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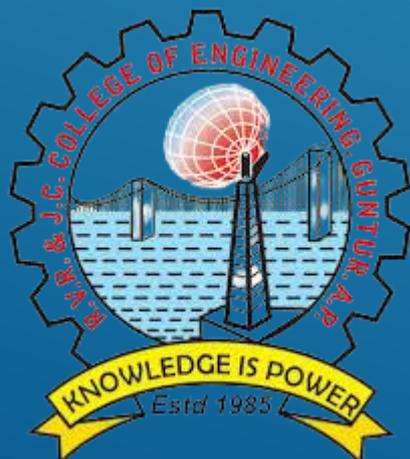
MECHZINE

GET TO KNOW THE WORLD !



**THE 360 DEGREE
SELFIE**

**SPHERICAL IMAGES ARE OPENING A NEW ERA
IN PHOTOGRAPHY**



A STUDENT INITIATIVE TECHNICAL MAGAZINE



THE 360 DEGREE SELFIE
SPHERICAL IMAGES ARE OPENING A NEW ERA IN PHOTOGRAPHY



A STUDENT INITIATIVE TECHNICAL MAGAZINE

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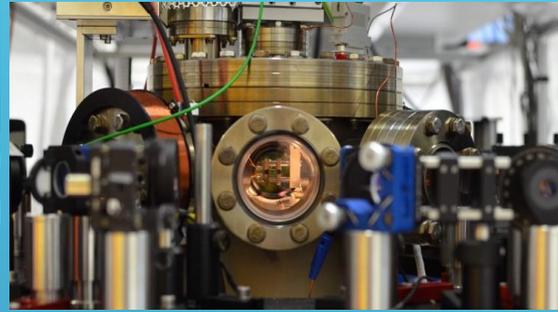


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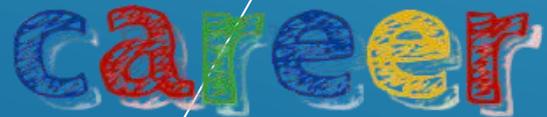
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Fun zone



Alumni Article



New Ceramic Coating Provides Long-lasting Shine and Continuous Protection

- Phani Madhavi , T.C.S

Introducing Guardian Ceramic Coating (CC) for the ultimate total surface protection, powered by ceramic technology. This revolutionary new formula delivers a noticeably brighter vehicle, that is softer and smoother to the touch.

- Creates a hydrophobic layer, delivering an invisible, durable coating with superior water repellency, preventing moisture and water from building up.
- Seals microscopic pores to protect the vehicle surface from harsh elements, blocking ultraviolet rays and protecting the paint from oxidation.
- Delivers a lasting weather shield, formulated to protect and keep your vehicle safe from sun, rain, bird droppings, salt, and dirt.
- Provides a long-lasting shine and continuous protection.
- Excellent water break, making the beads roll off the vehicle surface rapidly. Fresh citrus scent.
- A truly unique combination of bonding and leveling agents that optimize the interaction between the ceramic, cationic silicone polymers and carnauba creating an unbeatable total surface protectant.

CC PROCESS:

- Step 1 – Pre-wash the vehicle to get rid of dirt, dust, and bird droppings.
- Step 2 – Wash the vehicle with soap water or other alternatives.
- Step 3 – Rinse thoroughly after washing.
- Step 4 – Apply the solution.
- Step 5 – Rinse, complete the buffing process and dry.
- Step 6 – Apply a polishing compound (non-wax).
- Step 7 – Use a polishing machine on the vehicle evenly.
- Step 8 – Give the vehicle a final wipe.

Advantages of Ceramic Coating:

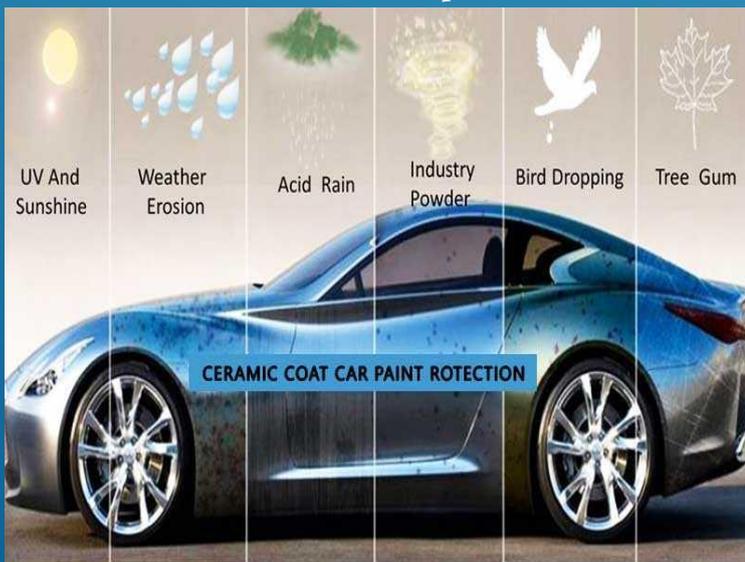
Here’s a list of advantages associated with CC.

- It offers an added layer of protection to the vehicle’s surface against basic contamination.
- It has minimal to no side effects on the paint.
- Its chemical bonding process ensures that the coating lasts for a long period.
- It is easier to clean a vehicle which has a CC.
- It enhances the overall aesthetic appeal of the car or the bike.

Disadvantages of Ceramic Coating:

Here’s a list of disadvantages associated with CC.

- The cost of a CC is on the higher side. It is an expensive procedure, especially for a car.
- It can take up to three days for the entire process to complete.
- The CC process needs to be performed by professionals. Otherwise, it might look unappealing and reduce the aesthetic appeal of your car or bike.





The Engineer's Hero

- N.V.S Srikar

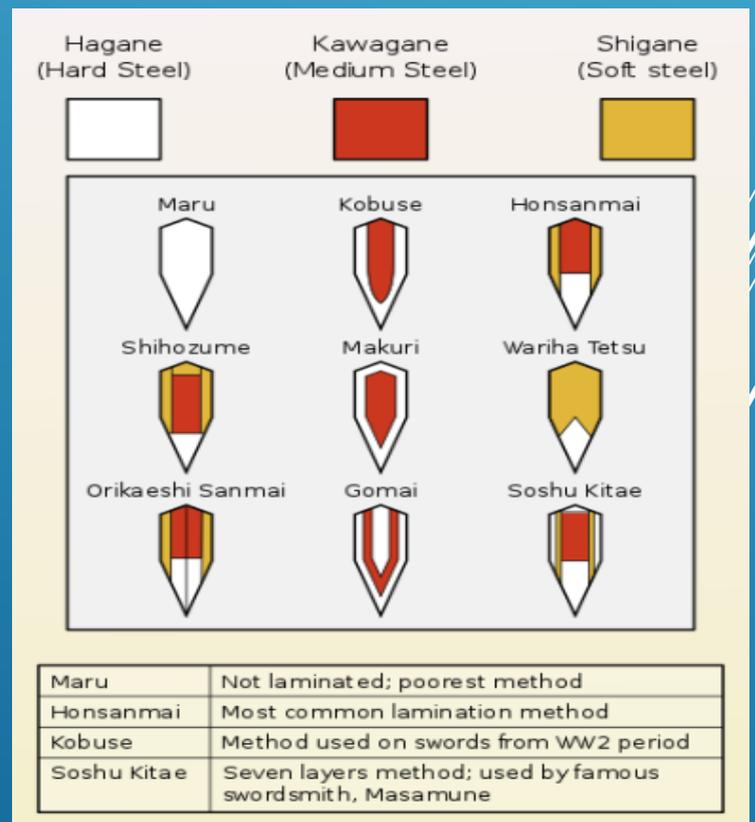
Since 2004, watching to cartoons was my favourite pass time. All of them had the same story line where a guy or a team bashes up bad guys with hi-tech powers, whom we called "super heroes". Gaping such a marvel on TV, and roleplaying it with friends and playing was the next big thing then. Over time these super-hero fantasies of mine grew up with me until one day, when I was introduced to this super hero, who is an engineer and whom I could call singlehandedly an inspiration and sole reason for me today to choose to become a Mechanical Engineer, The Iron Man. Yes, Anthony Edward Stark a.k.a Iron man inspired me to an extent that I wanted my own Iron man suit, and building it was hankering me.

In scientific parlance, the Iron man suit is an exoskeleton which is worn outside the body to enhance it. The two most important properties for a military uniform are wear resistant and shock absorbent, but these are not enough for an exoskeleton like Iron Man's suit. A battle exoskeleton requires hardness for penetrative loads, and ductility for shock loads. Meanwhile, this fits the host's body and covers all the body parts. At the same time, they are light, and their joints are extremely flexible to make all the flights and moves possible. Though, I couldn't build one in my four year course, I understood a little science behind this marvel which I bring to you.

As Iron Man's name suggests, he wears a suit of "iron" which gives him his abilities—superhuman strength, flight and an arsenal of weapons—and protects him from harm. The suits Tony Stark builds represent an extraordinary estimation of the near-future Ergonomics development. Almost all of

them have the following capabilities, external armour, supersonic flight, hovering capability, Weapons, decoy flares, and AI remote assistance. As well as this, the power source, known as the arc reactor, is extremely unique. Keeping the geek stuff of hi-tech sensors aside, let's focus on its design marvel.

To satisfy the requirements, the easiest estimation of the structure according to real life experience is multi-layer cladding. The noblest application of this can be traced back to the ancient Japanese Kamakura period, the design of the Katana (samurai swords). With the V-shaped hard outer layer (Hagne), and high-pliable material as the inner padding medium (Kawagane and Shigane) as shown below. Multi-cladding designs maximize the stiffness (or hardness) of the suit to penetrate the target, or prevent attacks, as well as maintaining the stability of the whole structure.



In Irons Man's suit, the outer layer is composed with heavy plating and protection, its material has been updated a few times. The first generation, Mark I, was made of steel and leather armour, with poor designs and lack of stability. As mentioned above, the hardness and lightness should coexist in the exoskeleton. The next generation, used steel alloys and chrome-plated titanium.

However, these materials will cause the armour to be frozen in high-altitude areas, according to the theme in Iron Man I. Considering this, Tony Stark finally changed his selection to titanium alloy as the core material, with a mixture of glass fibre. However, the inner layer, or inner layers are not mentioned in the movies or comic books. The reason is that it is definitely so much more difficult to explain as it is not that possible to be explained reasonably with our current technologies. If we try our best to consider it with the engineering view, the most likely inner-layer material would be sorbothane. The most fascinating and admiring bit he has done is the inner layer build, which also contains all the electronic devices, such as the 3-D screen, sensing devices, remote system, and even a computer with a fully functional AI. The mechanical streamline design perfectly minimizes the air resistance in high-speed movements, and fits the body of Tony Stark at the same time.

There's a scene from Iron man-I where he escapes from terrorist attack and suffers a 310 m sky fall yet survives. I've made some calculations which mathematically prove his survival possibilities indicating the shock absorption efficiency of his suit, which could be applied to automobile suspensions. Tony travelling at about 342 km per hour when hits the ground, the final landing magnitude of velocity and the kinetic energy which results in an energy transfer of 3.4×10^6 Joules which is fatal. As we all can imagine, with our current engineering abilities, it is absolutely

not possible to survive in the sky-fall shown above without any deceleration, though the firm sand ground will absorb a little bit of the total energy. This may not be impossible forever, however, it still tells us the importance of the shock-absorption efficiency for an exoskeleton.

A Japanese company made one, however, this contraption does not yet give the wearer added strength, but it does make the backpack they are carrying feel lighter, by transferring its weight to the ground. This can makes a 36-kilogram (79-pound) load feel about 80% lighter. In the 1960s, the first real powered exoskeleton appeared—a machine integrated with the human frame and movements which provided the wearer with 25 times his natural lifting capacity. The major drawback then was that the unit itself weighed in at 680kg.

The pieces of work from Tony Stark represent an extraordinary estimation of the near-future Ergonomics development. Nowadays, almost all of those technologies do exist or are currently exploring in our real life, such as exoskeleton for strength enhancements, armour for defence, for flight and even brain-computer interface (neural link). The real scientific work starts from imagination and fantasies, from relentless pursuit. I strongly believe, in a few decades, "Iron Man Suit" will not just exist in the



"My armor was never a distraction or a hobby. It was a cocoon. And now I am a charged man, you can take away my house, all my tricks and toys. One thing you cannot take away... I am Iron Man."
 – Anthony Edward "Tony" Stark

3D PRINTING IN THE MEDICAL FIELD - R. Roshini

Additive manufacturing, otherwise known as 3D printing, was first developed in the 1980s. It involves taking a digital model or blueprint of the subject that is then printed in successive layers of an appropriate material to create a new version of the subject. The technique has been applied to (and utilized by) many different industries, including medical technology. Often medical imaging techniques, such as X-rays, computed tomography (CT) scans, magnetic resonance imaging (MRI) scans and ultrasounds are used to produce the original digital model, which is subsequently fed into the 3D printer.

There are four core uses of 3D printing in the medical field that are associated with recent innovations: creating tissues and organoids, surgical tools, patient-specific surgical models and custom-made prosthetics. One of the many types of 3D printing that is used in the medical device field is bio printing. Rather than printing using plastic or metal, bio printers use a computer-guided pipette to layer living cells, referred to as bio-ink, on top of one another to create artificial living tissue in a laboratory. These tissue constructs or organoids can be used for medical research as they mimic organs on a miniature scale.

*"3D printing is already shaking our age-old notions of what can and can't be made."
- Hod Lipson*



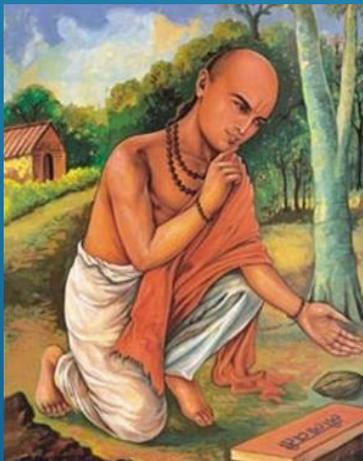
They are also being trialed as cheaper alternatives to human organ transplants. Scientists are experimenting with printing liver and intestinal tissue to help with the studying of organs in vitro, as well as with drug development for certain diseases.



In May 2017, the company presented pre-clinical data for the functionality of its liver tissue in a Programme for type 1 tyrosinemia, a condition that impedes the body's ability to metabolize the amino acid tyrosine due to the deficiency of an enzyme.

"3D printing can be used to produce prosthetic limbs that are customized."

The Law of Gravitational Force - Bhaskaracharya



Bhaskaracharya, or Bhaskara the Second, was an Indian astronomer and mathematician who was born in the year 1114 and died around the year 1185. He was born in the village Vijjadit in Maharashtra. His surviving mathematical works are called "Bijaganita" and "Lilavati". These have no equal in the scientific world. In addition, the mathematician also wrote the treatise entitled "Siddhant Shiromani". In this treatise, he describes astronomical equipment, mathematical techniques, eclipses, and planetary positions. This Indian mathematician and astronomer discovered gravitational force thousands of years ago. In his text "Surya Siddhant", the sage describes gravitational force as follows: "Objects fall on earth due to a force of attraction by the earth. Therefore, the earth, planets, constellations, moon, and sun are held in orbit due to this attraction."

Guide to your world of robotics: SPOT !

SPOT is a nimble robot that climbs stairs and traverses rough terrain with unprecedented ease, yet is small enough to use indoors. Built to be a rugged and customizable platform, Spot has an industry track record in remote operation and autonomous sensing.

ADVANCED TECHNOLOGY

Spot goes where wheeled robots cannot, while carrying payloads with endurance far beyond aerial drones. With 360° vision and obstacle avoidance, the robot can be driven remotely or taught routes and actions to perform autonomous missions.

DEVELOPER PLATFORM

Developers can create custom methods of controlling Spot, program autonomous missions, design payloads to expand the robot's capabilities, and integrate sensor information into data analysis tools. Spot's mounting rails, payload ports, and software development kit give customers the tools they need to customize the robot for their application.

VERSATILE APPLICATIONS

By integrating Spot with software and sensors, the robot can perform tasks in a variety of industries. From documenting construction progress to monitoring remote environments, adding situational awareness, and even performing, Spot can be trusted to get the job done.



Construction

Inspect progress on construction sites, create digital twins, and compare as-built conditions to Building Information Modeling (BIM) autonomously with Spot.

Oil + Gas

Create autonomous routes or drive the robot to remotely inspect facilities and improve awareness of plant operations.

Electric Utility

Create autonomous routes or drive the robot to remotely perform inspections in electrified or radiation dense areas.

Mining

Create routine tunnel inspection routes and attach additional payloads to take measurements and ensure safe working conditions.

Public Safety

Drive Spot remotely to get eyes on dangerous situations or inspect hazardous packages from afar.

Healthcare

Use Spot to triage patients, deliver food and medicine, or disinfect rooms from afar.

Entertainment

Program dynamic movements and expressive poses through the API or drive the robot in real-time as part of a performance.

Research

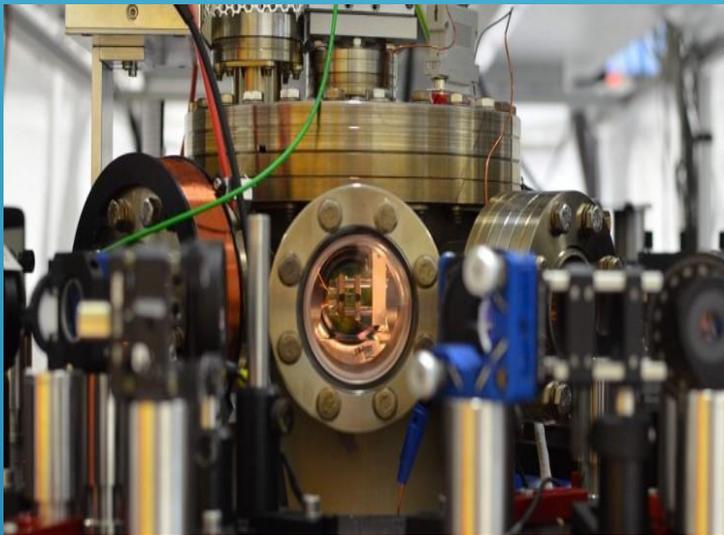
Integrate Spot with sensors and software to develop applications with industry partners. Academic pricing available.



Engineering
Marvels

NANO ENGINE – Engine That Works on A Single Atom

Scientists were successful in building the smallest working engine ever created. The engine is powered by single electrically-charged calcium atom and is claimed to have a similar thermodynamic efficiency (when scaled to size) of an average automobile engine. The Nano engine follows the same thermodynamic cycle that occurs in a normal car engine.



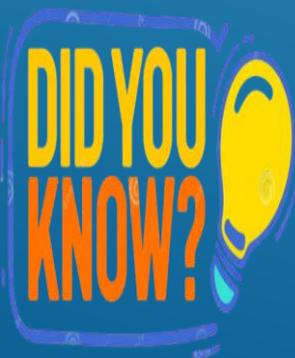
However, in this case, the power generated is converted into a vibration of an atom which serves as a mechanical motion. The scientists in their experiment were also able to observe a power output of 10^{-22} watts with an efficiency of around 0.3 percent. While there may not be any direct application of the single-atom engine, with few modifications, this tiny engine can lead to more opportunities in studying small quantum machines.

ROBOFLY – A Tiny Flying Robot That Can Operate Wirelessly

The RoboFly is no more a technology that you would only see in Hollywood movies. Engineers have designed a robotic fly which is half the size of a clip and weighs only one-tenth of a gram. The flying robot operates on its own and does not require any wires to achieve the flight. This is made possible through a photovoltaic cell, which is attached above the RoboFly and converts the remotely pointed invisible laser beam to electricity. In addition, the fly is also equipped with a microcontroller which acts as a brain to help the RoboFly gain control over its own wings. It essentially tells the wing muscles when to flap hard and when not to.



While the current RoboFly is still limited in terms of capabilities, researchers plan to develop an advanced version with integrated tiny batteries, advanced brains and sensor systems which will help the fly to navigate and perform tasks on their own. The robotic fly, once completely developed, will have significant potential in areas of search and rescue missions, surveillance, climate monitoring and more.



- ✓ *The first engineer known by name and achievement is Imhotep, builder of the Step Pyramid at Saqqārah, Egypt.*
- ✓ *Civil Engineering is the oldest branch of Engineering.*
- ✓ *Sir Mokshagundam Visvesvaraya was the first engineer in India.*
- ✓ *Elisa Leonida Zamfirescu is the first female Engineer in the world to receive a degree in Engineering.*
- ✓ *The Technical University of Denmark or DTU was the first college in the world to have courses in Mechanical and Civil Engineering.*

THE 360 DEGREE SELFIE

Spherical Images Are Opening A New Era In Photography

-J. Rangaraya Chowdary, Asst. Professor



Inexpensive 360 Degree selfie cameras that make spherical images are opening a new era in photography and changing the way people share stories. We experience the world in 360 degrees, surrounded by sights and sounds.

Until recently, there were two main options for shooting photos and video that captured that context: use a rig to position multiple cameras at different angles with overlapping fields of view or pay at least \$10,000 for a special camera.



The production process was just as cumbersome and generally took multiple days to complete. Once you shot your footage, you had to transfer the images to a computer; wrestle with complex, pricey software to fuse them into a seamless picture; and then convert the file into a format that other people could view easily. Today, anyone can buy a decent 360 degree selfie camera for less than \$500, record a video within minutes, and upload it to Facebook or YouTube.

Journalists and Reuters are also using 360 degree cameras to produce spherical photos and videos that document anything from hurricanes. Meanwhile, inexpensive 360° cameras are popping up on basketball backboards, football fields, and hockey nets during practice for professional and collegiate teams. Coaches say the resulting videos help players visualize the action and prepare for games in ways that conventional sideline and end-zone videos can't. These applications are feasible because of the smartphone boom and innovations in several technologies that

combine images from multiple lenses and sensors. For instance, 360° cameras require more horsepower than regular cameras and generate more heat, but that is handled by the energy-efficient chips that power smartphones. Because creating 360° content requires stitching together multiple images, doing it on the fly for live streaming represents an impressive technical achievement. Computer-vision algorithms have simplified the process so that it can be done on the camera itself, which in turn allows people to live-stream video with minimal delays!

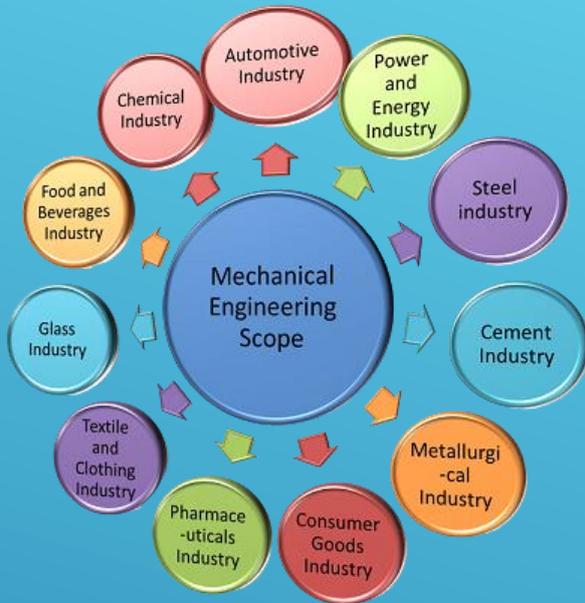
HOW DOES IT WORK?

A number of pictures are taken with panoramic views and when combined with supporting software, a 360-degree view pic is produced where the pictures are lined up to make a continuous circle around the point of shooting. The recent digital cameras are coming up with such built-in software to merge these panoramic photos into a single photo, which is viewed on a system using Adobe flash player, mostly.



Image: Harsha Bhogle 360-degree selfie with Google's Sundar Pichai

Career



Career Pathways for a Mechanical Engineer

Design

Skills Required:
CAD, CAE

Job Roles

- Structural Engineer
- CFD Engineer
- Design Engineer
- HVAC Engineer

Maintenance

Skills Required:
Machine Design, Engineering Systems, Control and Instrumentation

Job Roles

- Power Engineer
- Maintenance Engineer
- Systems Engineer

Production

Skills Required:
Industrial Engineering, Mechatronics, Production/ Operation Management

Job Roles

- Production Engineer
- Fabrication Engineer

Planning

Skills Required:
Project Management, Spread Sheet Calculations

Job Roles

- Project Engineer
- Logistics Engineer
- Project Manager

Sales & Other

Skills Required:
Spread Sheet Calculations, Modelling and Simulation

Job Roles

- Quality Manager
- Safety, Health and Environment Manager
- Financial Forecaster
- Sales Engineer

GATE 2018

Organizing Institute
Indian Institute of Technology Guwahati



GATE Online Application Processing System (GOAPS) Website Opens	Friday	01 st September 2017
Last Date for Submission of (Online) Application (through Website)	Thursday	05 th October 2017
Last Date for Requesting Change of Examination City (an additional fee will be applicable)	Friday	17 th November 2017
Admit Card will be available in the Online Application Portal (for printing)	Friday	05 th January 2018
GATE 2018 Examination Forenoon: 9:00 AM to 12:00 Noon Afternoon: 2:00 PM to 5:00 PM	Saturday	03 rd February 2018
	Sunday	04 th February 2018
	Saturday	10 th February 2018
	Sunday	11 th February 2018
Announcement of the Results in the Online Application Portal	Saturday	17 th March 2018

FOR MORE DETAILS VISIT: <http://gate.iitg.ac.in/>

Math Trick

- 1 x 1 = 1
- 11 x 11 = 121
- 111 x 111 = 12321
- 1111 x 1111 = 1234321
- 11111 x 11111 = 123454321
- 111111 x 111111 = 12345654321
- 1111111 x 1111111 = 1234567654321
- 11111111 x 11111111 = 123456787654321



Fun Zone



According to The Guinness Book of World Records, the toughest tongue twister is 'The sixth sick sheik's sixth sheep's sick'

Use your math skills to find the value of each '?'

+ + = 21

10 = + 4 +

+ = 8

14 = +

+ + + = ?

Have no fear of perfection - you'll never reach it.
- Salvador Dali



There are 5 sisters in the room:
Ann is reading a book,
Margaret is cooking,
Kate is playing chess,
Marie is doing laundry.
What is the fifth sister doing?

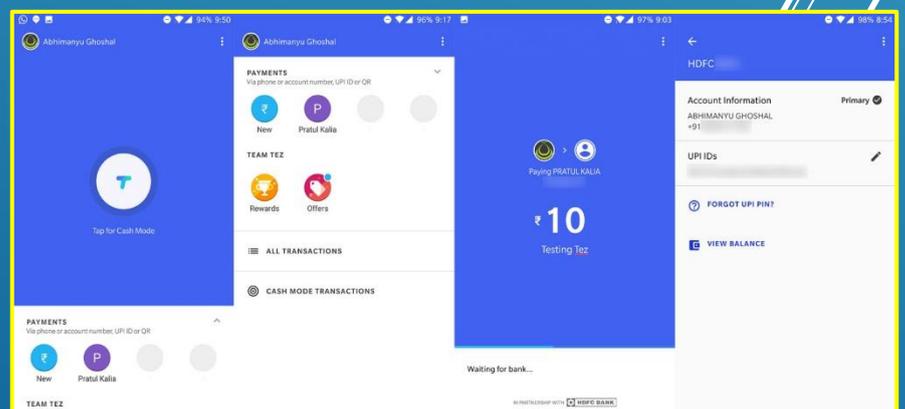


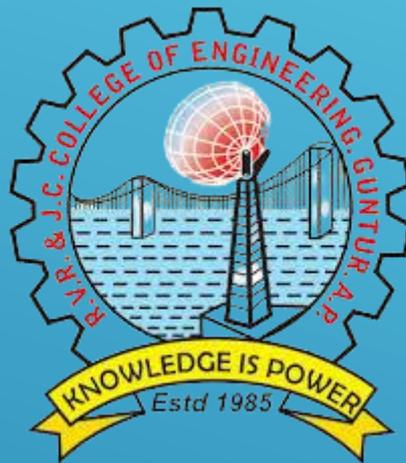
ANS: PLAYING CHESS

SOLVE SUDOKU

6					5	3
			2	7		
5		7		9	6	1
		6		1		8
	9	8				
			2			
					9	
			2			4
3	1			9		6
						2

TRENDING APPS: TEZ





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