



SPACE-MESA



presents

IMPULSE

2014-15

“GEARS-ROLL N ROCK”



GEARS: Roll and Rock.

Gears are the epitome of building blocks of any mechanical system. Gears roll and rock to sustain the mechanical system. May it be from massive automobiles to a small watch, a gear fits in the involute or epicycloid profile of other gear and imparts motion. It won't be wrong to say gears are the wheels of a mechanical engineer. Gears, in an abstract sense, also symbolize the immortal Time.



MESA-SPACE



presents

IMPULSE

2014-15

“GEARS-ROLL N ROCK”



Indian Red Cross Society, Bombay City Branch
Blood Centre

Telephone : 2266 3195
2266 3560
4050 0400
Fax No. : 2267 7448

141, Shahid Bhagat Singh Road,
(Town Hall Compound),
Mumbai - 400 001.

To,

Date : 25.03.2015

**Mechanical Engineering Students Assoc.
SPCE,
Bhawans College Campus,
Andheri (W),
Mumbai.**

Dear Sir,

We are extremely thankful to you and your organisation for arranging voluntary

Blood Donation Camp on 19.03.2015

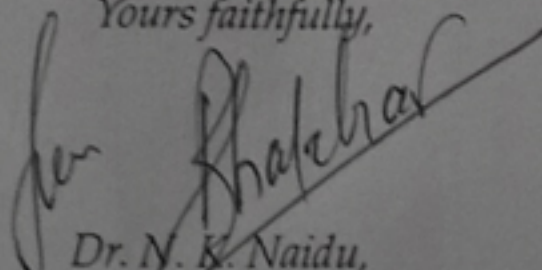
at SPCE, Bhawans Campus, Andheri (W).

We collected 79 units of blood on that day.

We are herewith despatching blood donor cards which you may please distribute amongst the donors. We are sure, you will grant us many more such opportunities in the future for collection of blood.

Thanking you

Yours faithfully,


Dr. N. K. Naidu,
Medical Director

S. F. No. 10
Version 2

Donations exempted under Section 80 (G) Vide Notification No. F/176/23-94-IT-A1 issued by Dept. of Revenue, CBDT
Registered under the Bombay Public Trusts Act, 1950 Cert. No. E-879 (BOM).

**Thanks giving letter from
Red Cross Society, Mumbai to
MESA for successfully organising
Blood Doantion Camp
on 19 March 2015.**

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Dr. R.B. Buktar
(Head of Department)

Prof. Megha Janbandhu
MESA Incharge



A Word From Head of Department

It gives me great pride to be witness of the revival of MESA Magazine IMPULSE under the theme Gears-Roll and Rock.

This magazine will so forth be the unified voice of Mechanical Engineering students bred by SPCE. Their voice, views and innovative ideas will have an excellent medium and platform to be heard and expressed.

The department in its continuous quest to excellence has always supported student activities as that is what defines an institution. Fruitful workshops by Autostroke, Siemens' internship, industrial visits to Parle and Volkswagon along with activities in social interest such as Joy of Giving are excellent examples of what Mechanical Department has achieved in this calendar year.

The reverie and nostalgia of the technical atmosphere and participation of students in Baja, Supra, Robocon and ISHRAE was in true spirit realized this year. This year marks the rejuvenation of technical zest and spirit and this magazine makes a bold statement of that.

Impulse definitely has re-started the tradition and so forth will gloss upon the attitudes, activities, hard work and zeal that students possess.

I wish the best to all students. My benediction and benevolence is always with them!

(Refer pg. no. 4)

**-Dr.R.B.Bukar
Head of Department
Mechanical**



A Word From MESA Incharge

MESA, the Mechanical Engineering Students' Association, aims to play a pivotal role in the development of students as engineers by various out-of-curriculum and extra curricular activities. MESA aims to inculcate among its members an awareness and appreciation of the various disciplines of not just Mechanical Engineering but also other relevant fields. By way of its activities MESA aims to be a platform particularly the students of FE SE TE and BE . MESA seeks to be an active organization of the Mechanical Engineering department which promotes exposure to their area interests.

Being the MESA incharge I have tried to give the exposure to the various fields and tried to bring the different opportunities in the form of Visits, Workshops, Expert Lectures, Technical Events, Internships, Projects etc. for the students for all the four years. As compared to the activities to the previous academic years, this year MESA has played a vibrant role in the overall development of the students.

MESA has provided a platform for exhibiting their talent in Co-curricular activities and extra – curricular activities for the students and Being a incharge of this association it gives me a immense pleasure to appreciate the efforts of the MESA committee for the year 2014-2015. In the past five years they are the most active committee members for this association and I hope that for the forthcoming years similar students I will be getting which will genuinely work hard for the department in the form of MESA.

(Refer pg. no. 4)

**-Prof. Mehga Janbandhu
MESA Incharge**



Prof. Praful Phadke lecture on IC engine:

MESA was proud to organize a special guest lecture on IC engine by Prof. Praful Phadke, Director, L.V.Diesels on 13th January 2015, for third year mechanical class. He thrown light on the basics of IC engine. He also was a faculty for AUTOSTROKE workshop for the third day. He profusely explained the assembling and disassembling of IC engine.

Blood Donation Camp:

On 19th March 2015 Mechanical Engineering Students Association conducted a “BLOOD DONATION” camp in the college. The camp was organized in Seminar hall room no.119. All the students, faculty and staff members participated voluntarily in the camp. In total, 79 units of blood were collected. Donors mainly include students along with staff members.

All the MESA committee members along with MESA Incharge, Prof. Megha Janbandhu made it a successful event.

MESA sports:

MESA organised the annual inter class sport's competition on 28 & 29 March 2015. Various outdoor games such as cricket, football, volleyball, badminton and indoor games such as carom and chess were held. Students from first year mechanical to fourth year mechanical participated with full enthusiasm. The following is the final points table for this year's MESA sports.

Sr. No.	Event	FE	SE	TE	BE
01	Cricket	20	120	20	70
02	Football	20	70	120	00
03	Volleyball	20	120	70	00
04	Badminton(Boys)	40	40	190	00
05	Badminton(Girls)	90	40	40	00
06	Carom(Boys)	80	180	130	00
07	Carom(Girls)	40	40	190	00
08	Chess(Boys)	155	155	80	00
	Total	465	765	840	70

A Word From General Secretary

Leadership and learning are indispensable to each - Leadership and learning are indispensable to each other. Students activities at college level gives a variety of experiences to enrich our personal and intellectual growth and this contributes to our overall academic success. In July'14, through the general elections the Mechanical Engineering Student Association(MESA) committee formed.

MESA is a student organization of the Department of Mechanical Engineering with aim to maintain a high level of interaction existing between the students and the faculty members. Apart from this, it organises technical sessions, workshops and contests through a close tie-up with the industry.

This term of MESA started with a Trek to historic Ajoba hills on 23rd august 2014. 135 students experienced this adventure. The event was successful with a overwhelming response from the students and excellent management shown by the committee.

The next event on our agenda was "Teachers Day Celebration". All the faculty members were present and were appreciated with a token. Prachiti Ghag expressed gratitude towards the teachers on behalf of all the students by presenting a speech. This was followed by a classical dance performed by Apakrita Tayade and a song by Prateek Tade which added colours to the programme.

It is rightly said that 'See and Know' is better than 'Read and learn'. On 16th Sept '14 MESA organised a industrial visit to The Volkswagen Pune Plant for 50 students which gave a real feel of company's advance automation in the making of automobile.

Then came the much awaited event the " MESA IV" which made the record of more than 100 students participation from Mechanical stream alone. This year we explored Uttarakhand state by visiting Musorie, Dehradun, Shivpuri, Harishikesh, Haridwar, Nainital and Corbett during the 10 days of the visit. It also included adventures activities like river rafting, zip lining and rope climbing. It was the teamwork and dedication of the entire MESA committee and the coordinators which resulted in success of this endeavour. The credits of success goes to Jay Mehta(Treasurer), Umang Patil(Co GS), Prachiti Ghag (Head of Events) and other committee members.



The activities of year 2015 began with 'SPECTRA-Imagineering traume', the technical festival of SPCE. " SPECTRA " as its name suggests, offers a wide spectrum of technical competitions, workshops, conferences and lectures. It is a one stop hub to enhance the competence and skills of an upcoming engineer. Being the General Secretary I from Mechanical department handled the responsibility of organising this mega event. The event went successful with a bunch of technical activities, under the excellent guidance of Dr. Hansa Jeswani, SPECTRA incharge. It was the result of hard work and dedication shown by all the co-ordinators, organisers, core committee members and the executives.

In Jan '15, MESA organised Autostroke, a 3 day national level design awareness programme by Codex Design services in association with IIT Delhi. The workshop mainly focused on vehicle dynamics and it's working principles, design and analysis using solid works, live dis assembling of car, etc.

Finally the activities of the year concluded with MESA sports. In march last week we organised various sports like cricket, volleyball, football and indoor games like table tennis, carom, chess, etc. which were held successfully. The credit goes to Bharat Pawar(Sports Secretary), Vrishtee Rane(Ladies sports secretary) and the organisers and committee members.

Throughout my journey as General Secretary, I have received tremendous support from all my fellow T.E's. Their help and coordination has been a tremendous boost for the programmes held so far. I am very thankful to all of them. The credit of all the creative work done for MESA and SPECTRA goes to the magazine secretary, Avinashkumar Chauhan.

I would like to thank our principal Dr.P.H.Sawant, Head of Department Dr.R.B.Buktar, MESA coordinator Megha Janbandhu who guided me and helped me in many ways. I would also like to thank all the exofficios for their help and cooperation throughout.

As I conclude a special thanks to all the committee members, fellow students, for their contribution, help and cooperation in carrying out events successfully and making this endeavour a memorable one for me.

-Atul N Patil
General Secretary



A Word From Magazine Secretary

It brings immense pleasure to finally bear fruits of the tremendous work put behind organizing various activities in MESA. This magazine is in a way written form of lauding it.

Representing the Mechanical Department- its professor and its students, I have tried to make it a tool of mass communication. This magazine is the yearly report of all the activities done under MESA.

This year is the rebirth of IMPULSE Magazine, as it was unpublished last year. The theme of this year was- GEARs: Roll and Rock. Gears are the epitome of building blocks of any mechanical system. Gears roll and rock to sustain the mechanical system. May it be from massive automobiles to a small watch, a gear fits in the involute or epicycloid profile of other gear and imparts motion. It won't be wrong to say gears are the wheels of a mechanical engineer. Gears, in an abstract sense, also symbolize the immortal Time.

This year there are many new things incorporated with the production of this magazine. This year there was no traditional magazine committee as such. So I would like to thank Prof. Megha Janbandhu (MESA Incharge) and Dr.R.B. Buktar (Head of Department) for their valuable feedbacks in editing of articles and suggesting improvements for the creative stuffs of the magazine. In this magazine I have also included reports of various internships and industrial visits in order to acquaint the juniors with these activities and give their significance.

In order to expand the reach of MESA magazine, for the first time, I have endeavored releasing E-MAGAZINE, that is, soft copy of the magazine so that everyone can have it and read it.

This magazine has tried to reach the mechanical junta by giving them a platform to express their views and share technical and non-technical ideas. It is a potpourri of articles with a collage to sum up MESA activities. Great thanks to professors and all authors without which this would not be possible.

I have tried to deliver to my peers a variety of articles and glimpse into people's feelings and thoughts. I do hope this magazine is refreshing and am glad to have restarted this tradition. Juniors you have got to take it from here in the ensuing years. Happy Reading!!!



ALTERNATIVE SOLUTION IN MATHEMATICS

Vipul Ahuja
(7.E. Mech)

Can you all solve the following equation and find out the value of x?

$$x = (10\cos(36^\circ) + 40) / (\sin(14^\circ))$$

The answer by most of the people would be yes. But is it so easy to calculate?

The answer is no. Because without calculator estimating the precise value of the above equation would be very difficult. Solving the values of $\sin(14^\circ)$ and $\cos(36^\circ)$ on a piece of paper without using calculator or log table is very difficult. Solving them is even more difficult when you don't know the Taylor theorem.

Let us assume that we don't know the Taylor's theorem nor we have the calculator, which means we neither have a programmed machine which gives us answer on a mere press of button, neither we know the Taylor's theorem using which we can write

$$\sin x = x - (x^3/3!) + (x^5/5!) - (x^7/7!) + (x^9/9!) - \dots$$

and calculate value of $\sin x$ upto 5-6 significant digits. So how would one go for solving the above equation in absence of these approaches?

I have one approach which I discovered while facing this problem in 12th std when I didn't had a scientific calculator. I will be discussing this approach in detail which forms an alternative approach in mathematics for deriving the expansion of $\sin x$.

The derivation is very simple but to make it look more simplified, I will touch the basic concepts of sine and cosine which makes the derivation look more simplified and also explains the evolution of sine and cosine terms.

The circle shown is a unit circle, the co-ordinates of A represent the sine and cosine of the angle x. X co-ordinate represents cosine whereas Y co-ordinate represents sine of the angle x. When this x is very small, we can assume that

$$\text{Arc AB} = \text{Length AB}$$

Thus we conclude that

$$\lim_{x \rightarrow 0} (\sin x)/x = 1$$

$$x \rightarrow 0$$

This limit helps us to find out the derivative as well as integral of sine x and cosine x.

$$d/dx(\sin x) = \cos x \quad \text{and}$$

$$\int (\sin x) dx = -\cos x \quad \text{and}$$

$$d/dx(\cos x) = -\sin x$$

$$\int (\cos x) dx = \sin x$$



The above results are supposed to be known by every engineer as he applies it daily. But we will apply it in a different manner so that one can get the value of $\sin x$ for any value of x .

We also know that for integration of two functions u and v , we use the formula

$$\int uv \, dx = u \int v \, dx - \int [(du/dx) \int v \, dx]$$

Using the above integration formulae, we will actually prove that there is no need of Taylor's theorem for calculating the value of $\sin 140$ and $\cos 360$.

$$\int \cos x \, dx = \sin x$$

$$\int \cos x \cdot 1 \, dx = \sin x$$

$$x \cdot \cos x + \int x \cdot \sin x \, dx = \sin x$$

$$x \cdot \cos x + x^2/2 \cdot \sin x - \int x^2/2 \cdot \cos x \, dx = \sin x$$

$$x \cdot \cos x + x^2/2 \cdot \sin x - x^3/6 \cdot \cos x - \int x^3/6 \cdot \sin x \, dx = \sin x$$

Proceeding in a similar way, we get

$$[1 - x^2/2! + x^4/4! - x^6/6! + \dots] \cdot \sin x = [x - x^3/3! + x^5/5! - x^7/7! + \dots] \cdot \cos x$$

Therefore we get a ratio as follows

$$(\sin x)/(\cos x) = [x - x^3/3! + x^5/5! - x^7/7! + \dots]/[1 - x^2/2! + x^4/4! - x^6/6! + \dots]$$

Using the simple ratio theory

$$\sin x = c \cdot [x - x^3/3! + x^5/5! - x^7/7! + \dots]$$

$$\cos x = c \cdot [1 - x^2/2! + x^4/4! - x^6/6! + \dots]$$

Putting $x=0$ in the cosine equation, we get

$$\cos 0 = c \cdot [1 - 0 + 0 - \dots]$$

$$1 = c \cdot 1$$

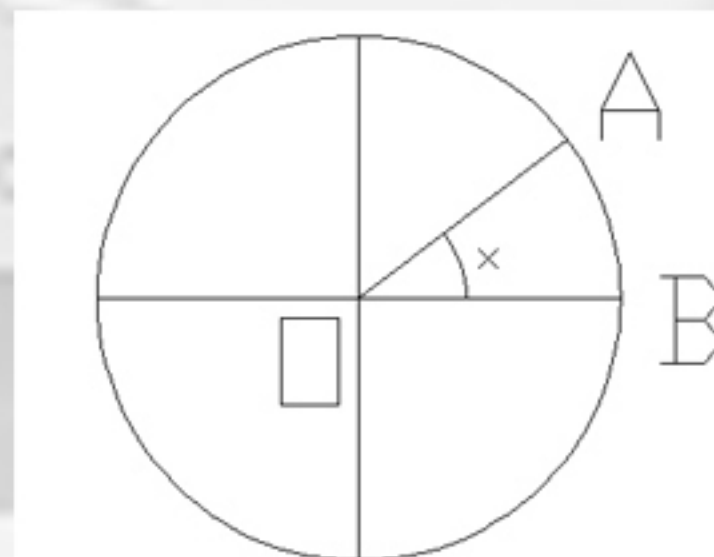
Therefore, $c=1$

Hence the $\sin x$ and $\cos x$ can be expanded as

$$\sin x = x - x^3/3! + x^5/5! - x^7/7! + \dots \quad \& \quad \cos x = 1 - x^2/2! + x^4/4! - x^6/6! + \dots$$

Thus without using Taylor's theorem or calculator, we can find out the value of \sin or \cos of any angle precisely. It will take more time than a calculator, but it will certainly produce the result. Probably this may be the technique, when the mathematicians do not know the Taylor theorem and they didn't had any programming device.

We must always try to develop alternative approaches for solving problems because it helps us to develop more understanding of the problem and it also helps to cope up with future problems more easily. Many more examples of alternative approaches are there in mathematics and physics, which we could not even guess. This was only one example which I could discuss, but actually I have many more of them.



POWER OF LIMITS

Vipul Ahuja
(7.E. Mech)

We have already learnt the use of limits in high school for finding derivatives and solving some problems which give indeterminate forms. But actually the power of limits is not restricted this much only. When I was in 12th std, one commerce student told me that he has a method to calculate cube roots, fourth roots.... of any number using a simple calculator having +, -, *, / and $\sqrt{}$. So I observed how he did it and I began to reason about his method. The commerce student was unaware of the actual working of the method, but I analysed it and found out that he was actually solving a limit. The limit is given below as follows:

$$\lim_{n \rightarrow \infty} [1 + r(x^{1/n} - 1)]^n$$

This is the extraordinary limit which can solve problems involving any root any power even without the use of a scientific calculator. But I know every one of you would be guessing how this limit can do so many wonders. So I have solved this limit below in an extreme simple manner for everyone to understand easily.

$$\text{Let } L = \lim_{n \rightarrow \infty} [1 + r(x^{1/n} - 1)]^n$$

$$\text{Then } \log L = \log \lim_{n \rightarrow \infty} [1 + r(x^{1/n} - 1)]^n$$

$$\log L = \lim_{n \rightarrow \infty} \log [1 + r(x^{1/n} - 1)]^n$$

$$\log L = \lim_{n \rightarrow \infty} n \cdot \log [1 + r(x^{1/n} - 1)]$$

$$\log L = \lim_{n \rightarrow \infty} \log [1 + r(x^{1/n} - 1)] / (1/n)$$



$$\log L = \lim_{n \rightarrow \infty} \log [1+r(x^{1/n} - 1)] / (1/n)$$

The above limit is of the indeterminate form 0/0. Hence to solve the problem we shall apply the L-Hospital's rule, which gives

$$\log L = \lim_{n \rightarrow \infty} \frac{1}{[1+r(x^{1/n}-1)]} * r * x^{1/n} * \log x$$

$$\log L = \frac{1}{[1+r(0)]} * r * 1 * \log x$$

$$\log L = r \cdot \log x$$

$$\log L = \log x^r$$

$$L = x^r$$

Thus we see that the limit gives the answer as x^r . Thus the limit can be used to find any power of any number even by using a simple calculator or it can even be used by programmers to find make program for finding powers of any number.

Step by step calculation for finding power r of any number x using above limit is as follows:

- 1) The no. whose power to be found is x . Then to obtain $x^{1/n}$ we use ' $\sqrt{\quad}$ ' multiple times (12-20) to approach n to infinity.
- 2) Then subtract 1 from the value obtained in step 1.
- 3) Then multiply the value obtained in step 2 by the power r .
- 4) Then add 1 to the value obtained in step 3.
- 5) Finally in step 5, square the value obtained in step 4 the same no. of times as ' $\sqrt{\quad}$ '.

Another interesting limit is very common but its usefulness is unrealized by us. This limit enables us to find the logarithm of any number to any base. I will give you the limit but expect you all to come up with the solution to find the log value of any number to any base.

$$\lim_{n \rightarrow \infty} \frac{[a^{1/n} - 1]}{[b^{1/n} - 1]}$$



WORLD'S FIRST ANALOG COMPUTER

Madhura Veligeti
(7.E. Mech)

If we were asked , when was the world's first computing device made? 1900's ? 15th century ? Or let's generously say..3rd century ...! Well, we are all absolutely mistaken! In the very 100BC did our forefathers (precisely, the Greek ones) have an elaborate machine that could accurately determine the position of the sun and the moon from the earth at any point of time. Not just that, the positions of Mercury , Venus, Mars, Jupiter and Saturn (all the planets known at that time). Although it's still a speculation if they were treated as planets like we do today or were just perceived as stars that move (wanderers) , it is amazing how they were particularly noticed and incorporated in a mechanism comprising of 30 gears in a shoebox sized cuboid! And to add to its glory, it also had another calibration that exactly timed the solar and lunar eclipses!

(Down: a proposed model of the Antikythera Mechanism; a part of the remains of the Antikythera shipwreck)

This enigmatic machine ,called as ' The Antikythera Mechanism ' was found in pieces shattered on the ocean floor in the midst of a ship wreck off the tiny island of Antikythera (Greece) in 1900. However it was only in the last decade that scientists could put together around 82 fragments and figure out how the mechanism worked (most probably!).





Today, these 82 archeological artefacts are showcased in The Antikythera Mechanism Exhibition at the National Archaeological Museum, Athens ,Greece. In 2005, a team of Researchers from around the world were appointed to work meticulously on the AMRP (Antikythera Mechanism Research Project). The most innovative techniques like 3D X-ray imaging were used to reveal unknown elements of the mechanism. Later, the team came up with a computer model using Computer Tomography and also released a documentary ' The world's first computer ' on TV which filmed the whole process.

(Top : An exploded computer reconstruction of the Antikythera Mechanism ,AMRP; for more infromation, visit www.antikythera-mechanism.gr)

The Antikythera Mechanism was extraordinary ,for no machine so intricate and complex is known to exist in atleast thousand years after 100BC . This awe-inspiring mechanism ,sometimes called the world's first analog computer continues to astonish scientists even today, and raises challenging questions on our knowledge and understanding of history at large.

GOOGLE GLASS



Google's project program for developing a line of hands-free, head-mounted intelligent devices that can be worn by users as "wearable computing" eyewear. The first product release from Project Glass, Google Glass, was available for beta testers (U.S. residents only) to purchase in 2013, for \$1,500 plus tax.

Interactive Glass Features

Google Glasses look like a pair of eyeglasses, but the lens of the glasses are an interactive, smart-phone-like display, with natural language voice command support as well as Bluetooth and Wi-Fi connectivity. Google Glass is powered by the Android mobile operating system and compatibility with both Android-powered mobile devices and Apple iOS-powered devices is expected.

Early Versions and Beta Testing

Early versions of Google Glass were titanium-framed glasses (that fit with your prescription or no prescription at all) to show communications from your smartphone or Google accounts in the display. Google Glass was designed to take phone calls, send texts and also take photos and video and deliver search results. The wearable computing device is also keyed to voice commands, for example to take a picture you simply say "take a picture" to capture what is in your view.

App developers, working with Google, are currently developing software that will be incorporated into the consumer version of Google Glass in 2014. Google also offers the "The Glass Explorer Program" for people who want to get involved early and help shape the future of Glass. The program is open to U.S. residents, over 18 years old, and the beta tester must purchase the eyewear.

Google Glass Criticism

Early reports from testers suggest users can expect "curious stares" from those around them and several incidents of fights and verbal disagreements have been reported between the Glass wearer and people around them who did not wish to be recorded in a public place. One person in particular, Sarah Slocum, alleged she was harassed and attacked for wearing Glass in a Lower Haight bar (Source: SF Gate). Since then, a number of bars and restaurants in San Francisco and other cities have implemented a "no Glass" policy to prevent customers from recording



other patrons.

As the Glass devices receive some serious criticism, Google's response was to offer this list of 10 Google Glass Myths to try to counter the concerns:

Myth 2: Glass is always on and recording everything: Just like your cell phone, the Glass screen is off by default. Video recording on Glass is set to last 10 seconds. People can record for longer, but Glass isn't designed for or even capable of always-on recording (the battery won't last longer than 45 minutes before it needs to be charged). So next time you're tempted to ask an Explorer if he's recording you, ask yourself if you'd be doing the same with your phone. Chances are your answers will be the same.



VOLKSWAGON IV



PHYSICS UTSAV 2015 AT BHABHA ATOMIC RESEARCH CENTRE MUMBAI

IVAT B.A.R.C

MESA SPORTS 2015



BLOOD DONATION CAMP



A REPORT ON SPACE ELEVATOR

Rajesh Sharma
(7.E. Mech)

Introduction:

The Space Elevator is the proposed concept of space travel. The long massive rope, known as tether, extends from the surface of earth to the space. It will similar to the game of tetherball in which the one end rope is tied to the pole and other to the ball. In space elevator, the rope is the tether which extends from the pole, i.e., earth and the counterweight at the other end acts as a ball. The counterweight may be the space station or a heavy asteroid. The force of gravity of earth causes the tether to pull towards itself and the upward centrifugal force, which is greater at higher altitudes, causes the tether to remain taut. The center of mass of the structure lies at the geostationary orbit and hence stays over the same point above the surface of earth. The major drawback of the conventional space craft is its use of tremendous amount of fuel required to transport payloads out of the earth's gravitational field. Once it is out of the gravitational field, the rest is easy. The space elevator can be proved as an alternative to the conventional rockets. It can be used to transport the satellites or payloads or even humans out of the gravitational field of earth. Then it can be transported to the required planet or the satellite. Also the large rockets are not economical. It takes about \$25000 per kg of the payload to transfer it to the space, while the space elevator reduces the cost to almost \$200 per kg. Even though the material used for space elevator is not available at present but there are materials, such as Kevlar, which can be used to build the space elevator on other bodies with weaker gravity than earth like mars or moon. The strength to density ratio of the tether required on such bodies is comparatively low than that required on earth.

History:

The concept of the space elevator was first introduced by a Russian Scientist Konstantin Tshilkovsky in 1895. He proposed a tall standing structure, inspired by the Eiffel tower, which will extend to the geostationary orbit of earth. But this idea was rejected as the structure, like other building, was compressive in nature and there is no material in the universe that can resist such a huge amount of compressive stress. Even though the idea was rejected, the concept was still alive. In 1959, another Russian scientist Yuri Artsutanov proposed a similar concept using a tensile structure. He suggested the use of a cable which will extend from earth to about 1,44,000 km above the surface so that the gravitational field and the centrifugal force would balance. He



also suggested tapering the tether so that the stress in the tether remains constant. The tension in the cable goes on increasing with height. Thus, the cable is made thinner at the ground level and thickness gradually increases with height so as to keep the stress constant. His idea was also supported by NASA. NASA also suggested that instead of using a tension structure alone or a compression structure alone, it will be practically efficient to use the combination of both. According to this theory, the tether lowering from geostationary orbit to the base station on earth would be in compression and the base station will be a high tower extending from surface to about 3,000 km using the available material. This is done to reduce the weight of the entire structure. Also the elevator can built by using present graphite epoxy composite material, but the diameter of the rope required will be 2 km at GEO and 1mm at the surface. The entire weight of the structure will be 60×10^{12} tons. If carbon nanotubes are used then the diameter of the rope will to 0.26mm to 0.15mm and the weight would be only 9.2 tons. NASA is still working on the same.

Why it is a science fiction?

Even though the technological development in this particular field is taking place at a high pace, there are many technological barriers which make this concept a science fiction. Some of these challenges are listed below:

1.No known materials strong enough:

No material in nature is sufficiently strong to build a space elevator. The material required for the space elevator must have a high strength to density ratio of about 1,00,000 kN. No material holds the promise. But recently discovered carbon nanotubes may be used for the same. Carbon nanotubes are found to 100 times stronger than steel, light in weight and conducts electricity. But by using recent technologies, only a few centimeters of carbon nanotubes are successfully been produced.

2.The rope will be susceptible to dangerous vibrations:

The tether used in the space elevator will be susceptible to dangerous vibrations that may lead to the wear and tear of the rope. The vibrations may be caused due to the gravitational pull from Sun and the Moon or the solar winds. Thus the material used should not only withstand the tension due to the gravity and the centrifugal force but also should be able to handle these vibrations. The maintenance of the system will also be a challenge. This may pose a serious problem.

3.Safety issues:

The prime safety concern identified is the potential collision between the elevator structure and the other objects in the space. This includes space debris, active spacecraft and meteoroids. Space debris includes everything ranging from the paint chip to the dead satellites. This debris also poses the threats for other active satellites. The cleaning of the space should be given key importance before building the space elevator.



4.Catastrophic failure:

The complete severing of the space elevator structure is called the catastrophic failure. This is the ultimate disaster which may lead to huge loss of life and property. This may cause due to the collision of the space debris, excessive vibration of the entire structure or unbearable stresses which may lead to the material failure. Also during the first attempt, the probability of such failure is high. Thus, preventative measures like building a base station in the equatorial international waters may be adopted. It is been found out that building a base station in the Indian Ocean will be much safer.

5.Environmental issues:

The environmental issues include lighting, hurricanes, ultraviolet and similar radiations which may affect the life of the elevator. But it can be minimized to some extent by building the structure on the equatorial region as the effect of the environment is mildest at the equator. In the Low Earth Orbit (LEO), atomic oxygen, space debris and UV radiations affects the material the most while in the geosynchronous orbit, meteoroid and solar UV radiations affects the life of the material.

6.Social risks:

There are some non-technical aspects which have to be considered in building a space elevator. Some political issues regarding the location of the base station or terrorist attacks can be some of them. Environmentalists may target the space elevator due to unknown consequences. But these issues doesn't seem worthy in front of the technical issues.

Conclusion:

Even though there are many challenges faced by the scientists all around the world to build a space elevator, especially regarding the material to be used for the same, it can be thought that there's nothing impossible in the world of science. It is quite difficult to build space elevator on earth, but it can be built on low gravity planets like moon or mars using present material. The concept of space elevator will no more be a science fiction in the next couple of decades.

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SOME INTERESTING PROOFS!!

Vipul Ahuja
(7.E. Mech)

1) Boyle's Law

Every engineer irrespective of branch must have studied the Boyle's law, First law of thermodynamics. We have studied that Boyle's law can be proved using kinetic theory of gases or through experimentation. But can Boyle's law be proved without any experiment or kinetic theory of gases?

The answer is yes. To prove it one requires to do simple maths on various laws applicable to constant temperature system. I did this proof when I was working on Boyle's law for adiabatic process. For adiabatic process also, we can easily prove the Boyle's law. These proofs seem to be irrelevant from engineering application point of view but deriving these proofs give us understanding of the process both mathematically and physically.

The Boyle's law states that

‘For Isothermal process $PV = \text{constant}$ ’

and

‘For Adiabatic process $PV^y = \text{constant}$, $y = \text{ratio of specific heats}$ ’.

I will prove the first statement and I hope that every one of you will be able to deduce second one from the method of first.

For an isothermal process of ideal gas, we can write first law of thermodynamics as

$$dQ = dU + dW$$

For isothermal process of ideal gas, $dU = 0$ as Internal Energy (U) = constant

Therefore, $dQ = dW$

Also from definition of Enthalpy

$$H = U + PV$$

Therefore, $dH = dU + d(PV)$

$$dH/dU = 1 + d(PV)/dU$$

Now as we know that $dH/dU = y$

y :- ratio of specific heats

We know that specific heats for a given gas are constant at given temperature, Therefore y is



constant for a given temperature

Therefore, $y-1 = d(PV)/dU$

$$d(PV) = (y-1)*dU$$

Since y is constant and dU is zero for isothermal process, we have

$$d(PV) = 0$$

which implies $PV = \text{constant}$ at given temperature

I am sure everybody will try to prove the Boyle's law for adiabatic process which is more rigorous than this but interesting.

2) Value of e

' e ' also called the natural number or euler's number is one of the most useful constants in the fields of mathematics, physics as well as engineering. This constant has its significance due to various reasons which underlies in the definition of ' e '. It implies that there is a limit to value of n th power of a number having reciprocal of ' n ' added to 1. This definition certainly shows that there can be some very important significance of this number.

Can you tell what could be the significance of this number from above definition?

I would love to break your suspense by telling that the significance can be understood quite easily. This unique number has the capability to reframe any number in form of limits and hence we can use this definition of ' e ' to solve limits involving random variables. To explain you a bit more I will write a simple equation to make you understand how one reframe any number in form of limits.

$$a = e^n$$

a is any random number

n is the power of e which gives a

This much explanation is more than sufficient to understand the significance of ' e ' but if any reader is interested to know more about ' e ' can contact me.

I will now show you how to calculate value of this constant but I will do it by a method when neither calculus was developed so effectively, nor there were Taylor and McLaurin series.

We can write the definition of ' e ' as

$$e = \lim_{x \rightarrow 0} (1+x)^{1/x}$$

Since $x < 1$, we can expand the R.H.S by binomial theorem



$$e = \lim_{x \rightarrow 0} \{1 + [n * x] + [n*(n-1)*x^2/2] + [n*(n-1)*(n-2)*x^3/3!] + \dots\}$$

where $n = 1/x$

On simplification it gives

$$e = \lim_{x \rightarrow 0} \{1 + 1 + [(1-x)/2] + [(1-x)(1-2x)/3!] + \dots\}$$

The final simplification gives the value of e as

$$e = 1 + 1 + 1/2! + 1/3! + \dots$$

Thus we get the value of the most useful constant in a very simple manner

Finally I would like to end this article by writing the value of

$$e = 2.7182818284590$$

I remember this value even if someone awakes me from sleep in midnight.

(All the above data is purely based on my research on simple topics of curriculum and you will not find it anywhere, not even Wikipedia. Please do not copy or imitate any part of this article without my consent.)

Vipul D. Ahuja

T. E. Mech

9405691668



HOW TO SAVE PETROL?

Rajat Singh
(7.E. Mech)

One day I was At a Petrol Pump Filling Petrol into my Bike and All Of A sudden I remember this question out of Quora thinking of telling you dear folks very less known facts about Petrol Bunks I.e how they cheat customers into less quantity of Petrol/Diesel filling. This Fact will lead you to get the right quantity for what are you paying and help in saving a lot!

So let me Tell you A thing or two:

1.Problem- Whenever we go to fill Petrol we ask for a whole amount like Rs. 50 or 100 or more,- generally for our ease and lesser time consumption we fill Petrol in whole numbers and this is what they take advantage of,you might have seen those preset keys where they just press a button and start filling and within seconds its done. What they actually do is they preset a lesser amount as shown eg. Of its 50 its set to 30 or 35 that's it.

Solution- However It may sound a bit quirky but I have tried this fact for real! Always fill Petrol/diesel in odd and bit different Numbers eg. If you were to fill for 100 go for 83/85 and you will see that you got the same or more amount earlier than what you were getting for 100!

P.S- The Man Filling will give u an awkward look :D

OK so that Was one thing,let me give you some good tips for Petrol filling that will save your money ☒

1. Fuel at night or early morning: This is a phenomenon we often do not realise. We refuel petrol/diesel when the tank gets to the reserve. Oil expands with the rise in temperature. This expansion causes lesser energy generation, if fueled in hot time of the day. The fuel will burn faster than what you imagine. Best time to fuel the car is early in the morning or later at night.

2. Fill fuel when half tank empty: One of the most important tips is to fill up when your petrol/diesel tank is HALF FULL. There is a scientific reason to why you must do this. The more petrol/diesel you have in your tank, the less air occupying its empty space. Petrol/ diesel evaporate faster



- when in contact with air. Nowadays petrol/diesel storage tanks have an internal floating roof. This roof serves as zero clearance between the petrol/ diesel and the atmosphere, so it minimises the evaporation.
- 3. Avoid full throttle while filling fuel:** There are three modes in how you can fuel in a petrol pump. Low, medium and high. If you are using high throttle (i.e filling fast, pressing the lever down fully), it can easily evaporate. So try to fill at a slower speed when you are in a self service station, or instruct the bunk attendant.
- 4. Don't fuel when the fuel filling tanker is filling the underground storage:** It is important to notice this as when the tankers fill fuel at the fuel station all the dirt that is settled at the bottom gets disturbed and if you are fueling at the same time it can get into your vehicle tank along with fuel - it can affect your engine.
- 5. Regular checking of tyre pressure:** Tyre pressure must be checked once every two weeks. It helps to reduce the drag while driving thus increasing your mileage. There is a label in your car just when you open the driver seat which tells you the tyre pressure.
- I normally keep 1 psi above what is recommended while driving in city, it gives me better mileage. But when you are driving on highway, please keep the tyre pressure as recommended by the manufacturer because the tyre warms up on rotation. If you have greater air pressure, when the temperature rises, it can expand thus putting more pressure on the tyre. It can explode if it is a tube tyre or get punctured faster.
- 6. Clear of unwanted items from the car.** We normally forget or get lazy to clear off the items and keep accumulating things unless we are falling short of space in the boot. It is important that you remove all the unwanted items whenever you are starting to move around. Every extra kilo of weight will need additional fuel, decreasing the mileage.
- 7. Replace spark plugs:** once every 5 years, you must replace the spark plugs, use a better quality spark plug not the ordinary one which comes with the stock car. It improves your fuel combustion thus giving more mileage and it improves your Air condition performance.
- 8. Service your car at regular intervals:** During car service, always get three things replaced - oil, oil filter & air filter. If you can find a reliable mechanic then you can do it at low cost. Only 100-200 rupee if you buy the oil, oil filter & air filter.





10 DAYS TOUR



TREK TO AJOBA HILLS

भवनचे
त्रिकी महाविद्यालय

BHARATIYA VID
SARDAR PATEL



BATCH-2018

रतीय विद्या भवनचे
अभियांत्रिकी महाविद्यालय

BHARATIYA VID
SARDAR PATEL COLLEGE



BATCH-2017



BATCH-2016



BATCH-2015



3 DAYS AUTOSTROKE WORKSHOP

TIME (A POEM)

**-Avinash Chauhan
(7.E. Mech)**

Para 2

**Time O Time,
What a spoiler you are!
Recounting every moments so slyly,
What a narrator you are!
You are the alpha,
You are the genesis,
You are the only inception
You are the dusk,
You are the dawn,
You are the one to see resurrection.
When Moses divided the ocean
You were there
When Krishna taught the 'archer'
You stood and stare.
You discerned the twilight
Of Alexander-The Great
You beheld the dawn
Of Noah and his mates.**



Para 3

Time O Time

How partial you are!

Brimming with prejudice

What a deceiver you are!

You stretch....too....long

When I am missing her

And hastily wither away

When I spend you with her.

You related yourself only with

The law of relativity

Unveiling your secrets solely to Sir Einstein

You showed you partiality.

You knew, amplification of mass at quadratic pace of light

Will yield energy

You knew, the maximum useful work of the universe

Contributes to the entire exergy.

TIME,

You are the goldest,

Your are the oldest,

Every moment yet

Your are even the newest.



TIME- THE FIFTH DIMENSION

-Suraj Jogi
(7E Mech)

The higher dimensions (dimensions beyond the 3 spatial dimension) came into existence when Einstein, Kaluza, Klein and several others worked on developing a single theory (known as "Unified theory" back then and "String theory" recently) which would explain all of gravity, Electromagnetism etc. They dreamed of postulating an equation which would explain "everything".

Imagine two lizards crawling on the roof inside a room. The room has a balloon floating in the air.

Now, assume that lizards can only crawl but not jump and also that they can only see what's in front of them. So, for a lizard, this world is of only two-dimensions. Because, it can't see places or go to places whatever's above or below it.

Back to the room.

Now, while the lizards are crawling on the wall, one lizard suddenly slips and falls on the balloon. Now, the 1st lizard which is sticking to the roof tries to find its mate by crawling each and every inch of the inside walls of the room. And similarly, the 2nd lizard tries to find its mate by crawling every surface bit of the balloon.

Can either find either? No. Because, the lizard's vision does not permit them to see beyond two dimensions. What happened to second lizard in POV of 1st lizard? The second lizard "Slipped into another dimension".

What happened to second lizard in its own POV? It "slipped into another dimension".

We are similar to lizards. We can only see what we see but cannot see beyond what we see because we are restricted to see what we are meant to see. There is a 4th dimension, a 5th dimension (You know there are 10 dimensions if you have researched.) in front of us. But, we just simply cannot imagine or see them except to understand them and play with them mathematically.

This story might be a good metaphor to relate to our restriction of imagining higher dimensions.

Now, back to the lizard story;

Now seeing the plight of the lizards, assume you caught the tail of 1st lizard and hung it in the air in the middle. Now, what will the 1st lizard see?

It will be amazed to see that there exists a "different" world completely

. Now, after watching the balloon hanging in the room and a wall beyond it, maybe its brain (scientifically disputable*) triggers its sense of 3rd dimension and suddenly, it can see the floor behind it. It can see the chandelier's hanging from a wall while crawling on corners.

Similarly, all it takes is a person to show the 4th dimension to us and maybe our brain too (again, scientifically disputable*) will start seeing what we have not been seeing all these days.



TIME

Kunal Patel
(7.E. Mech)

Time, one of the daily aspect of life .It goes with the particular torn. One of the most powerful tool in today's generation.

**You must have heard the maxim,
“ One who saves time ,
Time saves the one”.**

Time matters a lot. It is the only tool, which is independent.

Have you ever imagined world without the factor so called ‘TIME’

There are people in the world, who utilize each and every second of life ; whereas there are people who passes year by year just like an empty vessel with nothing.

A very awesome relation given by Sir Pandit Jawaharlal Nehru in respect of time .

-time has certain relation with past, present, and future.

Imagine, you are sitting in a dark room and have nothing to do. most probably you will think of past . Sitting in the present you are thinking of past. This means, roots of present lies in the past in the current scenario. This implies sitting in the present you are utilizing the time thinking of past because you are unable to action in particular room and also at the same time you are entering the realm of future. In this way,

Inference can be drawn that all the three(past, present and future) at a particular time co-exist.

Time is a factor which is common. Time shows the complete experience of past, present and future.

Time is subjective but it is made objective by human being by putting in to mathematical ideology numbering from 1 to 12.

Many people still judge the time by waxing and waning of moon i.e especially for the completion of months. Time is not just in the ambit of seconds, minutes and hours but it also encompasses days , months , and years .

Among all sources, time is so elusive and in its way is quiet different. Time defines every moment . Time is a part of emotion . Every moment of time we are under certain repression of happiness, sorrow and depression. It is kind of analogy between time and emotion .

Most amazing thing about time is TIME itself.



CLEANLINESS BEGINS AT HOME



One of the first signs of a well managed place — whether it is a restaurant, hotel, airport, office or train station — is its level of cleanliness. If the place isn't clean, it is unlikely to impress anyone. The same applies to an entire country. Indians who travel abroad are often awestruck by cleanliness levels in the developed world.

Therefore, if we want our country to realise its full potential in the world, we have to make it clean. A land of filth, no matter how talented its people and how wonderful its natural resources, will never earn the respect it deserves.

Perhaps this is a reason why the PM has taken on the Swachh Bharat mission with such gusto. Not only him, several other influencers and prominent people have lent a hand to the cause, often holding a broom along with it.

However, while the broom in hand does make a compelling photo-op and is well intentioned, it will take a lot more to clean India. If we are really serious about this, let us first figure out why we are dirty in the first place, and what it would take to have a cleaner India.

We are not dirty people. Indians keep their homes scrupulously clean. In many parts of India people do not wear shoes inside the house to keep interiors clean. Some of our religious places are kept clean (though there are exceptions, don't even get me started on Varanasi and Mathura). Diwali, our biggest festival, is the time to spring clean. Indians are meticulous about taking a shower daily, which may not be as common in the West.

So why is our country dirty? Why is it when we step out of our homes, we will find the roadside littered? Is it the municipal corporation that isn't doing its job? Is it the local politician who should ensure things are kept clean? Do we not have enough dustbins?

None of the above issues fully explain why India is unclean. The reason is that we make it dirty in the first place. And if we want truly to be a clean country we need to take steps to ensure we minimise filth in the first place, rather than hoping someone will pick up the broom and clean it. Developed countries in Western Europe and North America do not have local authorities sweeping the streets all the time. They have systems in place, and the local population cooperates to not create filth in the first place.

We on the other hand look at our country differently from our homes. Inside our houses, we



want things to be spick and span. Outside the entrance door, it doesn't matter. It isn't mine. It's dirty anyway and how does it matter if i dump some more litter on the streets?

With this mentality, you can have an army of municipal corporation workers working 24×7, a hundred celebrities sweeping the streets, the PM making a dozen speeches, i assure you, India will not become clean.

The only way it can and will become clean is if we minimise and prevent creating filth in the first place, and the only way that will happen is when all of us together think 'what is outside my home is also mine'.

This sense of community, recognition of a greater good and collective ownership is the only way for the situation to change. Else, we risk this cleanliness drive becoming another social fad that will be forgotten when the novelty wears off.

Of course, infrastructure improvements such as new treatment plants for solid, sewage, industrial and agricultural waste are required. New sets of indices, whether they be measures of cleanliness or density of dustbin distribution, are needed too. Laws and fines have their place as well. All that is indeed the government's job and they will be judged on it.

However, all this will come to naught if we Indians don't change our mentality about what is my space and what isn't. The country is yours. You obviously can't clean all of it, but you can be aware of at least a little bit of area around you. If every Indian has a concept of 'my 10 metres', or a sense of ownership about a 10 metre radius around him or her, magic can happen. Ten metres is just 30 feet around you. Given the number of people we have, we can achieve a lot if we all get together.

So it should not just be 'my home should be clean', but 'my home and surrounding 10 metres should be clean'.

Whenever there is a collective sense of ownership, we have higher cleanliness levels. It is for this reason most college campuses are cleaner than the city outside, despite housing thousands of youngsters inside.

So get out there, scan your 10 metres. Can you improve anything? A swachh Bharat is indeed possible. The first step is 'swachh manasikta' or clean mindsets. Are you game?

In the interests of full disclosure Prakash Javadekar, Union minister for information and broadcasting as well as for environment and forests, nominated me to help with the Swachh Bharat campaign. This column is one of my contributions towards the campaign. Opinions expressed, however, are independent and personal.



INDUSTRIAL VISIT AT PARLE GLOBAL TECHNOLOGIES PVT. LTD.



Company Visited : Parle Global Technologies Pvt. Ltd.

Number Of Students : 30

Faculty Co-ordinator : Prof. Megha Janbandhu

Date : 20th September 2014

On receiving the letter of permission from the company, all the students along with the faculty member reached there at 10:30 am. Few members of the company received us at entrance.

Initially, we were given a brief introduction about the company. The presentation on 'Tablet Manufacturing and Tooling Terminology' started at 11:00 am and continued till 1:15 pm. Refreshments were also provided. The visit to the manufacturing department started at 1:45 pm which continued till 3:15 pm. Later on there was a feedback session for about 10 minutes. This was all about the visit.

About the industry :

Location : Waliv road, Vasai ,Thane-401208 ,Maharashtra.

Founder : Mr. Rajmal L Mehta

Products manufactured :

Tablet punches and dies, tool polishing and blister change parts for pharmaceutical industries.

Operations :

The punches are mainly of two types-D with bigger die and B with smaller die, the tablet presses determine sizes of the punches. A tablet press is a mechanical device that compresses powder into tablets of uniform size and weight. A press can be used to manufacture tablets of a wide variety of materials and to form a tablet, the granulated material must be metered into a cavity formed by two punches and a die.

The company also manufactures blister changing parts that help put tablets into wrappers. The two types of blister changing parts Aluminum-PVC and Aluminium-Aluminium are made based on the drawing. The Haas machining centres used by the company to manufacture blister changing parts and tablet tooling has helped the Vasai-based unit pose a stiff challenge to its competitors.



This was all about the industry.

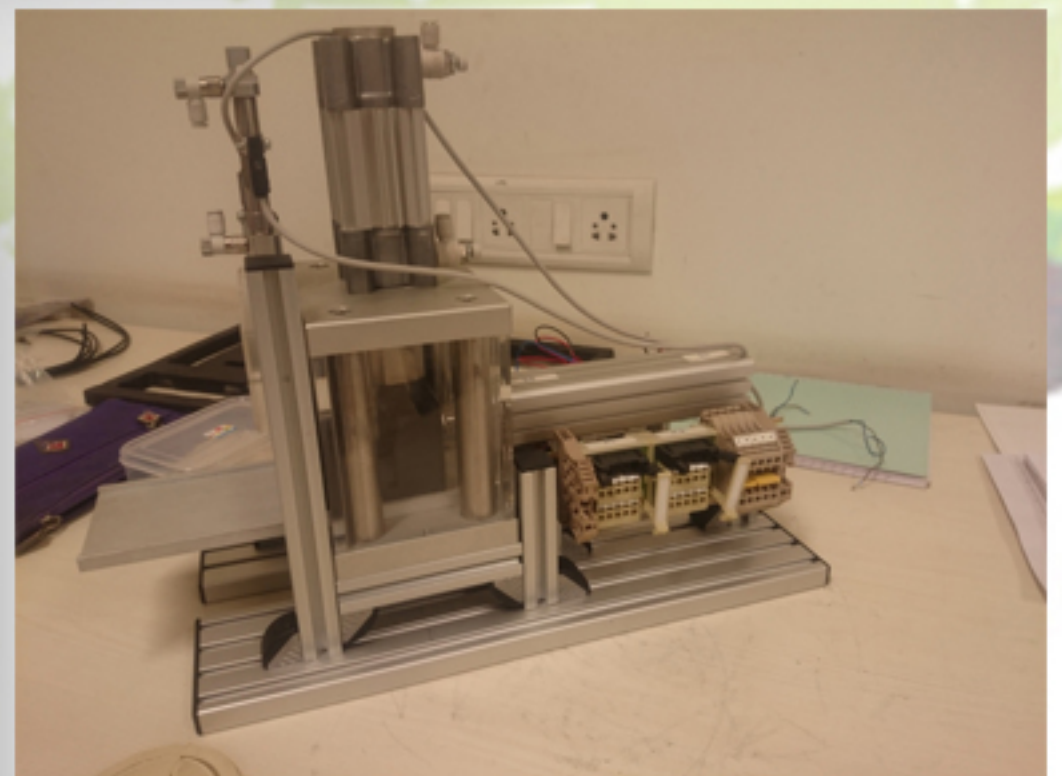
It was an informative,interesting and successful visit. We express our thanks to the principal who permitted us to go on the visit. On behalf of the students I request to arrange more industrial visits for students which can practically train the students.

(Refer pg. no. 42)





TEACHER'S DAY



SIEMENS' INTERNSHIP



IV AT PARLE GLOBAL TECHNOLOGIES



PHADKE SIR'S LECTURE ON IC ENGINE

A REPORT ON INDUSTRIAL VISIT AT B.A.R.C

**- Vishal Rathod
(FE Mech)**

In co-ordination with Mechanical Engineering Students Association (MESA) of SPCE Andheri, First Year Mechanical Engineering students participated in “Physics Utsav 2015” organized by BARC, Mumbai to celebrate National Science Day. Total 22 students and MESA Incharge Miss Megha Janbandhu were warmly welcomed by Mr .Lalit Pant Scientific Officer Nuclear Physics division. He also instructed students about do’s and don’ts and briefed about **PHYSICS UTSAV 2015 .**

The program comprises of inspirational lectures by eminent scientist, film shows, and visit to various research facilities including the Dhruva Reactor, ion accelerator and robotics division.

The various divisions of BARC are :

DHRUVA REACTOR

VAN DE GRAFF COMPLEX : NUCLEAR PHYSICS AND ACCELERATOR

DEVELOPMENT ACTIVITIES

REMOTE HANDLING AND ROBOTICS

COMPACT MUON SOLENOID DETECTOR at LARGE HADRON COLLIDER AT CERN

INDIA BASE NEUTRINOS OBSERVATORY (INO)

FOLDED TANDEM ION ACCELERATOR, FOTIA

NUCLEAR FISSION STUDIES WITH HEAVY IONS

GAMMA RAY ASTRONOMY

MACE γ - RAY TELESCOPE

AIR PLASMA JET

INDUSTRIAL RF ELECTRON LINACS

Some of the divisions which student got opportunity to see are the Dhruva Reactor, ion accelerator and robotics, Van de Graff generator and FOTIA accelerator. The students were boarded toward reactor campus. On the way, bus co coordinator Mr.Kashyap and Miss Anita



Gupta showed students various areas in BARC campus. They also showed earlier India's longest building. After that the group of students went to auditorium for the inaugural ceremony of Physics Utsav. Chief Guest of the function was Prof. Mustansingh Barma (Director of TIFR, Ph.D. (physics), Padma Shri award of the government of India (2013)). Also Shri Sekhar Basu (Director BARC, Padma Shri award of GOI 2014). The program was initiated with a quiz followed by publication of BARC magazine. Mr. Basu, Director BARC shared knowledge of Nobel Prize and information of Indian scientists. And explained the biography of scientists and their inventions. He also delivered a lecture on Higgs boson particle invention and various telescopes along with scientific landscapes. The program ended by a short film on frontiers research produced and directed by BARC showing functioning of research centre. In which Dr. Anil Kakodkar (Ex-Director of BARC) informed about reactors like Apsara, Cirus and Dhruva. Dr. S. Shankar informed about generation use of isotopes like Cobalt-60. Mr. Paul Thomas detailed about use of radioactivity for preservations of food stuff, seeds and agro products. He also showed benefits of them and plan launched by BARC 'KISAAN'. KISAAN comes up with 'TAG-24' TBG 39 and TG 37A variety which is grown in 10 states across the nation.

Group of students were taken to see Dhruva –the research reactor of 100 MW with metallic natural uranium as fuel, heavy water as moderator coolant and reflector is a unique reactor of its kind. Students were taken inside the Dhruva laboratory. Mr. Surendra Singh, Scientific Officer of Dhruva control room informed students about control room details and mechanism of reactors various parts like biological shielding, basement, sub-basement, coolants, moderators, fuel exchanger, shut off rod, high q-diffractometer, high magnet diffractometer. Students were also educated with some models prepared of reactors for better understanding. Mr. Sharma, Scientific Officer informed how to reduce effect of α particle, β -particles, and γ -particles. After that students moved towards Van de Graff generator and FOTIA accelerator divisions of BARC.

FOTIA-Folded Tandem Ion Accelerator Facility, the instrument was completely designed and fabricated at the centre and only a few nations have the capability to make such an equipment. Mr. Basu Arindam along with Mr. Subramanyam, Scientific Officer showed FOTIA's controlling room and functioning. The FOTIA facility at BARC has been commissioned recently. Several beams have been accelerated up to a terminal voltage of 3 MV and are characterized by RBS technique. The voltage stability of less than 2 kV has been achieved using the voltage stabilization system developed in the laboratory. A PLC based interlock system is being incorporated for the safety of the machine components and the accelerator personnel. A new beam hall has



been constructed in order to set up five beam lines for various experiments in the fields of nuclear physics, material sciences, arms, beam foil spectroscopy, etc. Details of the beam optics studies have been completed for the above beam lines and exact locations of various beam handling components have been finalized. Mr. Subramanyam, Scientific Officer also showed models prepared on Charles's law, Boyle's law and temperature sensing pressure pump. He also explained about LEHIPA-Low Energy High Intensity Proton Accelerator.

6MW Folded Tandem Ion Accelerator, FOTIA at BARC

An indigenously built Folded Tandem Ion Accelerator (FOTIA) has been set up at Nuclear Physics Division, BARC. The first beam of ions was delivered from it at 9:30 p.m. on Friday, April 21, 2000. The beam was of ^{12}C ions at 12.5 MeV beam energy. It was characterized by performing the Rutherford Back Scattering (RBS) on Gold, Tin, and Iron target nuclei. The accelerator has the capability of delivering heavy ion beams up to $A \gg 40$ and beam energy up to 66 MeV with a maximum terminal voltage of 6 MV. These beams will be used for research in basic and applied sciences in the field of nuclear physics, astrophysics, material science, accelerator mass spectrometry, atomic spectroscopy, etc.

The students were taken to the DRHR-Division of Remote Handling and Robotics where students found lot of interesting things as it was closely related to mechanical branch. They showed various devices like Manipulators, PFBR Periscope, Auto material transfer system (with demo), DNA microarrays, and Bhabhatrons which are installed at 34 medical centers across India for cancer treatment. The DRHR of BARC has made a substitute of Human arm in the form of Rugged Duty Master Slave Manipulator.

Handling capacity of RDM manufactured at HMT is very high (45 kg), which is close to that of human being. Also, the RDM has large volume coverage of 20 m³. Although the range of human arm is about 1 m³, the larger range of the manipulator is utilized by augmenting human arm motion with electrical motions. RDM consists of the assembly of a large number of miniatures, intricate and precise parts. Mechanical power transmission from one side of hot-cell wall to the other through various moving joints is a challenging task in MSM design. Design and manufacture of a reliable system with hundreds of moving parts, keeping it light weight, with low friction and low backlash is also a difficult task. Materials and components used in MSMs



are of high strength and radiation resistant.

BARC faculty showed exhibition of various scientific models, photo gallery of BARC and posters of different models which actually exist in BARC and used for research and development purpose.

In such a way, the Physics Utsav 2015 ended but still memorizing lot of educational fun, models and proud of our country that we also have such a extraordinary laborites ! It was very inspiring in learning science and upgrades the vision of nation toward various researches like Hon'ble C.V.Raman and others. Once again being a group member I thank Mechanical Engineering Students Association (MESA) Incharge Prof. Megha Janbandhu, Assistant Professor Mechanical Engineering Department for giving us a wonderful opportunity of visiting BHABHA ATOMIC RESEARCH CENTRE Mumbai. It was a brilliant lifetime experience.

(Refer pg. no. 19)

A REPORT ON AUTOSTROKE WORKSHOP

Prateek Jade
(7.E. Mech)

“AUTO-STROKE”

A 3-day workshop conducted by Codex Design in association with Rendezvous, IIT Delhi

AUTO-STROKE, a 3-day workshop on Automotive Design and Analysis was conducted by Codex Design in association with Rendezvous, IIT Delhi was organised in Sardar Patel College of Engineering by Mechanical Engineering Students' Association (MESA) between 23-25 January 2015. The workshop was coordinated by MESA Incharge Prof. Megha Janbandhu along with Mittal Mewada (TE Mech), Pradeepkumar Patel (TE Mech), Vedaantsingh Pardeshi (SE Mech) and members of MESA Committee. 124 students from SPCE and other colleges registered for the workshop.

The workshop was inaugurated on the 23rd of January by guest of honour Mr. P.N. Jumle, Director, Board of Apprenticeship and Training, Western Railways. Also present were Dr. P.H. Sawant, Principal, Sardar Patel College of Engineering; Dr. M.M. Murudi, Vice-Principal & HOD, Structural Engineering Department, Sardar Patel College of Engineering; Dr. Rajesh Buktar, HoD, Mechanical Engineering Department; Dr. Prashant Nagrale, HoD, Civil Engineering Department, Sardar Patel College of Engineering; Mrs. Vidya Joshi, HoD, Electrical Engineering Department. The chief guests welcomed the trainers for the workshop, Mr. Ashish Chandra, Technical Manager, Codex Design and Mr. Ripu Daman Singh Chauhan, Guest Faculty, Codex Design.

The first day of the workshop commenced with a detailed presentation on the various components of automobiles by Mr. Ripu Daman Singh Chauhan. Various components of automobiles such as chassis, body, engine, transmission, wheels etc. Students received a detailed overview of the various systems presently used in all the automobiles. He also answered various questions asked by students during the course of the session.



The second day began with the continuation of the previous day's session where students were acquainted with the components of automobiles. After the theory session was completed, Mr. Ashish Chandra conducted a session on Computer Aided Design and Analysis of automobile components. Here, the students were given basic knowledge of SolidWorks, a CAD software developed by Dassault Systemes, and were taught to design simple engine parts like piston, crankshaft, connecting rod etc. Also the students learned basic analysis of designs created on SolidWorks.

The final day of the workshop had three major activities. The students were divided into 3 groups. Mr. Ripu Daman Singh Chauhan explained the various parts of an IC engine aided by a live dis-assembling of the engine of a Maruti 800 car to the first group. Dr. Praful Phadke explained the construction and working of diesel engine to the second group. The third group was given a quiz based on the knowledge received during the course of the workshop.

After the sessions ended, the valedictory function commenced. Dr. Praful Phadke, Dr. M.M. Murudi & Dr. Rajesh Buktar were present to grace the occasion. The trainers, organisers, volunteers were felicitated by the guests. Later prizes were given out to the winners of the quiz. Dr. Murudi spoke to the students expressing the need of such training programmes and thanked the trainers. Prof. Megha Janbandhu presented the vote of thanks.

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A REPORT ON SEIMENS' INTERNSHIP

-Alshay Badwal
(7E Mech)

(8-12-14 to 20-12-14)

I did my internship in basic mechatronics at Siemens Airoli. It was a very nice professional experience for me. Basically it was 2 week programme designed by Siemens Germany.

On the first day they showed us the scale down version of pneumatic press which is actually used in company. They explained the working of every single part of the machine. Then we were surprised to hear that we were going to build our own pneumatic press and actuate it using PLC.

Then on second day we were first taught how to do mechanical assembly. Siemens has very powerful documentation work. They had machine drawing of every single part which is used in press. After the mechanical assembly session we were provided with the manufactured parts required for press. Then we did measurement of every part according to the drawings provided. We divided the parts into 3 categories a)perfect parts b)parts to be reworked c)failed parts.

After the assembly work we started with electric parts and their assembly. Instructors gave adequate amount of information about electric drives. Then we did wiring diagrams and did electric wiring according to that. After this we were informed about the pneumatic assembly.

We then learned how to read the pneumatic diagrams and do circuit designing. After this we did pneumatic circuit completion. Then on the last 2 days we learned PLC programming on SIMANTIC-7. We did a programme for the pneumatic press.

On the last day we actuated the pneumatic press we build. Felt good that we had a chance to apply the knowledge we gained during those days.

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A REPORT ON INDUSTRIAL VISIT AT VOLKSWAGON

Akshay Panchal
(7.E. Mech)

The students of TE MECHANICAL gathered at SPCE Entrance on 16th September, 2014 at 8:30 a.m. to leave for the Industrial Visit in a 49-seater bus. The journey begun by 9 a.m. as all the students arrived and the bus proceeded towards the visit. After picking up students from various pickup points, the bus made its next halt in Pune for students' breakfast and then it finally reached VOLKSWAGEN PLANT at approximately 3:00 P.M.

As the students reached the Volkswagen Plant, they were guided into the main building after a security check & were later seated in the auditorium where they were further informed about the plant by Mr. Chaitanya who is the Assistant Manager of the Communications Department. He began his presentation about the plant with showing the students two videos which described the technologies and methods used inside the plants to make a Volkswagen car, as the saying goes "Only Volkswagen can make a Volkswagen".

After the video the students were given few instructions before actually entering the plant workshops and then the one hour long visit began at 3:50 P.M. with Mr. Chaitanya as the guide. The students were provided with personal headsets to hear the information provided by the guide as the noise levels in the plant were high.

About the plant:

The Volkswagen plant in Chakan occupies a total area of over 2.3 million square metres (575 acres), with buildings covering about 1,15,000 square metres.

A workforce of over 3,500 people was engaged in building it during its peak construction stages. The plant was built in a record time of 17 months, with an investment commitment of INR 3,800 Crores (580 million Euros) by Volkswagen India Private Limited. It is the largest investment by a German company to date in the growing Indian market.



Production:

The plant has a production capacity of 130,000 vehicles a year, which in capacity was maximized in 2011. The construction of the plant commenced in 2007. The Honourable Governor of Maharashtra, His Excellency Shri. S. C. Jamir and Prof. Dr. Jochem Heizmann, officially inaugurated the new plant on March 31, 2009, in the presence of nearly 500 international guests.

The Pune plant is one of the most modern in the Volkswagen Group. It has a high level of vertical integration and a large share of local suppliers. The facility is the only production plant operated by a German automaker in India that covers the entire production process, from press shop through body shop and paint shop to final assembly.

The facility uses futuristically designed state-of-the-art equipment. For example, the body shop uses the Diode Laser Brazing (DLB) technology, whereas the Roof & Side Framer laser technology is used for welding the roof to the body of the car. The facility is also one of the few environment-friendly manufacturing plants around the area. For instance, the exhaust of the paint shop is re-burnt and the resultant heat and energy is reused.

Plant Details I – Body Shop:

The Volkswagen Plant produces about 1,50,000 cars per year i.e. 420 cars per day i.e. 30 cars per hour or we can also say ‘One car takes birth every two minutes’. This rate of production is possible only due to the latest technologies adopted by Volkswagen India & its effective implementation. In the Volkswagen Plant, there is 30% automation, which is an appreciable feat to achieve by any automobile company. The students were shown various departments of the body shops such as Welding, Gluing, Measurement Verification etc.

Door Gluing

The door of every car consists of two distinct parts, outer and inner, which are to be glued together. At Volkswagen, they use KUKA™ Robots to do this task of gluing. KUKA™ Robots in action

Measurement Verifications:

The Volkswagen cars are made with greatest precision and hence, every measurement is verified and confirmed before moving the vehicle body to the assembly line. There are 308 spots in the POLO and 312 spots in the VENTO where the measurements have to be strictly maintained. This job, too, is done by KUKA™



Robots which record the measurements and variations, if any, into the computer. This is done with the help of cameras which capture several images of the various critical spots and the data is then processed for further analysis and the output of measurement verification is shown on the screen of the integrated computer.

Spot & Laser Welding:

In a Volkswagen car, there are on an average 4500 spots where spot welding is done. This is also done with the use of robots which are programmed to weld at specific spots. Spot welding ensures highest levels of rigidity and safety. Also, a unique method used by Volkswagen is 'Laser Welding' which is used by them to weld the roofs to the body. In laser welding, copper wire is melted and deposited onto the joints where the welding is done with the use of laser. This type of welding gives high levels of rigidity and robustness. Volkswagen also claims that it is the only automobile manufacturer to use this type of process for attaching roof to the body. Laser welding results in 100% water proof roof and it also eliminates the use of rubber tapes, which enhances the looks of the car besides making it safer. The laser welding process is 100% automated and is isolated from human access. Also, arrangements are made in the room where laser welding is done, to completely stop the process when any human enters the room. This is achieved by extensive use of sensors.

The moving of vehicle body within plant is done at higher levels from ground to save space in the workshop.

Volkswagen boasts of its cars' safety features and claims them to be the safest cars which are safe even at high driving speeds. One of the features mentioned by them is the use of 'Safety Pads' in vehicles at places which are expected to bear most of the force in case of an accident. The use of safety pads helps in avoiding any intrusion of vehicle body parts into the passenger area. Besides safety pads, Volkswagen also uses different materials in critical areas ,i.e. areas which bear majority of forces in case of a road mishap, such as high grade steels etc.

Another major problem that can be encountered by users with their cars is 'Rusting'. To solve this problem, Volkswagen uses 100% Galvanized steel and also gives an antirust guarantee of 6 years even in coastal areas where the humidity is high and chances of rusting greater.

Paint Shop:

Volkswagen uses solvent based colors for painting the cars and ensures that the body is painted without any slightest errors. The looks of the paint in different conditions such as daylight and night lighting conditions are checked by virtually creating such



conditions with the aid of ‘Light Tunnels’.

Plant Details II – Assembly Line:

Volkswagen India manufactures both Left Hand Drive (LHD) & Right Hand Drive (RHD) cars in its Chakan Plant. The LHD cars are exported to countries such as Nepal, Sri Lanka, Malaysia and Taiwan. Both types of cars have a common assembly line which is spread across 46,000 sq. m and has total of 3700 employees working in 2 shifts to provide uninterrupted production of automobiles. The students were shown various processes in assembly line such as transmission attachment, tire assembly etc.

Vehicle Identity Number:

After the vehicle body arrives from the body shop, its doors are removed to facilitate further working. The primary task done on the automobile in the assembly line is assigning of the ‘Vehicle Identity Number’. This number gives each car its own individual identity and the car can be traced with this number.

Cockpit Assembly:

Each cockpit weighing 50kg is assembled into the car body with the help of robotic arms. When this task is being done, the car body is constantly moving ahead on the assembly line. This gives the workers only 117 seconds to complete the given task. If due to some reason, the task isn’t completed and it requires further attention, the workers have an option of stopping the assembly line by pulling a red rope. As soon as the rope is pulled, the LCD displays the information about the location where there is an issue and the chief engineer then attends to it.

After the cockpit assembly, the whole transmission system is attached to the body in few seconds which is famously known at Volkswagen as the ‘Fastest Chassis Marriage’. Later the vital components of the car such as batteries, bumpers etc. are fitted into the car. The car has to pass through 106 stations in the assembly lines before it is ready to be sold. The last station in the assembly line is the tire assembly.

Volkswagen uses tires manufactured by MRF, Goodyear and Apollo in their vehicles.

The doors are then reattached to the vehicles in the finish lines.

The Inspection Department lies ahead of the Assembly Line where the car is scrutinized for minute errors which are rectified and eliminated before the car is given an ‘O.K.’

The Bidding Adieu:

After enjoying the view of most sophisticated robots in action and witnessing the complete manufacturing of the automobiles, the students returned to the auditorium.



After the visit ended, Mr. Chaitanya thanked the students for their cooperation and also clarified the doubts of few students.

As a souvenir of the Industrial Visit, Volkswagen gave the students stickers of the VW® logo and a Magnetic Badge of the VW® logo. The students then left the premises of Volkswagen Chakan Plant by 5:30 P.M. with an amazing experience and long lasting memories.

(Refer pg. no. 19)

BLOOD DONATION CAMP

Atul Patil
(7.E. Mech)

On 19th March 2015 Mechanical Engineering Students Association conducted a “BLOOD DONATION” camp in the college. The camp was organized in Seminar hall room no.119. All the students, faculty and staff members participated voluntarily in the camp. In total, 79 units of blood were collected. Donors mainly include students along with staff members. Every member was asked to fill the form which consists of the donor’s biodata and some questions regarding their health in order to make sure that the blood donated by the donor is not defective. Doctors only allowed donors more than 48 kgs wt to donate blood. This camp helped students in getting awareness about their social responsibilities and showed enthusiastic participation for the same. The Camp started at 11.00 a.m. and went up to 3:30 p.m. in the afternoon. The camp was jointly organized by “Red Cross Blood Bank under the supervision of Dr. Ramdas and supporting staff. According to the information presented on the occasion, only 50 percent of the country's blood requirement is fulfilled through such blood donation camps. Hence, there is a need to create awareness amongst our youth for active participation in such a noble cause.

All the MESA committee members along with MESA Incharge, Prof. Megha Janbandhu made it a successful event. The camp is organized in a much disciplined manner checking each and every aspect of participant’s health. During the blood donation process the hemoglobin content of the partici-



pants were checked before donating the blood, clearly telling the participants about their health condition. Refreshments were provided to the participants after donating blood.

After the medical check-up of the donors samples would be taken. It was great to see more people than pre-registration numbers turning up in the venue. This stretched the capacity of the blood bank, as a result of which the contact details of the donors were taken so as to allow them to donate at the earliest to the blood bank. The Blood samples were carefully sealed and transported away, while the Student volunteers and hospital staff helped in all activities. Throughout the morning, there were smiles and laughter all around - a true embodiment of what we believe in - selfless service with a smile. The donors received credit card to stick to their chest which spreads social awareness in the society. Blood Donation Camp organizing committee members, faculties were inspecting every aspect of the camp throughout the day.

(Refer pg. no. 20)





ASHWINI GANACHARYA
(TE MECH)



SHUBHAM MAHADIK
(FE MECH)



EKTA NARVEKAR
(TE MECH)

बोथट झालेल्या संवेदना...

-Yogesh Kadam
(7E Mech)

मराठवाडा दुष्काळाने होरपळून गेला होता. सगळ्याच पक्षांचे राजकारणी या दुष्काळात राजकीय पोळी भाजून घेण्याचा प्रयत्नात होते. केंद्राचे कर्मचारी दुष्काळाची पाहणी करण्यासाठी आले होते. याच दरम्यान दूरदर्शनवर सायंकाळच्या ७ च्या बातम्यात एक बातमी ऐकली. मराठवाड्यातील काही युवकांनी एकत्र येऊन पन्नास शेतकऱ्यांची कुटुंबे दत्तक घेतली. वास्तविक पाहता त्या युवकांची आर्थिक स्थिती बेताची होती. पण तरीही सामाजिक बांधिलकीची जाणीव ठेवून, आपल्या बांधवांच्या वेदनेने कळवळून या युवकांनी पीडित शेतकऱ्यांना मदत केली होती. कती संवेदनशील मन होते या युवकांचे ! खरे तर आपल्या भारतीय संस्कृतीची शक्तिवणच ही आहे. आपले तुकाराम महाराज म्हणतात-

“ जे का रंजले गांजले त्यासी म्हणे जो आपुले
तोच साधु ओळखावा देव तेथेच जाणावा ”

परंतु क्षणात माझ्या डोक्यात विचारांचे चक्र सुरु झाले. आपल्या देशात मुकेश अंबानी, अमिताभ बच्चन, सचिन तेंडुलकर, शाहरुख खान ही आण अशी कतीतरी अब्जाधीश मंडळी आहेत. या मंडळींना दसित नाही का माझ्या शेतकऱ्यांचे दुःख? जर ते युवक आपल्या तुटपुंज्या पगारातील पैसे वाचवून शेतकऱ्यांची मदत करत असतील तर ही मंडळी कृतशून्य का? याचे एकच उत्तर मला मिळाले ते म्हणजे- बोथट झालेल्या संवेदना.....

मला माहिती आहे की हे लोक अनेक NGO, सामाजिक ट्रस्टला देणग्या देत असतात. परंतु आपल्या बांधवांवर आलेल्या असमानी संकटाला मदत केली म्हणजे या मंडळीच्या समुद्रावढ्या संपत्तीतून पाण्याच्या थेंबाएवढी संपत्ती कमी झाले असे म्हणता येईल. मुकेश अंबानीच्या बंगल्याचे एका महिन्याचे वीजबिल तब्बल ७२ लाख रुपये येते. अशा अनुकूल परिस्थिती सामाजिक बांधिलकीचे भान न ठेवता यांचे वागणे म्हणजे संवेदानाहीन मनाचा उत्कृष्ट नमुना ! एकीकडे बिल गेट्स, बॅरेन बफेट हे आपल्या संपत्तीतील अर्धा हिसा दान(charity) करत असताना रतन टाटा, बरिला, वाडिया यांच्यासारखे मूठभर अब्जाधीश सोडले तर बाकीचे आपल्याच श्रीमंतीत, पैशात मशगुल आहेत, रममाण आहेत. ज्या समाजाने त्यांना घडविले त्या समाजाच्या उपकाराची परतफेड करण्याची एवढी नामी संधी असताना या मंडळी गप्प आहेत कारण एकच- बोथट झालेल्या संवेदना.....



भारतात संपूतृतीचे वतिरण अतशिय असमान आहे. क्रेडीट सूवसि रसिस्चच्या-जागतकि संपूतृती अहवालानुसार सन-२०१४ साली भारतातील १० टक्के अतशिरीमंत लोकांकडे एकूण संपूतृतीतील ७४ टक्के वाटा आहे. हेच प्रमाण २००७ साली ६५.९ टक्के होते.

दविसेंदविस गरीब आणा शिरीमंत यांच्यातील दरी वाढत चालली आहे. सी रंगराजन समितीच्या अहवालानुसार सन २०१२ साली भारतातील २१.९ टक्के लोकसंख्या दारदिररेषेखाली आहे. तेव्हा आता तरी या अब्जाधीशांनी झोपेचे सोंग न घेता देशाच्या जडणघडणीत सक्रीय सहभाग घ्यावा.

मा.पंतप्रधानांनी सूचछ भारत मोहमिची घोषणा केली. आज भारतात १२५ कोटी लोकसंख्येपैकी ५९ कोटी ७० लाख लोक उघड्यावर शौचाला जातात. आणा या बाबतीत भारताचा जगात पहिला क्रमांक लागतो. यापेक्षा शरमेची दुसरी कोणती गोष्ट नाही. मला प्रमाणकिपणे असा वाटत की ह्या अब्जाधीशांनी मनात आणले तर २०१९ साली उघड्यावर शौचाला जाणारी एकही व्यक्ती भारतात असणार नाही आणा हीच खरी महात्मा गांधीजीच्या १५० व्या जन्मदनिची भेट असेल!

मा.पंतप्रधानांनी सुरु केलेली आणखी एक योजना म्हणजे संसद आदर्श ग्राम योजना ! संसद सदस्यांनी एकेक गाव दत्तक घेऊन त्या गावाचा कायापालट करण्याची ही योजना. आता या संसद सदस्यांच्या जोडीला जर या अब्जाधीशांनी सुद्धा एकेक गाव दत्तक घेतले तर पाहता पाहता आपल्या भारत देशाचे रूप पालटून जाईल. भारत सुजलाम सुफलाम होईल; आणा हे सहज शक्य आहे.

प्रश्न फक्त अब्जाधीशांचा नाही. आज आपल्या देशातील मध्यमवर्गसुद्धा आत्मकेंद्री बनत चालला आहे. केवळ प्राप्तीकर भरून आपली जबाबदारी संपत नाही. या देशाचा नागरिक म्हणून प्रत्येकाने आपापल्यापरीने देशाच्या प्रगतीला हातभार लावला पाहिजे. आता गरज आहे ती सर्वांनीच कात टाकण्याची आणा एका नव्या दृष्टीकोनाची! नासलेल्या दुधापासून सुद्धा पनीर बनवता येते. गरज असते ती दुध नासले या नरिशेतून बाहेर पडण्याची आणा थोड्याश्या कल्पकतेची ! मी देवाकडे प्रार्थना करतो की भारतमातेच्या सर्व लेकरांच्या बोथट झालेल्या संवेदना दूर होवोत आणा एका नव्या दृष्टीकोनाने, मानसकितेने आणा कृतीने ही भूमी समृद्ध होवो.



MESA COMMITTEE 2014-15



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(General Secretary)



Umang Patil
(Co General Secretary)



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