A.Y. 2021-22 **Departmental E-Magazine** MECHARDOUR together we evolve... ARTIFICIAL **ELLIGENCE** 2 zadi ka Amrit Mahotsav 5**G** ELHNOLOGY THINGS



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3D PRINTING

> PCET'S & NMVPM'S Nutan Maharashtra Institute of Engineering & Technology Mechanical Engineering Department



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Nurturing innovation \mathcal{F} creativity are key elements of a successful education system \mathcal{F} this \mathbb{E} -Magazine of Mechanical Engineering Department is a perfect blend of both. I am extremely happy to see this edition of \mathbb{E} -Magazine \mathcal{F} do appreciate that faculties and students have taken efforts to bring out this edition of \mathbb{E} -Magazine in this pandemic situation.

Through this magazine I would like to highlight that our students are performing very well in the academics as well as in the various events at state § national level. We are at NMIET trying to inculcate the best technical as well as best analytical skills in our students, to make them technologically superior and ethically strong. We at NMIET are committed towards creating opportunities.

This E- Magazine is a good platform for our students as well as faculties to show their creative abilities. I am sure that this platform will bring out an array of creativity with various distinct flavours.

I wish good luck and congratulations to all...

Dr. Lalitkumar Wadhwa Principal





It is a matter of pride to pen down the message for Mechanical Engineering departmental emagazine. This is a platform for the students to express their creative pursuit which develops in them originality of thought and perception. Department as well as college provides an ocean of opportunity for the students to exhibit their hidden talents and get a spotlight t for their efforts. Besides, this particular magazine inspires the young minds to view the world in a broader perspective. I congratulate the students as well as faculties who used this forum to present their ideas. As long as our ideas are expressed and thoughts are kindled we can be sure of learning, as everything begins with an ídea.....

My best wishes to all......

Dr. Pranav Charkha HOD Mechanical Engg.





Message

A good reader always hungry for the new content \mathfrak{S} here we are proudly presenting this second edition of our magazine.

As we are publishing new edition of the magazine the enthusiasm for crafting the magazine is still high. With the past experience of editing g designing all students of magazine committee have worked very creatively to bring this edition.

This edition is mixture of concepts of Past, Present ξ future of the Mechanical Engineering. I am sure that variety of content available in this edition of magazine will attract the readers.

Your valuable feedback & suggestions are important to us, please do share with us.

Thank you ...







Message

"A pen is mighter than the sword "they say. Every article in the magzine has beautifully justified the saying & crafting a college E-magzine was like making visible the shining tip of sword sharpened at our institute to all.

"Drop - Drop makes the ocean " we all know every drop has contribution in making ocean so immense and beautiful. Every article and content of the magzine was like a drop making this magzine "the ocean" so beautiful and enjoyable. It was a cumulative efforts of all the authorities and students in crafting this beautiful "college Emagzine."

It was a great opportunity and all together a great experience and pleasure in crafting a magzine for such a aknowledged and beautiful institute "Nutan Maharashtra institute of engineering and technology".

Editorial Team



Mr. Tejas Parbhane



Ms. Muskan Attar



Mr. Mahesh Mahajan



Ms. Mrunmayee Gadre





Ms. Aakansha Kamble



Mr. Naman Nandurkar



Mr. Rushikesh Kale



Mr. Aniket Udugade



About the Department

The Mechanical Engineering Department is the one of Best Department of Nutan Maharashtra Institute of Engineering & Technology (NMIET). The department believes in delivering the best Market value recent practical based education to there students. The department has highly qualified and experienced faculty with expertise in the areas of Design, Production, Manufacturing, CADCAM and Thermal. The Department continuously encourages their students to participate in various activities like Industry Based Project Work, VLCI, GIZ. Apart from placement, The Department provides platform to students for Higher Education as well as Entrepreneurship.

Year of Establishment: U. G. : 2012-2013

Intake: 60 Seats

DTE Code : EN6310

Affiliated to: Savitribai Phule Pune University, Pune.

VISION & MISSION Department of Mechanical Engineering



"To be a renowned mechanical engineering education provider for serving needs of industry and society"



1.To provide quality technical education with an effective teaching learning process.

2.To bridge the gap between industry and academia by collaborative activities.

3.To develop students with research, innovation and entrepreneurship activities.

4.To advance graduates with professionalism and a sense of gratitude towards society.

Program Outcomes (POs)

1. Engineering Knowledge

An ability to apply knowledge of computing, mathematics including discrete mathematics as well as probability and statistics, science, and engineering and technology

2. Problem Analysis

An ability to define a problem and provide a systematic solution with the help of conducting experiments, as well as analyzing and interpreting the data

3. Design / Development of Solutions

An ability to identify, formulate, and provide systematic solutions to complex engineering problems

4.Conduct investigations of complex problems

An ability to use the techniques, skills, and modern engineering technologies tools, standard processes necessary for practice as an IT professional

5.Modern Tool Usage

An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modelling and design of computer-based systems with necessary constraints and assumptions

6.The Engineer and Society

An ability to analyze the local and global impact of computing on individuals, organizations and society

Program Outcomes (POs)

7. 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.

8. Ethics

Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and Team Work

Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. 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.

11. 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.

12. Life-long Learning

Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

Programme Specifics Outcomes (PSO)

PSO 1 Analyzing and designing optimal solution(s) in the fields of Design, Thermal, Manufacturing and Industrial Engineering according to industry needs.

PSO 2 Develop an aptitude of innovative product development & providing solution to live industrial problems by equipping with modern analytical tools.

Programme Educational Objectives (PEO's)

PEO1	To develop technical professionals in various domains of mechanical engineering to solve relevant problems.
PEO2	To build foundation in engineering fundamentals to synthesize innovative solutions.
PEO3	To inculcate the spirit for technical professional and social ethics with lifelong learning to make aware about latest trends.
PEO4	To nurture communication, teamwork and interdisciplinary approach related to human values with ecology.

OUR TOPPERS

Final Year Students



Mr. Sandesh Donapurge 9.89/10



Mr. Auti Siddhey 9.77/ 10



Mr. Budhbaware Bhushan 9.73/ 10

Third Year Students



Mr. Chordiya Dhiraj 9.57/ 10



Mr. Suprap Paritkar 9.55/10



Mr. Patil Omkar 9.50/10

Second Year Students



Mr. Chaudhari Abhishek 8.66/10



Mr. Gadre Mrunmayee 9.55/ 10



Mr. Hebale Mallikarjun 9.50/ 10

Technical Articles

delete

"The human spirit must prevail over technology Albert Einstein

CNC Lathe part programming



Mr. Mallikarjun Hebale

NC part programming involves a series of coded instructions that are required to produce a part. The program controls the machine tool movements and controls auxiliary functions including spindle, coolant and rotation. The instructions may include numbers, letters, and symbols arranged in functional format blocks.

CNC part programming uses a program input device such as a keyboard, diskette drivers, pouched tape reader or serial ports among others. The program describes work that should be done on a part in the format required by CNC software. Programming is the point at which all the machining data is compiled and translated so that the control system can understand and implement the instructions.

Computerized numerical control machining is becoming more popular in computeraided computer-aided design and manufacturing (CAD/CAM) compared to conventional machining processes because level of productivity and high of its precision, coupled with ability to machine complex shapes 2Dand 3D. in numerical Computerized control machining with CAD/CAM has evolved over the past three decades and has established itself as the most acceptable and preferable means of manufacturing complex parts because of its flexibility and capacity to replicate parts with high accuracy, especially in high volume manufacturing operation. CNC machining equipment operates on multiple axes, however standa-

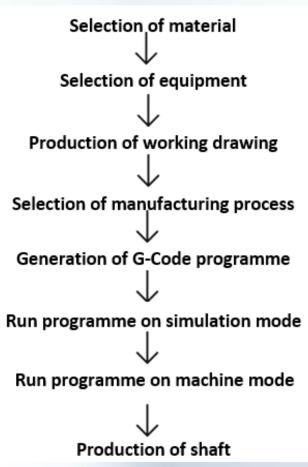


rd CNC machine has three linear motions along X, Y and Z axes while five axes machine has two additional axes of rotation. CNC machining operation has employed extensively the been in automotive industry largely because of the high precision, product consistency and high productivity and efficiency associated with the process. The application of CNC machining in manufacturing has been identified as a feasible solution to problem associated with additive manufacturing.

The application of CNC machining in manufacturing has been identified as a feasible solution to problem associated with additive manufacturing. Manufacturing method that produces components by adding or laying the material on each other to form a monolithic part. Furthermore, the possibility for automation and flexible manufacturing system has made CNC technology the best option to manufacture complex parts like transmission system and other intricate engineering parts.

Process planning: -

Generally, the production process begins with conceptualization of the product (shaft) and the starting point is the selection of the appropriate material and the type of equipment to be used. CNC lathe is the appropriate equipment for the production of the multiple steps shaft. The process for the production of the multiple-steps shaft can be depicted in form of flow chart below:-



The machining operation was carried out at the CNC laboratory. The major parameters for machining such as cutting speed, feed rate, and the depth of cut were considered. The depth of cut was carefully considered because of the nature of the work-piece while the machining operation was carried out at room temperature of about 280 C, due consideration was given to the measurements to obtain desired result.

Indoor Environmental Quality In Nearly Zero Energy Schools



Mr. Mahesh Mahajan

ndoor Environmental Quality (IEQ) is an important determinant of health and wellbeing. This is true for adults, but even more so for children. Children are continuously developing their lungs and other organs which explains why they are more susceptible to e.g., air pollution. Traditionally, research and policy have been focusing on the environmental quality outdoors, while missing to address the fact that most people, including children, spend most of their time indoors.

The two dominant indoor environments for children are the home environment and the school environment. In this seminar, we focus on the latter one. According to the World Health Organization, everybody has the right to breathe in healthy air indoors1. In the last decade, a lot of attention has been paid to health problems and indoor climate complaints of those working indoors. As a result, in recent years many office buildings have been transformed from 'sick' to 'healthy' buildings. However, similar interventions are still missing in school buildings, where scholars are often not consulted about their satisfaction with indoor comfort conditions. Without intervention, fine particles and CO2 concentrations in schools could be higher (Even three times or more) than in offices. Similarly, indoor temperatures in classrooms are often uncomfortably warm or cold and lighting conditions are far from optimal, while office buildings have well-filtered, air conditioned, well-illuminated, and acoustically insulated spaces. "Thermal comfort Is that condition of mind, which expresses satisfaction with the thermal environment, and it is assessed by subjective evaluation". Six primary factors directly affect thermal comfort and they are generally grouped into two categories:

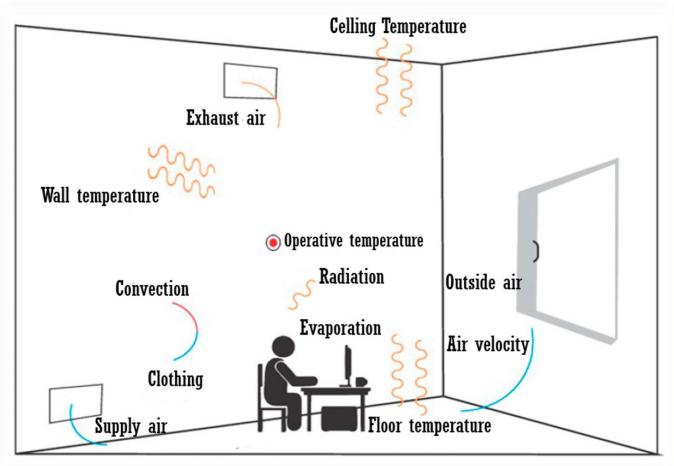
Personal factors:

Characteristics of the occupants (Including clothing and metabolic rate)

Environmental factors:

Conditions of the thermal environment (including indoor air temperature, mean radiant temperature, air speed, and relative humidity).

Apart from the parameters indicated above, there are additional factors affecting thermal comfort and heat dissipation from body such as food and drink, acclimatization, body shape, body mass index, age and gender, and state of health. Several studies have shown that poor IEQ reduces children's learning performances. Furthermore, we know that suboptimal air quality in have severe health classrooms can consequences, like the development of chronic respiratory diseases and (indoor climate-related) allergies. In many European countries more than 20% of children have developed such diseases by the age of 12. This number in India is probably similar or even higher. To warrant a healthy indoor environment, especially at school, we need to use energy for heating, cooling, ventilation



lighting of classrooms. Energy or performance of schools should be optimized ensuring proper air quality, thermal, acoustic, and visual comfort as mandatory goals. To have a proper balance between the initial investment and the recurring energy bills, the comprehensive approach of carefully designed school envelope and HVAC system should be followed, and not only reducing the delivered services to save energy. Another reason to minimize energy use in schools is of fight global course to warming. European countries as well as India have decided to ratify the Paris Agreement on Climate Change, which implies that all buildings, including schools, should be optimized, not just in terms of IEQ but also in terms of energy performance.

Automobile Air Conditioning The Journey So Far



Mr. Shubham Mune

utomobile air conditioning is now a fundamental requirement for motorists. However, the majority of us still have fond memories of cars without extras like air bags, power windows, power steering, antiskid brakes, or air conditioning.

In India driving during the hot and humid summertime results in sweaty passengers. Air-conditioning in automobiles has significantly improved human comfort and to some extent safety. It is now a necessary component of all kinds of vehicles. It may be interesting to know that Chrysler Imperial was one of the first production cars to offer automobile air conditioning in the year 1953, nearly 12 years after Packard and Cadillac made their first attempt way back in 1940 and 1941 respectively. In earlier days, a car AC system consisted of a fixed displacement compressor with electromagnetic clutch, two heat exchangers mostly made of copper tubes and fins and an expansion valve- all components connected with rubber or aluminum pipe lines with a desiccant filter driver receiver on the liquid line. A simple mechanical thermostat controlled the cabin temperature. The refrigerant used for decades was R12, a chlorofluorocarbon known as CFC-12 or its brand name Freon-12. After using R12. a CFC, for nearly 4 decades, it was found that this refrigerant was damaging the ozone layer and was responsible for ozone depletion. So R12 was banned from being manufactured in the US from 1996, and an alternative refrigerant R-134a was man-



dated for all cars manufactured after 1996. In India, R-134a was introduced by all car manufacturers from the year 2000. The simple under-dash or in-dash mounted evaporator soon became a thing of the past. To increase space and make the driver cabin more comfortable, centrally mounted HVAC systems came into vogue. This led to the introduction of climate control and dual zone temperature control systems in the same car cabin. Dual AC systems, front and rear cooling units for multi-purpose vehicles (MPVs) and passenger cars were introduced around the same time. The HVAC system has the heater, evaporator and blower unit all in one. With the option to set the desired temperature automatically controlled by flaps/dampers using the climate control unit on the dashboard. To enhance the quality of air circulating inside the cabin, air filters or pollen filters are provided by most OEMs as standard feature with the car. The cabin air filter keeps out dust, soot and pollen, restricts the impurities and from flowing with the air over the evaporator into the passenger compartment. In the quest to improve fuel efficiency, reduce overall weight and reduce system size, many OEMs started using aluminum serpentine and parallel flow condensers. In serpentine design, one long tube is the folded back and forth, compressed with fins in between, with just a single path for refrigerant flow the to through. Refrigerant flows from the upper inlet to the bottom outlet through two tubes. The modern car AC system thus comes at a price, as some of the components are not repairable or reusable. Maintenance and servicing is more complicated and difficult. The journey of car AC in the last three decades has been very rapid. Gone are the days of non-AC cars, and when the AC needed to be switched off while climbing a steep mountain road. Modern car AC systems are more efficient, less taxing on the vehicle engine, and come with smarter support systems.

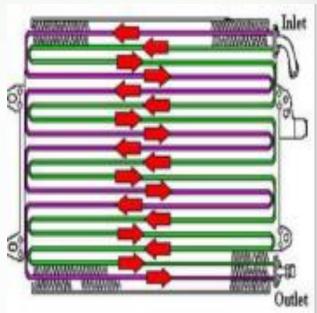


Fig. Serpentine Condenser

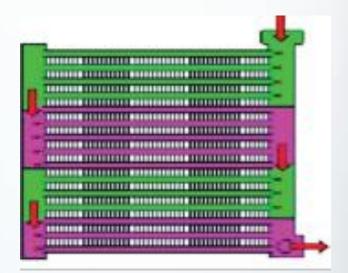
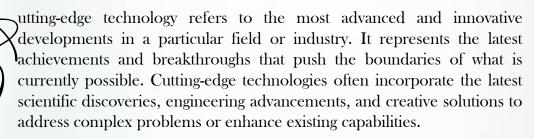


Fig. Parallel Flow Condenser

Cutting Edge Technologies in Mechanical Engineering



Mr. Ashwin Khalkar



Additive Manufacturing (3D Printing):

3D printing technology has been revolutionizing the manufacturing industry by enabling the creation of complex geometries, rapid prototyping, and customized products. In mechanical engineering, it's being used to produce lightweight and high-performance components for aerospace, automotive, and medical applications.

Robotics and Automation:

Robotics and automation are being increasingly integrated into various industries, including manufacturing, logistics, and healthcare. Advancements in robotic technology are leading to more sophisticated, agile, and collaborative robots capable of performing complex tasks.

Advanced Materials:

The development of advanced materials with superior properties, such as carbon fiber composites, graphene, shapememory alloys, and super alloys, is enriching the performance, efficiency, and safety of mechanical systems.

Internet of Things (IoT):

IoT is transforming the way mechanical systems are monitored and controlled. By embedding sensors and connectivity in machines, engineers can collect real-time data, optimize performance, and predict maintenance needs, leading to improved efficiency and reduced downtime.

Computational Fluid Dynamics (CFD):

CFD simulations are becoming more powerful and accessible, enabling engineers to study fluid behavior, heat transfer, and aerodynamics with greater accuracy. This technology finds applications in designing efficient cooling systems, aerodynamic optimizations, and weather simulations.

Nanotechnology:

Nanotechnology is offering opportunities for mechanical engineers to create advanced materials, coatings, and nanoscale devices with unique properties, leading to improvements in strength, durability, and functionality.

Energy Harvesting and Storage:

The focus on renewable energy and sustainability has driven research in energy harvesting technologies. Mechanical engineers are exploring innovative ways to capture and store energy from vibrations, heat, and other mechanical sources.

Biomechanics and Biomedical Devices:

Mechanical engineers are increasingly involved in developing cutting-edge medical devices, prosthetics, and implants. This field combines mechanical engineering principles with biology and medicine to improve healthcare outcomes.

Artificial Intelligence and Machine Learning:

AI and ML are being integrated into various aspects of mechanical engineering, such as design optimization, predictive maintenance, and autonomous systems, to enhance efficiency and performance.

Virtual Reality (VR) and Augmented Reality (AR):

VR and AR technologies are transforming the design and visualization processes in mechanical engineering, allowing engineers to create, test, and modify prototypes in virtual environments, leading to faster and more cost-effective product development.

These technologies are constantly evolving, and it's essential to stay up-to-date with the latest advancements to remain at the forefront of mechanical engineering.

Marvels in Mechanical Engineering



1. Hyperloop Technology:

Hyperloop is a proposed high-speed transportation system that uses magnetic levitation to propel passenger pods through low-pressure tubes at incredible speeds. Several companies have been working on prototypes and conducting successful tests, bringing this futuristic transportation concept closer to reality.

2. Floating Offshore Wind Turbines:

Floating offshore wind turbines are a groundbreaking technology that allows wind farms to be installed in deeper waters where traditional fixed foundations are not feasible. These turbines harness stronger and more consistent winds, opening up vast areas for renewable energy production.

3. Vertical Takeoff and Landing (VTOL):

Aircraft: Advances in VTOL aircraft technology are bringing us closer to practical electric flying taxis and autonomous aerial vehicles. These aircraft combine aspects of helicopters and fixed-wing airplanes, enabling vertical takeoff and landing while providing the efficiency of winged flight.

4. Mars Rovers and Space

Exploration: Engineers have been continuously pushing the boundaries of mechanical design and autonomy with the development of Mars rovers like Perseverance. These robots are equipped with advanced instruments and capabilities to explore the Martian surface and conduct scientific experiments.

Mr. Dhiraj Chordiya

5. Supercritical Carbon Dioxide (sCO2) Power Cycles:

SCO2 power cycles are gaining attention as a more efficient and compact alternative to traditional steam cycles for power generation. This technology has the potential to significantly improve the efficiency of power plants and reduce carbon emissions.

6. High-Performance Electric Vehicles (EVs):

Mechanical engineers have been instrumental in designing and optimizing high-performance electric vehicles, with impressive advancements battery in technology, power electronics. and aerodynamics, leading to increased range and performance.

7. Self-Healing Materials:

Self-healing materials are a fascinating development in mechanical engineering. These materials have the ability to repair themselves when damaged, offering increased durability and potentially reducing the need for frequent maintenance and repairs.

8. Space Launch Vehicles:

The development of reusable rockets, like Space X's Falcon 9 and Falcon Heavy, has revolutionized the space industry. These rockets are capable of landing back on Earth after launching payloads into space, drastically reducing the cost of space missions.

9. Advanced Prosthetics:

Mechanical engineers have played a crucial role in developing cutting-edge prosthetic limbs that are more lightweight, responsive, and adaptable, significantly improving the quality of life for amputees.

10. Green Building Technologies:

Mechanical engineers are at the forefront of designing sustainable and energyefficient buildings. Advancements in HVAC systems, energy-efficient materials, and smart building technologies are transforming the construction industry.



Fig. Hyperloop Technology

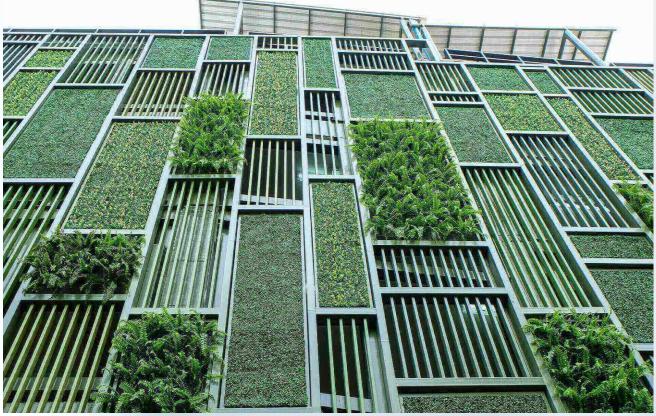


Fig. Green Building Technology

Poems

"Genuine poetry can communicate before it is understood."

T. S. Eliot

गणित जीवनाचे

गणित जीवनाचे स्वतःवर अवलंबून असते, मांडणी योग्य केली तर उत्तर बरोबर येते. १ सज्जनांचा करावा सर्वानीच गुणाकार, तेव्हाच मिळतो आपल्या सोनेरी स्वप्नांना आकार.२ सदगुणी माणसे नेहमी हातच्याला ठेवावीत, वेळप्रसंगी त्यांनाच उपयोगात आणावीत.३ सुख दुःखाची वजाबाकी बेरीज नेहमीच होत असते, गणित जीवनाचे मित्रहो हिंमतीने सोडवायचे असते.४



चि.प्रतिक बाळकृष्ण मालपुरे.

Int 1

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Poly हो गया Over Degree मे किया Enter दिल मे थोडा सा था डर हमारे निकल आये पर@1

जस्ट हुये थे Admission तो सर पर आगये Submission बढ रहे थे completions अब एक ही था option Vacation vacation@2

सबमिट कर submissions नाही थी किसी को कुछ कदर पर थोडे होगये बेफिकर लिखकर बॉडी कर राही थी Pain But No Pain No Gain@3

अब आ गया था वो पल जो देणे वाला था हमारी जिंदगी बदल क्या हम होंगे सफल? इसका पता चलणे वाला था कल 🥺 @4

आ रही थी companis हो रही थी placements After putting lot of efforts We are getting placements 30/205

तभी जान मे जान आइ 😇 दिलने एक बात सिखायी,रख ईश्वर पर एकीनं होगा लक्ष जरूर हासील 😏 💐 @6

Mr. Chinmay Joshi

Sketches

"Sketching is a way of thinking on paper."

- Chris Riddell

