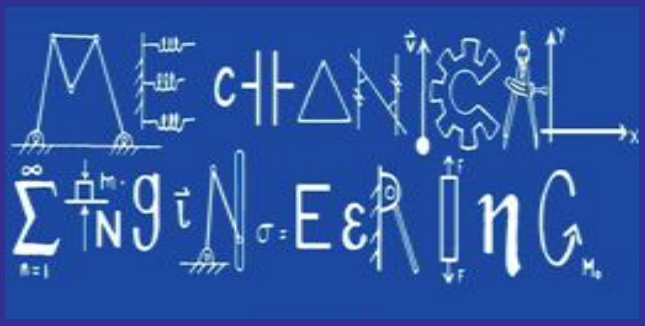
Yaantrika
Newsletter
Department of Mechanical Engineering



Volume 4 | Issue 1 | Dec-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

Objectives

- To achieve educational goals as stated in the vision through the mission statements which depicts the distinctive characteristics of the Institution.
- To make teaching-learning process an enjoyable pursuit for the students and teachers.

Vision and Mission of the Department

Vision

- To be a premier department for education in Mechanical Engineering in the state of Karnataka, moulding students into Professional Engineers

Mission

- To provide teaching - learning process that prepares engineers to meet the needs of industry and higher learning
- To provide environment for self-learning to meet the challenges of changing technology and inculcate team spirit and leadership qualities to succeed in professional career
- To instill professional ethics and concern for environment for the benefit of society

Program Educational Objectives (PEOs):

After 2/3 years of graduation, the students will have the ability to:

- Apply principles of mathematics, science and Mechanical Engineering to design Mechanical Systems and Applications in Industry
- Apply knowledge of Mechanical engineering to solve problems of social relevance with concern for environment
- Work with professional ethics as individuals and as team members in multi disciplinary projects demonstrating creativity and leadership
- Pursue higher education and research in advanced technology

Yaantrika from the Department of Mechanical Engineering is dedicated to the Italian Industrialist Enzo Ferrari, an Italian motor racing driver and entrepreneur, the founder of the Ferrari motor company.

What's inside……..!

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, 27th Cross, 12th Main, Banashankari II Stage, Bengaluru-560070, INDIA
Ph: 91-80- 26711780/81/82 Email: principal@bnmit.in, www. bnmit.org

Vidyaya Amrutham Ashnuthe

EDITOR'S DESK

Dear Readers,

Welcome to the December 2018 issue of 'Yaantrika'

The team of Yaantrika, wishes to give our readers an intellectually stimulating news letter. Our endeavor is to reflect the values and the quality of our esteemed Institution.
The present edition of Newsletter focuses on the activities/achievements of the department for past six months along with some interesting articles from our students.

We would like to appreciate all the students who contributed the articles for the issue. It is the willingness to put effort, share knowledge, concerns and special insights that have made this issue possible.

Knowledge is a treasure which appreciates when we share and depreciates when accumulated. Never stop sharing knowledge and helping others. Wishing the readers a happy reading.

Editorial Team

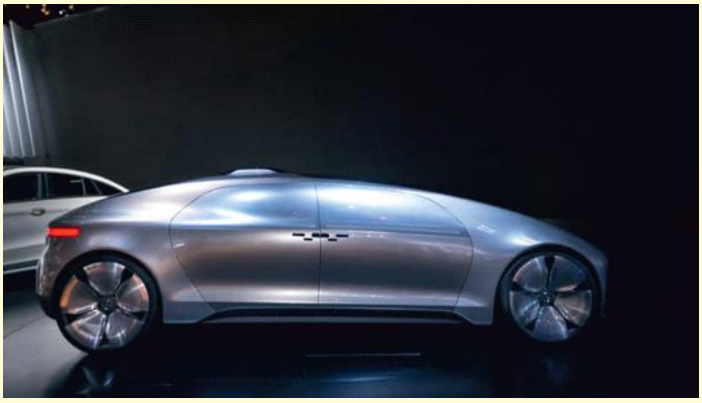
"Department of Mechanical Engineering has been accredited by National Board of Accreditation (NBA) for 3 years (2018 - 2021)"

ABOUT MECHANICAL ENGINEERING DEPARTMENT

Department of Mechanical Engineering started in the Year 2011-12 with an intake of sixty students. The department offers undergraduate program in Mechanical Engineering. All the laboratories have been established procuring state of the art equipments. The department has a team of talented and well qualified members of staff, with a blend of industrial and academic experience. Faculty members with Master's and Doctorate degree qualification having specialization in Machine Design, Thermal and Manufacturing Engineering are rendering their yeoman services to academics. The department has a R&D centre under VTU. Numerous research activities have been planned through the R&D centre.

BNMIT-Toyota Centre of Excellence was inaugurated on 14th May 2018. It is the state of the art lab equipped with cut section model of engine and transmission assembly along with clutch plate and differential gear box. The centre has been provided with separate engine and transmission systems which can be assembled and dismantled completely. From academics point of view, this type of exposure to the students of Mechanical Engineering plays vital role in their understanding of majority of core subjects by correlating the theoretical aspects of learning with hands-on sessions on the machines at the centre.

THE FUTURE OF AUTOMOBILES & CAR TECHNOLOGY - HYBRID, ELECTRIC & DRIVERLESS CARS



In a single century, the introduction of the automobile has spurred massive changes in the world culture, the communities in which we live, the environment, the economy, and personal independence. Every aspect of daily life has changed, from the places we live, to the food that we eat.

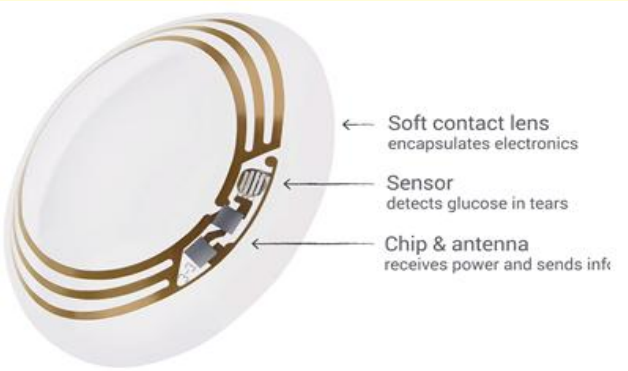
Automobiles, increasingly available to anyone, have blurred social class distinctions, expanded markets, and stimulated the economy. The industry directly employs more than 2.6 million people and according to Auto Alliance, accounts for 3% to 3.5% of a nation's Gross Domestic Product (GDP). Consumers can choose from a plethora of car manufacturers, all of whom produce different makes, models, and body styles. The vehicles can then be further customized by colour, engine type, transmission, interior design, and type of wheels. In addition, there are thousands of auto repair shops, high-performance mechanics, and body customizing shops ready to fulfil the dreams of any automobile owner.

Even though automobiles have also undergone changes significantly since their introduction, the pace of improvements in automobiles is increasing especially related to advancements to combat their negative impacts. Some futurists predict the appearance of autonomous autos self-driving cars within the next decade.

Driverless cars will be significantly more energy-efficient, safer, less damaging to the environment and more economical to operate than any mode of transportation in the human experience.

NAG POOJITH
VII SEM

GOOGLE SMART LENSES



greater load carrying potential. Image: NASA

Google came up with an idea to monitor the glucose level in humans without a blood test. Google is trying to achieve this with the help of a lens which has capability to monitor glucose level in tears.

The lens consists of a wireless chip and a miniaturized glucose sensor. A tiny pinhole in the lens allows for tear fluid to seep into the sensor to measure blood sugar levels. Both of the sensors are embedded between two soft layers of lens material. The electronics lie outside both the pupil and the iris so there is no damage to the eye. There is a wireless antenna inside the contact that is thinner than human hair which will act as a controller to communicate information to the wireless device. The controller will gather, read, and analyse data that will be sent to the external device via the antenna. Power will be drawn from the device which will communicate data via the wireless technology RFID. Plans to add small LED lights that could warn the wearer by lighting up when the glucose levels have crossed above or below certain thresholds have been mentioned to be under consideration. The performance of the contact lenses in windy environments and teary eyes is unknown.

ANEGUNDI ACHUTHA
V SEMESTER

CARBON NANOTUBE STITCHES IN AEROSPACE INDUSTRIES

The latest Airbus and Boeing passenger jets flying today are made primarily from advanced composite materials such as carbon fiber reinforced plastic — extremely light, durable materials that reduce the overall weight of the plane by as much as 20 percent compared to aluminium-bodied planes. Such lightweight airframes result directly in fuel saving, which is a major point in advanced composites' favour.

But composite materials are also surprisingly vulnerable: While aluminium can withstand relatively large impacts before cracking, the many layers in composites can break apart due to relatively small impacts.
Aerospace engineers have found a way to bond composite layers in such a way that the resulting material is substantially stronger and more resistant to damage than other advanced composites. Their results are published in the journal of *Composites Science and Technology.*

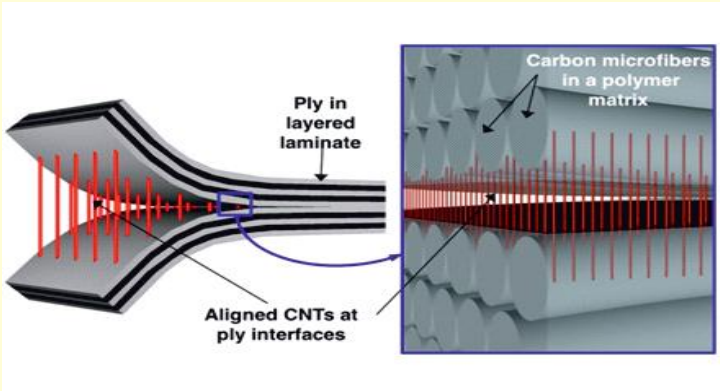
In experiments leading to test the material strength, it was found that, the stitched composites were 30 percent stronger, withstanding greater forces before breaking apart than the existing composite materials.
The researchers say that the improvement may lead to stronger, lighter airplane parts particularly those that require nails or bolts. Today's composite materials are composed of layers, or plies, of horizontal carbon fibres, held together by a polymer glue, which are weak. Attempts to strengthen this glue region include Z-pinning and 3-D weaving methods that involve pinning or weaving bundles of carbon fibres through composite layers, similar to pushing nails through plywood or thread through fabric.

Tests and Results:

The researchers came up with a technique to integrate a scaffold of carbon nanotubes within the polymer glue. They first grew a forest of vertically-aligned carbon nanotubes. They then transferred the forest onto a sticky, uncured composite layer and repeated the process to generate a stack of 16 composite plies — a typical composite laminate makeup — with carbon nanotubes glued between each layer.
To test the material's strength, the team performed a tension-bearing test — a standard test used to size aerospace parts — where the researchers put a bolt through a hole in the composite, then ripped it out. While existing composites typically break under such tension, the team found the stitched composites were stronger, able to withstand 30 percent more force before cracking.

The researchers also performed an open-hole compression test, applying force to squeeze the bolt hole shut. In that case, the stitched composite withstood 14 percent more force before breaking, compared to existing composites.

This work was supported by Airbus Group, Boeing, Embraer, Lockheed Martin, Saab AB, Spirit AeroSystems Inc., Textron Systems, ANSYS, Hexcel, and TohoTenax through MIT's Nano-Engineered Composite Aerospace Structures (NECST) Consortium and, in part, by the U.S. Army.



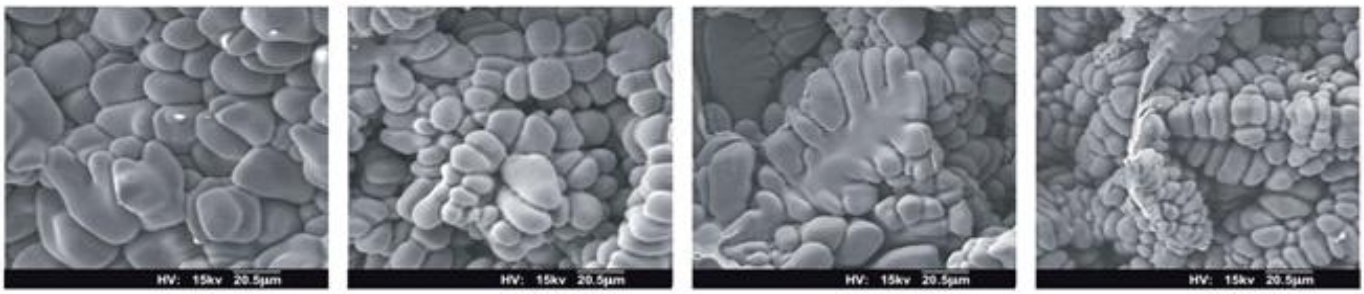
NAGENDRA OMKAR

III SEMESTER

ARE HIGH-END CAMERAS WORTH THE AMOUNT?

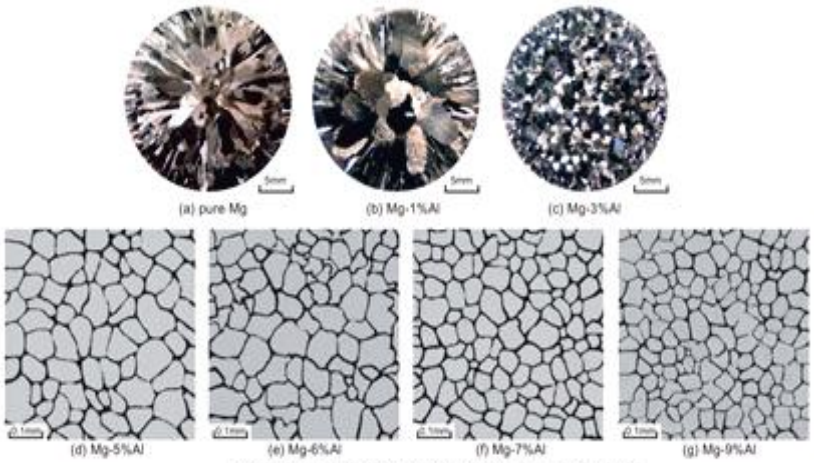
Upgrading to the high end models of leading camera brands is not everyone's cup of coffee. Professional travel photographers, full-time wildlife photographers are of need of such products. Are they worth? The main advantage of these products is the build quality. Recent advances use specialized magnesium alloys to prepare the body of these cameras. The lower camera models use plastic and carbon fiber reinforced thermosetting plastic. But when upgrading is into consideration, using a metal is very important.

Why Mg ? why not Al ? : Initially these models used aluminium but when magnesium was examined, it had enhanced properties. One third times lighter than Al; high corrosion resistance; susceptible to temperature extremities; easily machined, cast, forged and welded. Magnesium alloy can be made stronger and more workable by hot pressing under optimized condition to produce an ultrafine crystalline structure. Optical microscope and Transmission electron microscope show that ultrahigh strain rate plastic deformation induced by laser shock wave takes place at the surface layer and results in extensive formation of dislocations and twins. High density dislocations tangle and intersect with the twins lead to the refinement of grains. The micro hardness of surface layer induced by laser shock processing increases by up to 58% and the compressive residual stress on the surface of laser shocked area reaches upto 120MPa. During casting, there are high chances of aluminium melt reacting with iron and hence different fluxes are to be used to avoid such problems. But magnesium alloy casting is a fluxless process. SF_6 has been shown to be an extremely effective oxidation inhibitor for magnesium alloys. The precise mechanism is still not very clear but simplistically it involves the enhancement of the natural oxide film with MgF_2 to make it more protective. MgF_2 tends to block the pores in the MgO film and makes it more protective. This fluxless process is non-toxic.

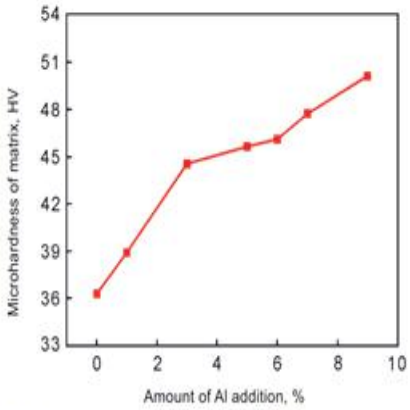


(a) Mg-1%Al (b) Mg-5%Al (c) Mg-6%Al (d) Mg-9%Al

Size and morphology of α-Mg dendrites of Mg-Al binary alloys



Photographs showing grain structures of Mg-Al binary alloys



Micro-hardness of the α-Mg matrix of Mg-Al binary alloys

In 2011, Teijin built a 4-seated concept car with its carbon-fiber reinforced thermoplastic (CFRTP) body structure. The material, claimed to be the world's first CFRTP technology, is now branded as Seereebo (Save the Earth, Revolutionary and Evolutionary Carbon).

Similarly, after much trial and error, Canon succeeded in realizing the EOS-1V as the first EOS camera that makes use of magnesium alloy. The Mg-alloy body is effective in shielding digital noise and continues to be adopted by all the digital EOS-1 models after the EOS-1V. The enhanced robustness of the material makes it possible to increase the sealing strength of the body's seams to achieve unprecedented dust and moisture resistance.

By these enhanced properties of magnesium and its alloys, leading camera brands are able to bring about significant change in the cameras like water resistant, shock proof etc and there by providing a wide range of opportunities for all the photographers to work under any situation, like the extreme desert heat and the freezing polar lands .

Sample of DSLR Camera's made up of Magnesium Alloy

VIGHNESH NANDAVAR

III SEMESTER

IOT AND AGRICULTURE

WHAT IS IoT?

IoT is an environment where people, animals, objects or instruments are given or assigned different and unique identifiers that enable them to transmit data over Internet without the aid of human - human interaction or even human-computer interaction. IoT has used it in almost every area of modern society. Among the major areas are Smart Health Care, Smart Cities, Smart Industry, Autonomous Vehicles, Smart Agriculture, Precision Agriculture, Smart Homes and others.

Any IoT based device consists of the following components:

- I/O interface for Sensors.
- Interface for connecting to Internet.
- Interface for Memory and Storage.
- Interface for Audio/Video.

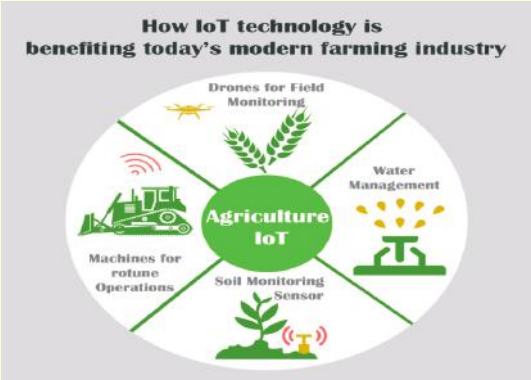
Benefits of IoT in Agriculture

The following are the benefits of IoT in Agriculture:

- IoT enables easy collection and management of tons of data collected from sensors and with integration of cloud computing services like Agriculture, fields, maps and cloud storage etc., data can be accessed live from anywhere and everywhere enabling live monitoring and end to end connectivity among all the parties concerned.
- IoT is a key component for Smart Farming as with accurate sensors and smart equipments, farmers can increase the food production by 70% till year 2050 as depicted by experts.
- Productions costs can be reduced to a remarkable level which will in turn increase profitability and sustainability.
- Efficiency level would be increased in terms of usage of Soil, Water, Fertilizers, Pesticides etc.
- Various factors would also lead to the protection of environment.

Current Status In India

Smart agriculture, the global market size of which is $17.57 billion at present is growing exponentially will soon achieve a market size as much as $26.76 billion by 2020. Smart agriculture market in Asia accounts for 40 percent of the global market share out of which India's contribution is still nominal. In India, over 40 IoT startups are dealing with smart agriculture as per National Association of Software and Services Companies (NASSCOM) report. While a majority of them are in research and development (R&D) phase, a few large-scale farmers have started implementing these IoT products on their farms for better output.



Microsoft is now taking AI in agriculture a step further. A collaboration with United Phosphorous (UPL), India's largest producer of agrochemicals, led to the creation of the Pest Risk Prediction API that again leverages AI and machine learning to indicate in advance the risk of pest attack. Common pest attacks, such as Jassids, Thrips, Whitefly, and Aphids can pose serious damage to crops and impact crop yield. In order to help farmers, take preventive action, the Pest Risk Prediction App. provides guidance on the probability of pest attacks initiated.

The Government of Karnataka announced the signing of a Memorandum of Understanding (MoU) with Microsoft Corporation India Private Limited, last year. The collaboration intended to empower smallholder farmers with technology-oriented solutions that would help them increase income using ground-breaking, cloud-based technologies, machine learning and advanced analytics.

AYUSH SURENDRA. K

III SEMESTER

INDUSTRIAL VISITS

One day Industrial Visit to M/s. Vishnu Forge Industries Pvt. Limited on 14th November 2018 by III Semester Students.

One day Industrial Visit to M/s. Shinag Allied Enterprises on 16th November 2018 by V Semester Students

Participants of FDP during Industrial Visit to M.G.I.R.E.D., Bangalore

Participants of FDP during Industrial Visit to M/s. Coca-Cola Beverages Pvt.Ltd, Bangalore

DEPARTMENTAL ACTIVITIES

Prof. T. J. Ramamurthy, Director, BNMIT addressing the gathering during Inauguration of one week faculty development program on **"Research Issues & Challenges in Mechanical Engineering"** held during 16th July – 20th July 2018.

Mr. A. Victor Sundararaj, Head - Engineering Academy, Infosys Limited, Bangalore, addressing the gathering during FDP, held from 16th July - 20th July 2018.

Dr. Shanmukha Nagaraj, Professor & Associate Dean (PG studies), R V C E, Bangalore addressing the gathering during FDP held from16th to 20th July 2018

Sri. Manohar K N, General Manager (R) TVS Motor Company Ltd. Bangalore delivering a speech on **"Start up and Engineering Skills"** during Entrepreneurship Awareness Camp held on 16th November, 2018

Prof. C.R.Panduranga Gupta, Vice-Principal Dr. Ravikumar G.V.V, Chief guest and Dr. Mukesh Patil, HoD during inauguration of FCD function held on 3rd November 2018.

Dr. Ravikumar G.V.V, Vice-President and Head of Advanced Engineering Group, Infosys, Bangalore delivering a speech on **"Challenges and Opportunities in the Current Era"** during FCD function held on 3rd November 2018.

FACULTY ACHIEVEMENTS

- Mr. Raghavendra. N has been awarded a Ph.D degree from Visvesvaraya Technological University (VTU), Belgaum.
- Mr. Saravanan. V has been awarded a Ph.D degree from Bangalore University (BU), Bangalore.
- Mr. Raghavendra. N published a paper on 'Development and Dry Sliding Wear Map for Al 7075/Al2O3 Particulate Composites' in Materials Today Proceedings, Volume 5, Issue 11, pp.3, November-2018.
- Mr. Saravanan.V published a paper on 'Numerical Comparison of Thermo Hydraulic Performance of Pin Fin Heat Sink and Micro Channel Pin Fin Heat Sink' in Sadhana, Indian Academy of Science, Vol. 43, Issue 7, pp. 1-15, June -2018.
- Mr. Madhu. P published a paper on "Non Linear Analysis of Constant Velocity Rubber Boot in a Car" in International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181. Vol. 7, Issue 10, October-2018.

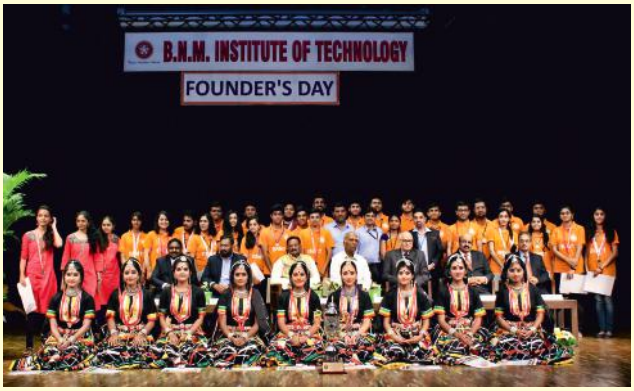
- Mr. Hemanth Kumar C. published a paper on 'Experimental Investigation on Mechanical Behavior of GFRP Composite Bolted Joints' in Journal of Emerging Technologies and Innovative Research, Volume 5, Issue 6, ISSN-2349- 5162, pp. 392-401, June-2018

- Mr. Manu. A.S Published a Paper on 'Strength Properties of Bioenzyme Treated Black Cotton Soil' in International Journal of Applied Engineering Research, ISSN 0973-4562 Volume 13, Number 7, pp. 302-306, October- 2018

- Mr. Manu. A. S and Madhushree k. J published a paper on 'Workability Characteristics of Crushed Granite Sand (CGS) in Cement Mortar' in International Research Journal of Engineering and Technology, Volume 5, Issue 5, pp 3714-3716, June-2018

- Mr. Manu. A.S presented a paper on 'Strength Properties of Bioenzyme Treated Black Cotton Soil' held at Reva University, Bangalore on 13th & 14th July 2018

STUDENTS' ACHIEVEMENTS



BNM Institute of Technology secured First place amongst 212 colleges across Karnataka in VTU Youth Fest held at BKIT, Bhalki from 2nd - 4th November, 2018.

- Periya Karupan, Arun Kumar, Abhishek. S and Shivram Mabla Gauda (VIII Sem Mechanical Engg students of batch 2014-15) published a paper on 'Experimental Investigation on Mechanical Behavior of GFRP Composite Bolted Joints' in Journal of Emerging Technologies and Innovative Research, Volume 5, Issue 6, ISSN-2349- 5162, pp. 392-401, July 2018.

- Dileep S. D, Yogesh B.K and Ravi. N (VIII Sem Mechanical Engg students of batch 2014-15) published a paper on 'Non Linear Analysis of Rubber Boot in Passenger Car' held at Reva University, Bangalore on 13th & 14th July 2018.

- Periya Karupan, Arun Kumar, Abhishek. S and Shivram Mabla Gauda (VIII Sem Mechanical Engg students of batch 2014-15) published a paper on 'Experimental Investigation on Mechanical Behavior of GFRP Countersunk Composite Bolted Joints' in International Research Journal of Engineering and Technology, Volume 5, Issue 6, ISSN-2395- 0056, pp.2488-2496, June- 2018.

- Akshar K.R. of 5th Sem presented a paper on 'Conclave for Natural Disaster Reduction and Sustainable Development' and bagged the First Prize in National Level Seminar held on 13th October 2018 at KLE's Nijalingappa College, Bangalore.

- Akshar K.R. of 5th Sem presented a paper in 'Idea Conclave for Better Bangalore' and bagged First Prize held on 2nd and 3rd November 2018 at M S Ramaiah College, Bangalore.

- Naren .P. of 3rd Sem has participated in State Level VTU Youth Festival and bagged the Gold Medal in Indian Group Song held from 2nd to 4th November 2018 at BKIT College, Bhalki, Bidar.

- Naren .P. of 3rd Sem has participated in State Level VTU Youth Festival and bagged the Bronze Medal in One Act Play held from 2nd to 4th November 2018 at BKIT College, Bhalki, Bidar.

- Agasthya Omkumar has participated in Game of Drones event at ATMOS 2018, the National Techno-Management festival of BITS Pilani, Hyderabad Campus held from 26th to 28th of October.

- Rohan Ravi. G. of 3rd Sem has participated in 'Inter-College Football Tournament' and bagged the gold medal held from 24th to 28th November 2018 at SSV Arena, Yelahanka, Bangalore.

- Ruthuraj .B. of 3rd Sem has participated in 'Inter-College Football Tournament' and bagged the gold medal held from 24th to 28th November 2018 at SSV Arena, Yelahanka, Bangalore.

- Prajwal Sharath of 1st Sem has participated in 'Asian Games Ice-Skating Championship' held in Indonesia from 27th to 29th of November 2018.

- Prajwal Sharath of 1st Sem has participated in Open World Championship and won 5 gold medals in Ice-Skating held in Philippines on 26th and 27th September 2018.

EDITORIAL TEAM

FACULTY

Manu A S
Asst. Professor

STUDENTS

Vighnesh Nandavar	III Sem
Nagendra Omkar	III Sem
Ayush Surendra K	III Sem
Anegundi Achutha	V Sem
Nag Poojith	VII Sem

For your kind suggestions & advice, kindly email to: manuas@bnmit.in