# ANTHARIKSH

**The Space...**

## DEPARTMENT OF AEROSPACE ENGINEERING

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

MYLAVARAM, ANDHRA PRADESH, INDIA.

**Vision of the Department**:

**To achieve academic excellence and produce highly competent professionals in the field of Aerospace Engineering**

**Mission of the Department**:

**DM1**: To impart high quality education in Aerospace Technology through class room teaching and laboratory practice
**DM2:** To develop indigenous Aerospace Technology by carrying out research in collaboration with industry and research organizations
**DM3:** To train and inspire the student community to possess effective communication and leadership skills with ethical values
**DM4:** To harness the technological development by being consistently aware of societal needs and challenges

**Program Educational Objectives (PEOs)**

| PEOs | Statement |
|---|---|
| PEO1 | To provide students with sound mathematical, engineering and multidisciplinary knowledge to solve Aerospace and Allied Engineering problems |
| PEO2 | To prepare students to excel in higher education programs and to succeed in industry/academia profession. |
| PEO3 | To inculcate ethical attitude, leadership qualities, problem solving abilities and life-long learning for a successful professional career |

**PROGRAM OUTCOMES (POs)**

**PO1: Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

**PO2: Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

**PO3: Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4: Conduct Investigation of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

**PO5: Modern Tool Usage:** Create, select and apply appropriate techniques, resources, and modern engineering and IT tools including predictions and modeling to complex engineering activities with an understanding of the limitations.

**PO6: The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7: Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9: Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10: Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11: Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO12: Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**PROGRAM SPECIFIC OUTCOMES (PSOs)**

**PSO1:** To apply the knowledge of Aerodynamics, Propulsion, Aircraft structures and Flight Dynamics in the Aerospace vehicle design

**PSO2:** To prepare the students to work effectively in Aerospace and Allied Engineering organizations

# FOCUS AND SCOPE

*Anthariksh is a department magazine, bridges the gap between students and faculty. Typically, a department magazine consists of Technical articles, ideas, project outcomes, language skills, literary articles, technical updates, success stories, career tips, academic advice, the latest events and happenings related to campus. Cover-stories have to be written in an engaging format. We can also include interviews of former students who have achieved success through dedication and hard work.*



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**E-Mail: anthariksh.lbrce@gmail.com**

**Disclaimer**

Some of the contents published in this magazine are from open sources. The contents of this magazine are for information purposes only, enabling the faculty and students to have easy and quick access to information and do not have any legal sanctity. This magazine is intended for circulation among students of the department of Aerospace Engineering of LBRCE only.

# FROM HOD's DESK

Dr. P. Lovaraju

## Define Goals in Binary Terms

**One critical aspect of goals is that they must be defined in binary terms. At any point in time, if I were to ask you if you had achieved your goal yet, you must be able to give me a definitive "yes" or "no" answer; "maybe" is not an option. You cannot say with absolute certainty if you've fully completed the outcome of "making more money," but you can give me a definitive binary answer as to whether or not you are currently standing on top of the Eiffel Tower. An example of a clear business goal would be that your gross income for the month of April this year is $5000 or more. That is something you can calculate precisely, and at the end of the month, you can give a definitive answer as to whether or not your goal has been achieved. That is the level of clarity you need in order to form a goal that your mind can lock onto and move towards rapidly.**

# ARE THEY HEARING ?

- STORY ABOUT AREA 51 ....!

Jashuva Akumarthy,
18761A2101.

We are living on Earth since 50,000 years over 108 billion were born, investigation of the research was started from 50 years after industrial revolution, so all these aspects made us updated to 2020 in technology and we have started visiting planets soon, as we think of the future of travelling in space and development of human life. Consistently approaching the end of the Universe may occur, in the same way, a fear started in the people that we are living on earth similarly any living being ever or still living on the planets. For that fear, scientists sending signals to the species, and we call the species ALIENS. Thinking about them now arises a question that "Are They Hearing ?". Some scientists say that they may be more advanced in the technology, they will come soon and others say they are already here. If we think about aliens are here we will get a place in our mind "AREA 51" the air base in Nevada, US, built in 1955 and still in use.

When we search in Wikipedia we get AREA 51 is the common name of highly classified United States Air force facility. The entire range covers more than 2.9 million acres of land. According to the US military, it represents "a flexible, realistic and multidimensional battle-space to conduct testing tactics development, and advanced training". The History says the origin of AREA 51 was unclear. It was created during the Cold War between the US and the Soviet Union as a testing and development facility for aircraft, including the U-2 and SR-71 Blackbird reconnaissance planes. Although it opened in 1955, its existence was only officially acknowledged by the CIA in August 2013. Four months after the CIA's disclosure, President Obama became the first US president to mention Area 51 publicly. Although official information is sparse, it is believed that the US military continues to use Area 51 to develop cutting-edge aircraft. About 1,500 people are believed to work there, many commuting on charter flights from Las Vegas. Annie Jacobsen, who has written about the history of Area 51, told the BBC that some of the world's most advanced espionage programmes are at the site. "Area 51 is a test and training facility. The research began with the U-2 spy plane in the 1950s and has now moved on to drones" she says.

The secrecy surrounding Area 51 has helped fuel many conspiracy theories. Most famous is the claim that the site hosts an alien spacecraft and the bodies of its pilots, after they crashed at Roswell, New Mexico, in 1947. The US government says there were no aliens and the crashed craft was a weather balloon. Others claim to have seen UFOs above or near the site, while some say they have been abducted by aliens, and even experimented on, before being returned to Earth. And, in 1989, a man named Robert Lazar claimed he had worked on alien technology inside Area 51. He claimed to have seen medical photographs of aliens and that the government used the facility to examine UFOs. Area 51's association with aliens may have served as a useful distraction for the intelligence agencies. "As early as 1950 the CIA developed a UFO office to deal with the sightings of unidentified flying objects over Nevada. When people first saw the U-2 spy plane flying, no one knew what they were seeing," says Ms Jacobsen. "The CIA used that disinformation to their benefit by fostering an alien mythology."

If people 'storm' AREA 51 this happens : Matty Roberts, 20, created a Facebook event proposing that "we can run faster than their bullets". Let's see them aliens". Two million people said they were "going", although a linked festival has since been moved because of fears of a "**possible hu-**

Warning signs around Area 51 make it clear that no trespassers will be tolerated. The USAF warned that Area 51 "is an open training range for the US Air Force, and we would discourage anyone from trying to come into the area where we train American armed forces". It added: "The US Air Force always stands ready to protect America and its assets."

## VERTICAL FARMING

D V Sunil Kumar,
19765A2103.

Farmers have grown food in roughly the same way for thousands of years: Planting seeds and watching them to grow; raising animals from birth to slaughter; hoping that nature provides them the right amounts of rain and sun. Now the Technology says that it has a better idea. Agriculture in its current form is bad for the Planet, it says- fields for crops and animal grazing occupy land where trees could be planted, and farming sucks up vast amount of increasingly precious water. Why not make food in a completely different way, may be growing lettuce in skyscrapers? One of the most trending modern technical farmings is "**Vertical Farming".**

**Vertical Farming** is the practice of growing crops in vertically stacked layers. It often incorporates controlled environment agriculture, which aims to optimize plant growth, and soilless farming. The modern concept of vertical farming was proposed in 1999 by "Dickson Despoiler". Some common choices of structures to house vertical farming systems include buildings, shipping containers, tunnels and abandoned mine shafts. Vertical Farming resulted in getting 10 times the crop yield than would receive through traditional farming methods. It typically uses a mix of natural light and artificial light. Artificial lighting is often LED-based and may be driven by a renewable power source such as solar power or wind turbines. There is a wide range of possible benefits when the farming is vertical. The benefits of growing indoor vary from the producers without the need of pest and disease control. Due to the closed system pests and diseases have less chance causing damage to a crop.

Another advantage is that produce can be produced year-round and can be produced close to its market, avoiding high transport costs and related $CO_2$ emissions. Vertical Farms can reduce land, fertilizer, water and pesticide use. In most cases, use of chemicals is not necessary.


How do Plants can be grown and get their Nutrients in Vertical Farming ?

And What are the Techniques used to grow the plants in Modern Vertical Farming?

***DID YOU KNOW ?***

***SLOSHING...***

***Sloshing is the violent resonant fluid motion in a moving tank. When a fluid moves and interacts with its container, the dynamic pressures of such an interactions may cause large deformation in the container wall as well as the supporting structure.***

# REYNOLD'S EXPERIMENT

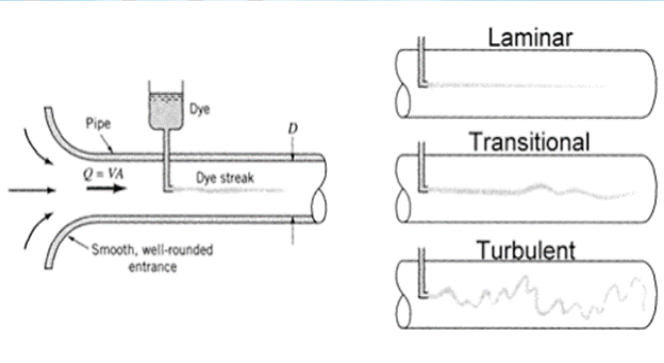
G. Roshitha Shankar, 19761A2111,
J. Sarika, 19761A2114.

It was introduced by Osborne Reynolds (1842–1912), who popularized it's use in 1883. In his 1883 paper Reynolds described the transition from laminar to turbulent flow in a classic experiment, in which he examined the behavior of water flow under different flow velocities using a small stream of dyed water introduced into the center of clear water flow in a larger pipe. The larger pipe was glass so the behavior of the layer of the dyed stream could be observed, and at the end of this pipe there was a flow control valve used to vary the water velocity inside the tube. When the velocity was low, the dyed layer remained distinct through the entire length of the large tube. When the velocity was increased, the layer broke up at a given point and diffused throughout the fluid's area cross-section. The point which this happened was the transition point from laminar to turbulent flow. The ratio of inertia forces to viscous forces, the parameter obtained is called the Reynolds number (Re), in honor of Osborne Reynolds

$$Re = \frac{inertia\ force}{viscous\ force} = \frac{\rho v D}{\mu}$$

where,

Re = Reynold's number
V = velocity of fluid
D = diameter of pipe
μ = dynamic viscosity of fluid
ρ = density




With respect to Reynolds number:
**Re = 2300 transitional flow.**

**Laminar Flow (Re < 2300, only in pipe):** Laminar flow may be described as an orderly pattern , i.e. in laminar flow the fluid moves in layer, or laminas, one layer sliding over an adjacent layer with only a molecular interchange of momentum. Such that the transverse exchange of momentum is insignificant.

**Turbulent Flow (Re > 2300, only in pipe):** The turbulent flow is a three-dimensional random phenomenon, exhibiting multiplicity of scales, possessing vorticity, and showing very high dissipation.

***DID YOU KNOW ?***

*In zero gravity, a candle flame is round and blue*

# ULTRA-MODERN TECHNOLOGY IN INDIAN TEXTS

Meena Mahitha,
20761A5638.

VAIMANIKA SHASTRA-science of aeronautics. The Ancient Indian text Vaimanika Shastra was written by Maharishi Bhardwaj, a great Hindu sage. He is one of the finest physicians, economists and a renowned scholar.

The world got to know the airplanes in 1905 only after Wright brothers flew the first plane. Whereas, the science of aeronautics was analyzed and gifted to the world by Maharshi Bharadwaj named it, Vaimanika Shastra centuries ago. According to captain Anandbodas, a retired principal of a pilot training facility, Maharishi Bharadwaj spoke the existence of airplanes 7000 years ago. Maharshi revealed to venerable Sri. Pandit Subbarayasastri, who recorded in a Sanskrit manuscript by himself before World War-I. Vaimanika Shastra discusses about the planes that were used in ancient India by the sages. In this context, it explains that the aircrafts not only flew in the earth's environment but they travelled as inter-planetary crafts. The text also described many factors that influence the aviation like the aircraft designs, aerial routes, metals and alloys used, pilot's dressing, food, etc.,. It includes the definition of vimaana (airplane), pilot, the lessons for the pilot too. It is said that the pilot must be aware of 32 secrets and only such a person can be entrusted to fly the aeroplane. The secrets consists of many traits like expertise in mantrika, taantrika, drishya, adrishya, paroksha, know the direction of enemy approach and many more. The design of the aircraft is illustrated with the 31 parts with their locations, some of them include Vishwakriyaadarpana or mirror of outside views, Shaktyaakarshana or energy attracting mirror, Parivesha mechanism above the hood of the Vimana etc.

The scientific inventions that came latter in the 19$^{th}$ and 20$^{th}$ centuries like Electric motor and electric generator have also been elucidated in the age old Indian texts. Vaimanika shastra proved it once again that the Vedas and shastras have the most sophisticated scientific techniques and the advanced technology than which the present day world follows. These shastras were thought to be inexistent and claims made by Indians were marked as mere myths, until John Bruno Hare, founder of internet sacred text archive, had brought the sacred text into light. Though the authentic book is in Sanskrit language, GR Josyer translated it into English in 1991. Still, many of the scientists and civilized people suppose the vimana shastra to be pseudoscience. On contrary, an aerospace engineer at UC-Irvine tested a model present in vimana shastra and to the world's surprise, it worked and "It is a viable aerodynamic structure" he says. It can be firmly trusted that studying the Indian texts could lead us to create advanced space crafts.

I would like to wind this up by presenting my thought that the ancient astronaut theorists have mastered the scientific knowledge, hence walking in the footsteps of the exceptional scientists India ever had, world may create wonders in building ultra-modern engineering.

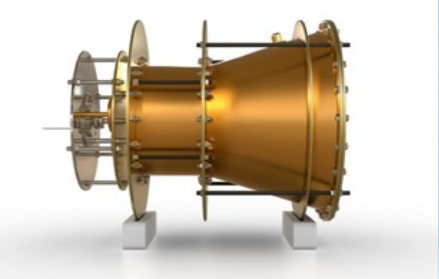
***DID YOU KNOW ?***

***If you put a giant mirror 10 light years away from the Earth and look at it through a telescope, theoretically we'd see 20 years into the past.***

# THE EM DRIVE JUST WON'T DIE

K Bharath Ganesh,
18761A2120.

The **Electromagnetic Propulsion Drive (EM Drive)** Invented by British scientist Roger Shawyer back in 1999. The EMDrive uses electromagnetic waves as 'fuel', creating thrust by bouncing microwave photons back and forth inside a cone-shaped closed metal cavity. More than 20 years after its introduction, the EmDrive is still being tested in labs around the world, including Defense Advanced Research Projects Agency (DARPA), Arington, USA. The original EmDrive, built by Roger Shawyer in 1998, is a sealed copper tube wider at one end than the other. According to Shawyer, if you bounce microwaves around inside the tube, they exert more force in one direction than the other, creating a net thrust without the need for any propellant. Theoretical model-based predictions of performance have led to new thruster designs, and these new designs may help inform future development and testing activities.



According to conventional physics, this should not happen. Put simply, closed systems like the proposed EmDrive should not generate thrust. The sticking point is the law of conservation of momentum, which says that inside a closed system momentum remains constant. Therefore, you cannot pull yourself up by your bootstraps. This result has remained solid for the past century and is accepted by many scientists. This is why most critics don't take the EmDrive seriously, and some mock it with comments about 'magic space unicorns' providing thrust, or 'EmDrive, more like BS Drive.' But several research groups, including NASA's Eagleworks and a team at Xi'an in China, tried it and got the same result, a small-but-distinct net force.

***"many enthusiastic individuals want to believe it is a method that can be used to escape the constraints of known physical principles on space propulsion systems."***

***Brice Cassenti***, an expert in advanced propulsion systems at the University of Connecticut, goes with the general view that the EmDrive does not seem plausible because it violates the law of conservation of momentum. "Only the electromagnetic waves emitted by the conical antenna can provide a momentum change, that can provide a force, and the force is several orders of magnitude too small," Cassenti told *Popular Mechanics*. ***McCulloch*** has developed a theory of Quantized Inertia (QI), which explains the effect and how it could help with human space travel. The big challenge of measuring a low level of thrust can be resolved by feeding the thrust equations into optimization software, McCulloch has designed a drive thousands of times more efficient than Shawyer's original. The current design is calculated to provide a thrust of about 0.012 N for one kW of power.

Presently, the EmDrive project is greenlit for Phase 2, DARPA told *Popular Mechanics* in February this year. Meanwhile, other teams are hoping to reach a final demonstration of the technology later this year. With two ongoing studies rigorously testing the EmDrive's "impossibility," the controversial drive that is hung around astro-engineering circles for more than two decades is only months away from its do-or-die moment.

For more details: [The EmDrive Just Won't Die | EmDrive Testing Results (popularmechanics.com)]

## REMEMBERING COLUMBIA

N. Ramanjaneyulu,
20761A5635.

**Space shuttle Columbia launch:** That Columbia's 28th Space mission, designated STS-107, was originally scheduled to launch on January11, 2001, but was delayed. Columbia finally launched on January 16,2003, with a crew of seven members. Eighty seconds to launch, a piece of foam insulation broke off from the shuttles propellant tank and hit edge of the shuttles left wing. Cameras focused on the launch sequence revealed the foam collision but engineer's couldn't pin point the location & extent of the damage. Their corners were not addressed in the two weeks that Columbia spent in orbit because NASA management believed that major damage had been caused.

**Crew members:**

- Commander: Rick D. Husband ,a U.S Air force colonel.
- Pilot: William C. Mc Cool, a U.S Navy commander.
- Payload commander: Michael P. Anderson, a U.S Air force lieutenant colonel.
- Payload specialist: Ilan Ramon , a Israeli Air force colonel.
- Mission specialist: Kalpana chawla, Aerospace engineer who was on her second space mission.
- Mission specialist: David M. Brown, a U.S Navy captain & flight surgeon .
- Mission specialist: Laurel Blair salton clark, a U.S Navy captain .

**Space shuttle Columbia disaster:** Columbia re-entered the earth's atmosphere on the morning February 1, 2003. It was not until 10 minutes later, at 8:53 A.M. the shuttle left wings leading edge had been damaged or were missing. Wind & heat entered the wing and blow it apart. The first debris began falling to the ground in west Texas near Lubbock at 8:58 A.M. One minute later, the last communication from the crew of 7 members at 9:01:10 A.M. The Crew members were killed no later than this point.

## ISRO-WHAT'S NEXT

P. G. S. S. SUBHASH,
18765A2108.

### CHANDRAYAAN-3

Chandrayaan-3 will be a mission repeat of Chandrayaan-2 but will only include a lander and rover similar to that of Chandrayaan-2. It will not have an orbiter. The Chandrayaan-2 orbiter continues to function optimally. The project is planned to be launched some time in 2022. Chandrayaan-3 is expected to retain the heritage of its predecessor while sporting a configuration that allows robust design and capacity enhancement for mission flexibility. It is estimated to be worth ₹615 crore rupees.

***WHY SRIHARIKOTA...!?***

***Sriharikota is located away from populated areas, Coastal areas, accessible to transportation of heavy equipment to the launch site- rail, road and/or shipping. Earth rotates from west to east. Man made satellites also go round the earth in the same direction (west-east). When satellites are launched towards east the satellite gains incremental velocity of the earth velocity (460 m/s at the equator), as it leaves the earth's atmosphere. Communication satellites are put into geostationary orbit above the equator with zero inclination to the equatorial plane. To achieve this the launch site should be ideally located on the equator or close to the equator. Otherwise the satellite orbit would be inclined to the equatorial plane and it has to be manoeuvred for which extra fuel is required.***

## ADITYA-L1

Aditya-L1 is India's first solar mission. The outer layers of the Sun, extending to thousands of km above the disc (photosphere) is termed as the corona. It has a temperature of more than a million-degree Kelvin which is much higher than the solar disc temperature of around 6000K. How the corona gets heated to such high temperatures is still an unanswered question in solar physics. It was meant to observe only the solar corona. It is planned to be launched on the PSLV-C56 in late 2021 or early 2022. The Aditya-L1 mission will be inserted in a halo orbit around the L1 point (Lagrangian point 1), which is about 1.5 million km from Earth. The 1,500 kg satellite carries seven science payloads with diverse objectives, including but not limited to, the coronal heating, solar wind acceleration, coronal magnetometry, origin and monitoring of near-UV solar radiation (which drives Earth's upper atmospheric dynamics and global climate), coupling of the solar photosphere to chromosphere and corona, in-situ characterisations of the space environment around Earth by measuring energetic particle fluxes and magnetic fields of the solar wind and solar magnetic storms that have adverse effects on space and ground-based technologies. Aditya L1 will be able to provide observations of Sun's photosphere, chromosphere, and corona. In addition, an instrument will study the solar energetic particles' flux reaching the L1 orbit, while a magneto-meter payload will measure the variation in magnetic field strength at the Halo-orbit around L1. The Adithya L1 mission will enable a comprehensive understanding of dynamical process of the sun and addresses some of the outstanding problems in solar physics and heliophysics. As of July 2019, the mission has an allocated cost of ₹ 375.53 crore excluding launch costs.

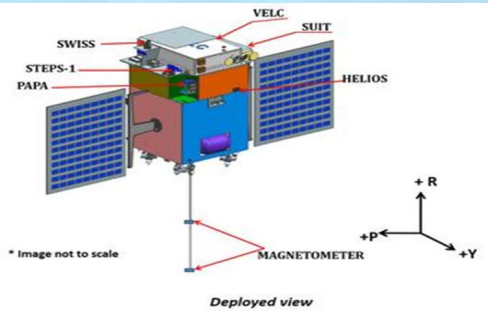
## GAGANYAAN

It is an Indian crewed orbital spacecraft intended to be the formative spacecraft of the Indian Human Spaceflight Programme. The spacecraft jointly manufactured by ISRO, the Defence Research and Development Organisation (DRDO), and the Hindustan Aeronautics Limited (HAL). The objective of the mission is to carry three people in a 3.7-tonne capsule which will orbit the Earth at a 400 km altitude for up to seven days. The crewed vehicle was originally planned to be launched on ISRO's GSLV Mk III in December 2021, but this has since been delayed to no earlier than 2023. At present, the Indian astronauts are preparing for the mission in Russia, training in a simulated zero gravity environment to get accustomed to the harsh conditions of space. ISRO conducted its successful Re-entry and Pad Abort test on 18 Dec 2014 and 5 July 2018. It has also planned two uncrewed orbital test flights of the Gaganyaan capsule the first in December 2021 and the second, 2022.

***DID YOU KNOW ?***

***Bumblebees are not designed to fly. It's body is too heavy for it's light wings, wings that should not able to keep it in the air. Bumblebees refuse to accept their limitations. It flies inspite of what its been told it cannot do. It knows their strength.***

***Be a bumblebee***



Deployed view

# IMPORTANCE OF COMPOSITE MATERIALS IN AEROSPACE/ AVIATION INDUSTRY

S. Indrasena Reddy

Asst. Professor

The composite materials are becoming the preferred material in many applications such as Aerospace, Automotive industry, Civil structures, etc. Composite materials are the combination of two or more elements with different properties. As a result, they offer desirable combination of proper-ties based on principle of combined action to meet a particular requirement which may not be possible if any one of the constituent used alone. The two materials work togeth-er to give the composite unique properties. One of the constituent is called as rein-forcement and the one which it is embed-ded is known as matrix.

Composite materials are important to the Aviation Industry because they provide structural strength comparable to metallic alloys, but at a lighter weight. Composite materials have played a major role in weight reduction, and hence they are used for both structural applications and compo-nents of all space-craft and aircraft from gliders and hot air balloon gondolas to fighter planes, space shuttle and passenger airliners. This leads to improved fuel effi-ciency and performance from an aircraft. Boeing's 787 Dreamliner will be the first commercial aircraft in which major struc-tural elements are made of compo-site mate-rials rather than aluminum alloys.

Since the birth of aviation, designers have continuously endeavored to improve the lift to weight ratios of aircrafts. the use of com-posite materials, as these enable designers to overcome the barriers created by using metals. They can be formed into various shapes to increase their strength and lay-ered with fibers running in a different di-rection, to allow designers to form struc-tures with unique properties. The develop-ment of next generation composite materi-als with light-weight and high-temperature re-sistance will help in designing high-performance, economical aircrafts.

A Brief History of Composite Materials in Aerospace: Fiberglass consisting of glass fibers embedded in a resin matrix is the most common composite material, and first came to prominence in the 1950s for designing Boeing 707 passenger jet. Com-pressor blades of the RB211 jet engine de-veloped by Rolls Royce in 1960s were made of carbon fiber, which is brittle and has unique fatigue behavior. Fibrous com-posite materials were originally used in small amounts in military aircraft in the 1960s and within civil aviation from the 1970s. Since the 1980s composites have primarily been used for secondary wing and tail components such as wing trailing edge panels and rudders. Each generation of new aircraft de-veloped by Boeing has had an increased percentage of composite material, with the highest being 50% in Boeing 787 Dreamliner. The major struc-tural elements of Boeing's 787 Dreamliner are made of more carbon 'sandwich' com-posites and advanced carbon laminate, a shift away from archaic fiberglass compo-sites.

Aramid fibers, on the other hand, are wide-ly used for constructing leading and trailing edge wing com-ponents and very stiff, very light bulkhead, fuel tanks and floors.

Advantages of Composites Usage in Aer-ospace: Some of the key benefits of using composites for aer-ospace applications in-clude the following:

• Weight reduction up to 20 to 50%.

• Single-shell molded structures provide higher strength at lower weight.

• High impact resistance. For instance, Kevlar (aramid) armor shields planes have reduced accidental damage to the engine pylons that carry fuel lines and engine controls.

• High thermal stability

# ACHIEVEMENTS

## LIST OF GATE-2021 QUALIFIED STUDENTS

| S.No. | Reg. No | NAME | GATE Reg. No. | ALL INDIA-RANK | SCORE |
|---|---|---|---|---|---|
| **1** | **17761A2120** | **MALLAVARAPU CHERISHMA** | **AE21S26065096** | **83** | **640** |
| 2 | 17761A2110 | GIRAJALA SURYA KALAVATHI | AE21S26065308 | 586 | 373 |
| 3 | 17761A2114 | KUCHIKA SRIHARI | AE21S26065208 | 545 | 387 |
| 4 | 17761A2132 | SHAIK VANHAR ALI | AE21S26065320 | 605 | 369 |
| 5 | 19765A2106 | RAGIREDDY SURESH | AE21S26065300 | 883 | 314 |

## PLACEMENTS

| S.No. | Reg. No | NAME | NAME OF THE COMPANY | PACKAGE |
|---|---|---|---|---|
| 1 | 17761A2122 | M.N.V.Bharadwaz | VEM Technologies Pvt. Ltd. Hyderabad | 2.86 Lakh |

*If A equal SUCCESS then the formula is A equals x plus y plus z. With x being work , y is play and z is keeping your mouth shut...*

-Albert Einstein

హృదయానికి లయతో లాలి పాడింది అమ్మ
మన ఊయలతో ఉసూలు అడింది అమ్మ
మమకారమును ముచ్చటతో అద్దింది అమ్మ
చిరకాలం చిరంజీవిల వర్ధిల్లు అనే దివేన అమ్మ
అమ్మ చేతి ముద్దకి సాటిరావు పరమాన్నాలు
తప్పు, ఒప్పులను అనురాగంతో సరిచేసే గురువు అమ్మ
తన నిద్రలో మన మెలుకువని పసిగట్టే బంధం అమ్మ
బాధలో భుజం ఇచ్చే స్నేహితురాలు, చీకటిలో వెలుగే అమ్మ
మరోజన్మ ఉన్న లేకపోయినా, జన్మజన్మలకి నువ్వే అమ్మ
ప్రపంచం నన్ను మరిచిన, ప్రాణం పోయినా తగ్గదు నీ ప్రేమ

మీ నజుముద్దీన్

# ANTHARIKSH

THE SPACE...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