula ~star dust. The collapsed core becomes one of the three possible extremely dense, exotic objects: white dwarfs, neutron stars or black holes.

About 95% of all stars eventually produce a collapsed core with mass below 1.4 times the mass of our sun (or  $1.4M_{\odot}$ ) become white dwarfs. Since our sun is below this mass, it first becomes a red giant, then its core will become a white dwarf and its outer layers will produce a planetary nebula.

Collapsed cores with mass above  $3 M_{\odot}$  become Black holes (1/1000th of all stars become Black holes) The remaining 5% are middling-mass stars which eventually become neutron stars.

A white dwarf, when first produced was very hot but not very luminous. As white dwarfage, it begins to cool and if no force acts on it eventually becomes nonexistent and produces no radiation. In other

words, it becomes more or less the same temperature as the background of space. At this point, it is considered 'black dwarfs'. A teaspoon of a white dwarf can have a mass of 30 tons. White dwarfs are also sometimes found in binary systems.

Subrahmanyan Chandrasekhar, discovered that under extreme gravitational force, electrons are squeezed into and are absorbed by nuclei. Electrons combine with protons resulting in neutrons and emitting neutrinos. Getting rid of electrons allows the star's collapse to something a thousand times smaller still—a neutron star. The core collapses in less than 1 sec into a neutron star. This star is just one giant composed entirely of neutrons.

However, strange white dwarfs and neutron stars may seem strange. Black holes are even more bizarre. All of the black holes mass is compressed into an unimaginably small volume called a singularity. Every black hole is surrounded by an event horizon. It's the limit of what we can see. The gravitational field of a black hole is so high that it pulls everything and anything which is in its close proximity. A black hole is a region of space-time exhibiting such strong gravitational effects that nothing—not even particles and electromagnetic radiation such as light—can escape from inside it. We know that stars don't last forever but what about black holes? They are very close but not quite far away. The famous Physicist Stephen Hawking discovered that black holes eventually evaporate via Hawking Radiation. Under the classical mechanics of physics, nothing can escape from a black hole. However, things shift slightly when quantum mechanics concepts are added to the equation. Under quantum mechanics, for every particle, there is an antiparticle, a particle with the same mass and opposite electric charge. When they meet, particle-antiparticle pair can annihilate one another. If a particle-antiparticle pair is created just beyond the reach of the event horizon of a black hole, it is possible to have one drawn into the black hole itself while the other is ejected. The result is that the event horizon of the black hole has been reduced and black holes can decay a process that is rejected under classical mechanics. If you fall into a black hole, theory has long suggested that gravity would stretch you out like spaghetti, though your death would come before you reached singularity. But the 2012

study in Nature suggests that quantum effects would cause the event horizon to act much like a wall of fire, instantly burning anyone to death. Black holes do not "suck." Suction is caused by pulling something into a vacuum which the massive black hole definitely is not. Instead, objects fall into them. I would like to end with a quote by Albert Einstein: "The most incomprehensible thing about the universe is that it is comprehensible"

**Sree Madhumitha**

**I EC E- B**

### **Artificial Intelligence**

I am sure most of us have heard about Sophia, Siri, Alexa and also about the Robots that serve food at restaurants.

But have you ever wondered how all these work or what the principle behind them responding to us is? Well the obvious answer will be artificial intelligence. But what is artificial intelligence?

Artificial Intelligence (AI) which is also called as machine intelligence is the intelligence demonstrated by machines in contrast to the natural intelligence displayed by humans or other animals.

AI research is basically defined as the study "intelligent agents". The term "artificial Intelligence" is applied when a machine mimics functions that humans associate with other human minds (such as learning and problem solving).

AI was founded as an academic discipline at a workshop in Dartmouth College in 1956 and has experienced several waves of optimism, followed by disappointment and loss of funding which was followed by new approaches, success and renewed funding.

AI research has been divided into subfields that often fail to communicate with each other. The subfields are on technical consideration like a particular goal with the use of particular tools.

The AI field was founded on the claim that human intelligence can be precisely described that a machine can be made to stimulate it. People also consider AI to be "danger to humanity" if it progresses unabated. People fear that unlike previous

technological revolutions, AI will create a risk of mass unemployment. In the present times, AI techniques have experienced a resurgence following concurrent advances in computer power, large amounts of data and these AI techniques have become an essential part of the technology industry. In the early 1980's, AI research was revived by the commercial success of expert systems, a form of AI program that stimulated the knowledge and analytical skills of human experts.

A typical AI perceives its environment and takes actions that maximize its chance of successfully achieving its goals. An AI's intended goal function can be simple or complex. Goals can be explicitly defined or can be induced. However, some AI systems such as nearest neighbour, instead reason by analogy, these systems are not generally given goals, except to the degree that goals somehow implicit in their training data. Such systems can still be benchmarked, if the non-goal system is framed as a system whose "goal" is to successfully accomplish its narrow classification task.

AI often revolves around the use of algorithms. An algorithm is a set of unambiguous instructions that a mechanical computer can execute. Many AI algorithms are capable of learning from data; they can enhance themselves by learning new strategies or can themselves write other algorithms.

Much of AI research involves figuring out how to identify and avoid considering broad swaths of possibilities that are unlikely to be fruitful. Compared to humans, existing AI lacks several features of human "commonsense reasoning".

The overall research goal of artificial intelligence is to create technology that allows computers and machines to function in an intelligent manner. The general problem of simulating intelligence has been broken down into sub-problems. These consist of particular traits or capabilities that researchers expect, an intelligent system to display.

There is no established unifying theory or paradigm that guides AI research. Researchers disagree about many issues.



AI is relevant to any intellectual task. Modern AI techniques are pervasive and are too numerous to list here. When a technique reaches mainstream use, it is no longer considered AI; this phenomenon is described as the AI Effect. High profile examples of AI include autonomous vehicles, search engines, online assistants, image recognition photographs, spam filtering, predicting of judicial decisions and targeting online advertisements. AI is breaking into the healthcare industry by assisting doctors. AI has also contributed to the growth of automotive industry through the creation and evolution of self-driving vehicles.

Not only this, AI is widely spread in many fields of the society and helping in the development of a better future.

**Sanjana Sridhar  
I ECE-B**

### **Welcome to the World of Cryptocurrencies: Bitcoin and Litecoin**

Cryptocurrency is a digital currency designed to work as a medium of exchange that uses cryptographic system for security. It is difficult to make forged because of its security feature. It is mainly an alternative virtual currency that can be used to buy and sell goods and services in the same way as a traditional “fiat currency”.

Cryptocurrencies are quite different to the existing traditional currencies. They offer a “decentralized” medium of exchange to easily verify, transfer funds between two parties by the use of public and private keys for security purposes. Unlike traditional currencies (which are controlled by central banks and government regulation), they derive their values from their community of users and the values can fluctuate a lot more depending on the amount of supply and demand for that currency. Since, it is a currency that exists online, you can access your money anywhere you go without worrying about Bank holidays or

Strike days. It is very safe and secure and so protects you from risks including identity theft, personal information leakage.

This is the world's first popular and major cryptocurrency which appeared in 2009. All digital currencies created since then are called altcoins or alternative coins. Litecoin, peer coin, feather coin and hundreds of other coins are all altcoins because they are not bitcoin.

The bitcoin value varies daily. The currency itself is self-contained and there is no precious metal behind the bitcoin. It is completely unregulated and decentralized. The Bitcoin transactions are irreversible and are transferred through a peer-to-peer network between individuals with no middleman bank to take a slice. A bitcoin holds a very simple data ledger called a block chain which is unique to each individual user.

The value of each bitcoin resides within each bitcoin itself and is forgery-resistant. One of the advantages of bitcoin is that it can be stored offline on a person's local hardware. However, if you lose your wallet's hard drive data or even your wallet password, your wallet's contents are gone forever.

Litecoin is an experimental digital currency that enables instant payments to anyone, anywhere in the world. Litecoin was created in October 2011 by former Google engineer Charles Lee and can handle a higher volume of transactions. Litecoin is a proven medium of commerce complementary to it. It uses peer-to-peer technology to operate with no central authority; managing transactions and issuing money are carried out collectively by the network. Litecoin Core (name of software) enables the use of this currency features faster transaction confirmation times with improved storage efficiency. The Litecoinblock chain is capable of handling higher transaction volume than its counterpart - Bitcoin.



Litecoin uses the Script technology algorithm and performs calculations much more serialised than those of bitcoin which uses the SHA-256 hashing

algorithm involving calculations in parallel processing. The litecoin can confirm transactions much faster than bitcoin. At the time of writing, the total hashing rate of bitcoin network is over 20,000 Terra Hashes per second, while litecoin is just 95,642 Mega Hashes per second. The key difference for end-users is being the 2.5 minute time to generate a block, as opposed to bitcoin's 10 minutes.

### Rajshekhar Choudhary I ECE- B

#### Crossing the Bridges with Mathematics

Mathematics is a wonderful branch of science. It is the foundation for all the branches of Engineering. Applications of Mathematics are not only confined to the Science, Technology and Engineering fields but it is so deeply rooted in our daily life, that we cannot even think of a field that doesn't involve mathematical concepts. Problem solving skills, ability to think logically about a situation, quantitative reasoning and many more such qualities are nurtured by mathematics.

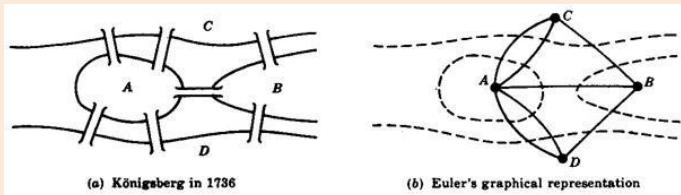
Mathematics provides a method to understand patterns, to quantify relationships and to predict the future. It strives to make our life orderly and prevents chaos. Students find Mathematics a tough subject to crack in their academics. This is mainly due to their inability to find the applications of the various mathematical tools they learn. In Mathematics, we can also find the branches which are fun filled and have wide range of applications.

Graph theory is one such branch that has applications in almost all fields of Science and Technology and our daily life. This wonderful concept was introduced by the Swiss mathematician Leonhard Euler when he solved the Königsberg bridge problem.

In the 18<sup>th</sup> century, the quaint town of Königsberg in Prussia (formerly Germany, present day Russia) was set both sides of the Pregel River and included two large islands - Kneiphof and Lomse. Königsberg was a thriving city and trading centre with its location strategically positioned on the river. The healthy economy allowed the people of the city to build seven bridges across the river, most of which connected to the island of Kneiphof. As the river flowed around Kneiphof, it divided the city into four distinct regions. The seven bridges were called

Blacksmith's bridge, Connecting Bridge, Green Bridge, Merchant's Bridge, Wooden Bridge, High Bridge, and Honey Bridge. According to lore, the citizens of Königsberg used to spend Sunday afternoons walking around their beautiful city. While walking, the people of the city decided to create a game for themselves, their goal being to devise a way in which they could walk around the city, crossing each of the seven bridges only once. Even though none of the citizens of Königsberg could invent a route that would allow them to cross each of the bridges only once, still they could not prove that it was impossible.

Leonard Euler, the famous mathematician was staying in St. Petersberg, not too far away from Königsberg. Mayor of Danzig, asked Leonard Euler for a solution to the problem.



Euler proved that the walk is not possible by representing the problem in a form of diagram called a network. He used four points to represent the four land areas and the lines to represent the seven bridges. The problem was to travel around the town crossing each bridge exactly once. On Euler's network this meant tracing over each line only once, visiting all the points.

Euler believed that this was somehow related to the problem of 'Geometry of position' which Leibniz referred to as *geometria situs*. This *geometria situs* is what is known now as Graph Theory. This invention opened a whole new type of geometry called Topology that is widely used in many areas like Cosmologists to study the structure of our universe, Engineers to design Robots, Biologists to abstract the shape and behaviour of proteins, enzymes and DNA, Physicists in Quantum Mechanics and String Theory where tiny variations in shape matter etc.

**Dr.Leena N. Shenoy**  
**Associate Professor**  
**Dept. of Mathematics**

## Liquid Water on Mars

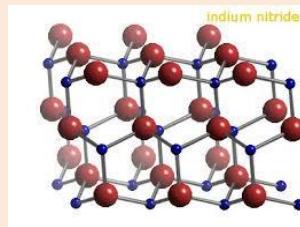
A large body of water on Mars is detected, raising the potential for Alien life. The discovery suggests that the liquid conditions beneath the icy southern polar cap may have provided one of the critical building blocks for life on the red planet.



A new paper published in Science suggests that far beneath the deeply frozen ice cap at Mars's south pole lies a lake of liquid water—the first to be found on the Red Planet. The finding is based on data from the European Mars Express spacecraft, obtained by a radar instrument called MARSIS (Mars Advanced Radar for Subsurface and Ionosphere Sounding). "The bright spot seen in the MARSIS data is an unusual feature and extremely intriguing," said Jim Green, NASA's Chief scientist. It definitely warrants further study. Additional lines of evidence should be pursued to test the interpretation.

## Diamond no longer Nature's Hardest Material

Until recently, diamond was the hardest known naturally occurring material. But, a new physical process applied to carbon has uncovered a substance wurtzite Boron Nitride (w-BN), that a group of scientists call is even harder.



*Structure of Boron Nitride*

New form of carbon was discovered that is harder than diamond but flexible as rubber. Scientists have found a way to make carbon both very hard and very stretchy by heating it under high pressure. This “compressed glassy carbon”, developed by researchers in China and the US, is also lightweight and could potentially be made in very large quantities. This means, it might be a good fit for several sorts of applications, from bulletproof vests to new kinds of electronic devices.

## Second Earth

Researchers have confirmed the existence of a SECOND Earth located in the Proxima Centauri System. The planet is believed to have oceans just like Earth and may host alien life. In the past, thousands of exoplanets have been discovered in the universe but none of them is like Proxima B.



Proxima B, as has been baptized, has very ‘promising characteristics’: it is probably rocky, slightly more massive than our own planet and is located in the region around its star that would allow liquid water on its surface to exist.

## Mind Blowing Maths

An old man in a desert had left few camels as an asset for his three Sons. When the father passed away, his sons opened up the ‘will’. The ‘will’ of the father stated that the Eldest son should get half of his total camels, the Middle son should be given  $\frac{1}{3}$ rd of his total camels and the Youngest son should be given  $\frac{1}{9}$ th of his total Camels. However, the solution of asset division became complex when the sons found that the total camel their father had were 17. As it is not possible to divide 17 into half or 17 by 3 or 17 by 9, the sons started to fight with each other. So, they decided to go to a wise man. The wise man listened patiently about the ‘will’. The wise man, after giving deep thought on this issue, brought one camel of his own and added the same to 17 making it a total of 18 camels. Now, he started reading the deceased father’s ‘will’.

Half of 18 = 9 so, he gave 9 camels to the eldest son.  
 $\frac{1}{3}$ rd of 18 = 6 so, he gave 6 camels to the middle son.

$\frac{1}{9}$ th of 18 = 2 so, he gave 2 camels to the youngest son.

Now add them up:  $9 + 6 + 2 = 17$  and they were left with one camel which the wise man took back.

**MORAL:** The attitude of negotiation and problem solving is to find the 18<sup>th</sup> camel i.e. the common ground. Once a person is able to find the common ground, the issue is resolved. It is difficult at times. However, to reach a solution, the first step is to believe that there is a solution. If we think that there is no solution, we won’t be able to reach any!

## Faculty Achievements

### Department of Mathematics

- **Sreelakshmi D.**, has been awarded Ph. D. Degree (VTU) under the guidance of **Dr. S. Manjunath**, Professor and Head.

#### Journal Publications:

- **S. Manjunath**, Solution of Lorenz Model with help from the corresponding Ginzburg-Landau Model, Applied Mathematics and Scientific Computing Trends in Mathematics, Springer Nature Switzerland AG 2018.
- **R. A. Daisy Singh**, Inter leaver Graph of Brick Product Graph C(2n, 1, 3) and Hamiltonian Laceability, International Journal of Pure and Applied Mathematics, Volume 119, NO. 14, 2018, 213-220.

### Department of Physics

#### Journal Publications:

- **J Thipperudrappa**, Experimental Studies of DC Conductivity and Thermo Electric Power of Polypyrrole/Titanium Dioxide Nano Composites, Materials Today: Proceedings 5(10), 20874-20881, 2018.
- **J Thipperudrappa**, Effect of Hydrogen Bonding and Solvent Polarity on the Fluorescence Quenching and Dipole Moment of 2-methoxypyridin-3-yl-3-boronic acid, Indian Journal of Pure & Applied Physics, Vol. 56, December 2018, pp 989-996.
- **J. Thipperudrappa and H.R.Deepa**, Modification of Spectral behavior of Ketocyanine-dye by Silver Nano-particles of different sizes, International Journal of Nanoscience, Vol. 17, No. 3 (2018) 1850022 (1-10 pages).

#### Recognition:

- **Dr.J Thipperudrappa** received a Certificate of Recognition for Outstanding Contribution in Reviewing by Journal of Molecular Liquids (An Elsevier Journal) during July 2018.

### Department of Chemistry

#### Journal Publications:

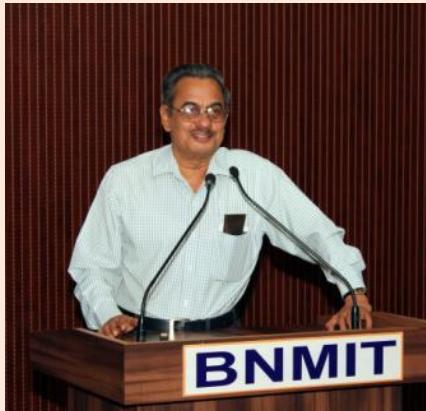
- **B. K. Jayanna and M. K. Prashanth**, Versatile Graphene Oxide decorated by star-shaped Zinc Oxide nano-composites with superior adsorption capacity and antimicrobial activity, Journal of Science: Advanced Materials and Devices, 3(2), 167- 174, 2018.
- **K. Prashanth**, Simple Fabrication of reduced graphene oxide -few layer MoS<sub>2</sub>Nano Composite for enhanced Electrochemical performance in Super Capacitors and Water Purification, Physica B: Condensed Matter, 537 (2018) 336-345.

## Student Achievements

- **Rajashekhar Choudhary** and **Rajkumar** of I EC B presented a paper on “Green Campus Initiatives” in Idea Conclave for better Bengaluru during 2-3, November, 2018 at M S RamaiahCollege of Arts, Science and Commerce, Bengaluru.
- **Mayura Nandan M R** and **Dhruv Kumar Singh** of I EC A have secured II prize in ISTE quiz 2018 organised by ISTE Student Chapter-BNMIT in association with BNMIT Q-Quotient Quiz Club held on 14<sup>th</sup> November 2018.
- **Shashank Simha B. K.** and **Sachith S. S.** of I EC B have secured III prize in ISTE Quiz 2018 organised by ISTE Student Chapter-BNMIT in association with BNMIT Q-Quotient Quiz Club held on 14<sup>th</sup> November 2018

- **Akul Bharadwaj** and **Alok** of I EC A participated in Raspberry PI Workshop at BMS College of Engineering, Bengaluru during 15-16, September 2018, during National Level Annual Tech Symposium, Phase Shift 2018.
- **Rajashekhar Choudhary** of I EC B participated in International Level Workshop on Formula Car Aerodynamics with live software simulation on 28<sup>th</sup> October 2018 at Aeronautical Society of India, AeSI, Bengaluru.

## BNMIT SCIENCE FORUM



*A talk on “Visualization of Mathematics and its Applications in Engineering Technology” by Dr. M.S. Suresh, Dean, BNMIT*



**Dr. H R. Deepa - Associate Professor, Dept. of Physics and Dr. Prathibha B.S. - Associate Professor, Dept. of Chemistry of BNMIT delivered a talk on “Nobel Prize 2018”in Physics and Chemistry respectively.**

### Editorial Team

### Faculty

**Dr. Leena N. Shenoy, Associate Professor, Department of Mathematics**

### Student coordinators

**Sachin P., I ISE    Sahana C Shekar, I CSE B    Sumukh Shenoy, I Mech.**