



# THE ECE HERALD

The Official ECE Newsletter

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## THE ORIENTATION PROGRAMME

Ravi Teja (611604)  
Avinash (611629)

8<sup>th</sup> August 2019, witnessed the commencement of two prominent events in the history of NIT AP, The genesis of phase 1B construction and the orientation program for the fifth batch of NIT AP. Dr. Dasharath Ram, director of Defence Research & Development Laboratory, Hyderabad and G Laxman, All India joint organizing society ABVP, were the chief guests for this occasion. Dr. Veeresh Kumar G B, Assistant Professor, NIT Andhra Pradesh headed this program.

He mentioned that our campus has attained 8<sup>th</sup> position in terms of Placements from our first outgoing batch. He explained the objectives of the induction program held from 8<sup>th</sup> to 24<sup>th</sup> August.

This program mainly focused on bringing out the hidden talents in students, teaching them several life skills and career improvement. With the available resources, the first-year class works are being commenced in the laboratory complex buildings and workshops are all being set for students. By December all the students including the PhD scholars will be provided accommodation in the permanent campus. 150 ft. high national flag is assumed to be constructed after the whole construction of the campus is completed.

The phase 1A work is to be completed with 206 Cr. from August 2018 to September 2019 with 6 lakh sqft, and phase 1B work with 192cr and covers about 5.6 lakh sqft approximately, is expected to be completed by August 2020. This is the fastest NIT campus being constructed with all the green building norms and a completely smart campus. The campus is fully network-enabled, with 350 cameras being arranged for live monitoring and the most advanced campus with very less construction time.

Dr. Dasharath Ram mentioned that DRDL would be pleased to extend its helping hand to NIT AP when necessary. He explained the importance of technological advancements in our country along with our progress in the field of space and war. He also added that the future development of the country lies in the hands of the young engineers. He extended his speech by saying that summer internship opportunities are being offered for several students at DRDL and students should utilize the opportunities provided.

Later on, Prof. Amba Prasad Rao spoke about the journey of NIT Andhra Pradesh. He accentuated that an outstanding person is not the one who does different things, but who does things in different ways. Addressing the



gathering Prof C. S. P Rao, director of NIT Andhra Pradesh, President of the induction program, explained the importance of the institute and its development. He advised the students to be dynamic and well determined.

He also added that the institution provides a chance and the students have to do their contribution to develop themselves and the institute. He also appreciated the team Prayatnam for all their persistent efforts towards the development of school children in the nearby villages. He also added that the institution provides a platform for the students to utilize it courageously, contributing to the development of the institutions and themselves.

## Master scientist award

Master Scientist was the program conducted by NIT Andhra Pradesh, to encourage the Innovative Ideas of School Students all over Andhra Pradesh. This Idea was proposed by Dr. Karthikeya Sharma. Despite the initial thought of awarding one student, the judging panel was elated with two ideas, so they decided to award them both. The winners of this master scientist award and their ideas are as follows:

Name: **L. Dwaraka Sai**, 10<sup>th</sup> Class,  
Velkatrasipalli English Medium,  
Chitiyal Mandal, Kadapa Dist  
Father: RMP Doctor.  
Mother: House wife.

Name of Project: **BALASANJIVINI**.

Explanation: Muringha Powder (from Muringha leaf) contains Vitamins like A, B, C, Calcium, Phosphorous, Magnesium and Iron, but it is difficult to feed Children. So jaggery is added to it, this helps to give Vitamins, Sharpness and other vital components. This project is tested practically which helped to increase marks and give birth to a baby. His future project is to build a robo from waste materials.

Name: **O. Abhiram**, 9<sup>th</sup> Class, Velkatrasipalli English Medium,  
Chitiyal Man, Kadapa Dist, AP.

Name of Project: **THUSARA BHANDHINI**.

Explanation: To convert the water vapour from air into Water and Make use of it by trees. For the past two years, there is no growth of Mango trees in his garden due to lack of rains. He was inspired by the idea of Cactus living in deserts and decided to work on it. The resource is from online helped him a lot. Firstly, roll the Plastic cover to the leaves and then put a pipe from inside to the glass. After some time, you can observe water in the glass. Trees only absorb 1% of water vapor from the environment whereas 99% of it remains in the air. Yet, due to this technique, we can save water and trees around us. Both of them felt very happy upon receiving this award and credited their teachers for always having their back and they also thanked NIT Andhra Pradesh for this opportunity.

Life ambition of both the student is to Work in ISRO as scientists. We all hope their dreams come true.



## FRESHER'S INTERACTION:

Revanth (611704)

On 24.08.2019, the event fresher's interaction was organized by ECEA from 9:00 am to 12:00pm. The whole event was conducted in laboratory complex of permanent campus. Event started with intro of ECE branch by faculty of the department. HOD of the ECE department, Dr. Puli Kishore Kumar and Dr. Kiran Kumar Gurralla addressed the freshers. Dr. Pavan Kumar spoke about the scope of electronics in present day scenario. Then Mr. Vijay Bhaskar, Ms. Uma Sindhu, Ms. Sumathi Jyothi spoke with the students.

Sumanth of IV year introduced the ECEA to the freshers. He explained the motto and importance of the association. Gave brief presentation on the previous activities and events conducted in previous years by the association. Association members conducted some fun and technical programs to the freshers.

Activities started with technical quiz. Freshers participated and showcased their talents like singing and dialogues.

Then later JAM, Pictionary were conducted. All juniors participated actively in all the activities and the event was a grand success.



## THE INDEPENDENCE DAY

Sai Anurag(611773)

As we all know, August 15, 1947, India got her freedom and finally broke from the shackles of slavery. We celebrated this auspicious occasion in a grand manner. This was celebrated in the campus of our own, all the students and the faculty members actively participated in making this program a success.



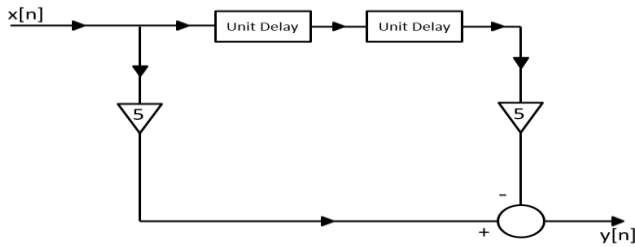
All the students were provided with transport facility from their respective hostels to the campus. As soon as our honorable director arrived, our national flag was hoisted and everyone over there showed their respect towards the flag by saluting it and singing our national anthem.

Then the director was invited onto the stage to deliver his valuable message, followed by the yoga performances by the students.

This programme was concluded by promoting awareness of "GREEN NATURE" as every student and faculty, planted a tree. Each and every one enjoyed a lot and had a good time by participating in this event.

## GATE Problems

1. Consider an air-filled rectangular waveguide with dimensions  $a = 2.286\text{cm}$  and  $b = 1.016\text{cm}$ . At  $10\text{GHz}$  operating frequency, the value of the propagating constant (per meter) of the corresponding propagation mode is \_\_\_\_\_.
2. The direct form structure of an FIR (finite impulse response) filter is shown in the figure.  
The filter can be used to approximate a
  - (a) Low-pass filter
  - (b) High-pass filter
  - (c) Band-pass filter
  - (d) Band-stop filter



\*\*Solutions to the previous issue questions are included in the e-copy

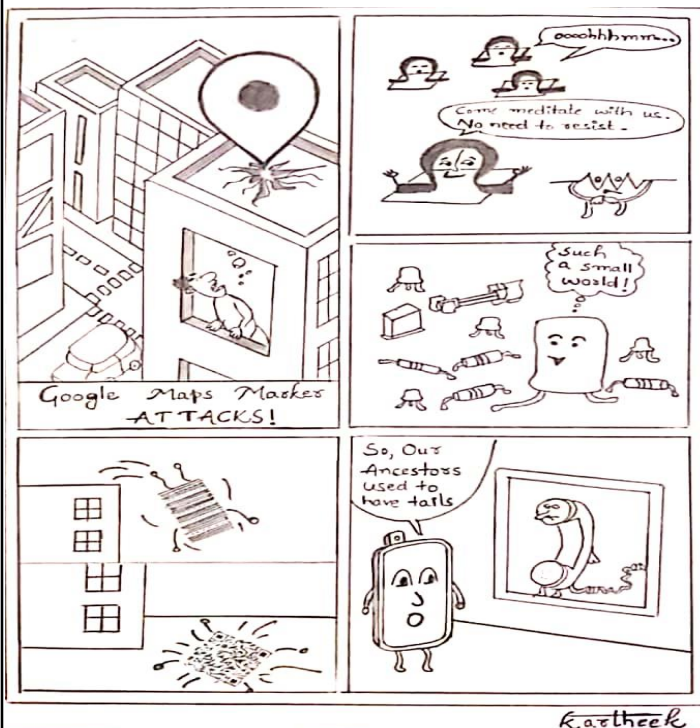
## Editors' Note

Hello readers!! We are pretty glad to bring you all, the second issue volume - 2 of our ECE Herald newsletter. We are again back with some interesting stuff. The highlights of this edition are THE ORIENTATION DAY event of NIT ANDHRA PRADESH and MASTER SCIENTIST program to encourage the innovative minds of school students across Andhra Pradesh. A write-up on the trending issue ARTICLE 370. This edition also covers the INDEPENDENCE DAY CELEBRATIONS at NIT ANDHRA PRADESH and ECE freshers interaction session which is very motivating. It also includes an article on the famous writer - J. K Rowling and the most trending and on swing Network RELIANCE JIO, the key to digital India. Also thrown spotlight on Black sand transistors. Additionally a column on Gate questions, technical cartoons, upcoming events in top institutes across India, pic of the month and spectacular artworks of students has also been included. We are pretty happy to publish this newsletter.

Also please remember that your suggestions are always welcome. Being readers, you people can also be a part of it by contributing with your skillful content like articles, artworks or any interesting stuff.

For any questions, suggestions, ideas, articles or artworks, please contact us at [theceherald@nitandhra.ac.in](mailto:theceherald@nitandhra.ac.in). Keep reading and keep contributing!!

## TECHATOON



## ARTICLE 370

G.Harshita(611626)  
M.Neelima(611654)

On 5 August 2019, the President of India Ram Nath Kovind issued a constitutional order revoking the 1954 order and making all the provisions of the Indian constitution applicable to Jammu and Kashmir. The order rendered the Article 370 and Article 35A of the Indian constitution ineffective.

**Article 370 includes some special provisions for Jammu and Kashmir few of them are:**

- It exempted the State from the complete applicability of the Constitution of India. The State was allowed to have its own Constitution.
- Central legislative powers over the State were limited, at the time of framing, to the three subjects of defence, foreign affairs and communications.
- Other constitutional powers of the Central Government could be extended to the State only with the concurrence of the State Government.
- Except Jammu and Kashmir rest of the states have single citizenship while residents of Jammu and Kashmir enjoy dual citizenship.
- They have special constitution and special flag.
- Indian Supreme court has no jurisdiction in Jammu and Kashmir.
- Disrespecting Indian flag and other national symbols is not a crime in Jammu and Kashmir.
- Tenure of all states government is 5 years but that of Jammu and Kashmir parliament is 6 years.
- RTI, RTE, CAG and majority of Indian laws are not applicable. Even the Fundamental rights are not applicable.
- Because of Article 370, no outsider (Indians) can purchase a land in Jammu and Kashmir.
- Hindus and Sikhs are a minority but they don't get a 16% reservation.
- A J&K citizen loses its citizenship if he/she marries an Indian.
- A Pakistani resident gains J&K citizenship, if he/she marries a J&K citizen.

Article 35A

Article 370



Article 370

Article 35A

**Advantages of removing this Article 35A and 370:**

- Many industries and infrastructure can be established now because one can hire or buy the land in J&K.
- Now India will be on a much stronger position to deal with Pakistan, as there will be no special status to J&K.
- Provisions which gave advantages to Pakistan are now ceased to exist.
- Better coordination between Local police of J&K and army.
- More political options will be now available to the people of J&K.
- J&K now can offer vast tourism potential in its all regions.

**Conclusion:**

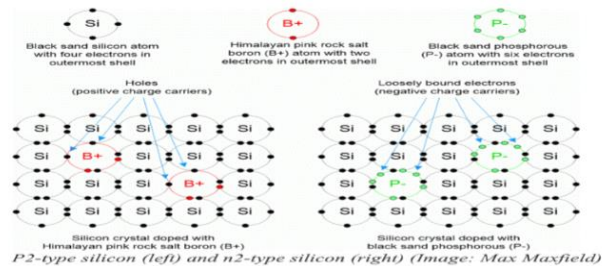
It is rightly so for the Government to finally strike down the Article 370. True integration of J&K with the nation will also send a clear message of one nation to our neighbour. Total elimination of the terrorist groups hiding in the J&K can be achieved, which will result in development and prosperity of J&K.

# BLACK SAND TRANSISTORS

-Avinash (611629)

The vast majority of today's integrated circuits use silicon as the primary substrate. As silicon is the main constituent of sand and one of the most common element on Earth (silicon accounts for approximately 28% of Earth's crust), we aren't in any danger of running out of it in the foreseeable future. In fact, when you sit on a regular "white sand" beach, it is silicon dioxide (SiO<sub>2</sub>), also known as silica, in the form of sand that gets between your toes. Of course, not all sands are created equal. In the case of Punalu'u Beach (also called Black Sand Beach) on the Island of Hawai'i, for example, the striking black sand is made of basalt, which was created by lava exploding and cooling as it flowed into the ocean. This basalt-based black sand has low silica content, which is why scientists and engineers never considered it as being a suitable source for the crystals used to fabricate silicon chips — until now. In standard silicon semiconductors, every atom has a nucleus formed from protons and neutrons.

Pure silicon is an insulator, but we can use a process called doping to introduce other elements into the crystal lattice that make it act like a conductor. It can act as a p-type or n-type semiconductor based on the doping element.



## Hawaiian black sand semiconductors

The term isotope refers to the fact that atoms come in variants that differ in the number of neutrons in their nucleus. Carbon, for example, has 15 known isotopes, of which carbon-12 and carbon-14 are the best known. In the same way that electrons form shells, so, too, do the protons and neutrons in the nucleus, leading to some stable configurations being known as magic nuclei (this idea was first postulated by the German-born American theoretical physicist, Maria Goeppert-Mayer (1906–1972), who received Nobel Prize for her work in this area). Magic nuclei can result in strange phenomena. As reported on Phys.org, for example, "The doubly magic nucleus of lead-208 spins, although it shouldn't." Silicon has traditionally been understood to have only 23 known isotopes. In February 2018, however, scientists from the European Organization for Nuclear Research, known as CERN, pushed the world's largest and most powerful particle accelerator — the Large Hadron Collider — to unprecedented energy levels, thereby discovering a 24th isotope of silicon. Furthermore, this isotope is a member of the magic nuclei society and is incredibly stable. It has yet to be explained why this isotope of silicon occurs only in Hawaiian black sand. Also unexplained is the presence of an e-isotope version of phosphorous (P-) atoms with six electrons in their outermost shell, in the sand. As illustrated below, when the magic nuclei isotope of silicon is doped with phosphorus, the result is n2-type silicon with a balanced pair of negative charge-carrying electrons at the site.

The vast majority of modern integrated circuits are created using complementary metal-oxide semiconductor (CMOS) technology, which

involves both NMOS and PMOS transistors connected in a complementary fashion. N2MOS field-effect transistors (FETs) created using n2-type silicon exhibit tremendous size, performance, and power-consumption advantages over their traditional NMOS counterparts. However, this would be of academic interest only without the ability to create corresponding P2MOS devices. What were required were boron (B+) atoms with only two electrons in their outermost shell, but this e-isotope version of boron had never before been seen in nature. Eventually the elusive boron is found in Himalayan pink rock salt. As illustrated in the image above, when the magic nuclei isotope of silicon is doped with the e-isotope of boron, the result is to leave a balanced pair of positive charge-carrying holes at the site.

Enhanced switching and power characteristics Evaluation of semiconductors created using Hawaiian black sand have barely begun at laboratories around the globe, but rumors as to their inexplicable characteristics are running rampant.

First and foremost, black sand transistors (BSTs), which can be used to create integrated circuits using conventional CMOS processes, are capable of switching at almost unbelievable speed. At first, Professor Tarantoga's team was at a loss to provide any reasonable explanation for this phenomenon, but it was eventually determined that the extreme switching speed was a result of interactions between the electron spin vectors in the outermost (valence) shells of the B+ and P-atoms.

BSTs are orders of magnitude smaller than state-of-the-art conventional transistors. So small, in fact, that it's possible to squeeze over 100 billion BSTs in a 1 × 1-mm square of black sand silicon (BSS). In turn, these ultra-small transistors consume an almost infinitesimal amount of power, thereby providing a path for devices like smartphones to run for a year or more on a single charge of the battery.

Of particular interest is the fact that BSTs exhibit negative resistance. As it says on Wikipedia,

"While a positive resistance consumes power from current passing through it, a negative resistance produces power." This has staggering implications. In the case of conventional integrated circuits, ramping up the clock frequency increases the amount of power consumed. By comparison, in the case of BSS-based semiconductors, increasing the clock frequency causes the power consumption to fall. Somewhere around 7.25 GHz, forward electromotive force (EMF) effects — they would be back-EMF if not for the negative resistance — caused by coupling with Earth's magnetic field result in the BSS-circuits actually generating surplus electricity while switching.

Although the amount of power generated by a single BST is minuscule, it becomes significant in the case of a BSS chip containing 100 billion of them. In fact, the excess power is more than sufficient to drive the rest of the device. As a result, the battery — which is currently the largest item in a smartphone, for example — could be dramatically reduced in size. This is because the battery's primary task would be to power the BSS chips until they crossed the 7.25-GHz threshold, at that time some of the excess power from the ICs could be used to trickle-charge the battery.

In the same way that every problem has a solution, so, too, does every solution have a problem. Conventional microprocessors, such as those from Intel, consume so much energy that they require special heat sinks to carry away any excess heat. Devices using black sand semiconductors face the opposite problem. When their power consumption falls into the negative region as they cross the 7.25-GHz boundary, they start to cool down. After researchers working with BSS-based smartphones suffered a number of frostbitten ear incidents, it became necessary to introduce cool-sinks into the phones to maintain their temperature at a comfortable level

# J.K ROWLING

Karthik (611737)

I'm sure that most of you have heard of the *Harry Potter* series unless you've been living under a rock. However, I'm pretty sure that most of you might not have heard of J.K Rowling. she is the woman who created the most successful bestselling series in history. Everything about this incredible woman is inspirational and extraordinary. Rowling might be one of the most exciting success stories but it wasn't all hunky-dory. Not many know what exactly went behind before she reached stardom. It's said that real success comes after a string of failures. That's exactly what happened with Rowling. Her personal life was in upheaval making every day troublesome for her.

One has to work very hard to achieve their dreams. However, with proper tools and technologies, you can make things happen much faster. During one fine morning in 1990, when she was on a train ride from Manchester to London, she formed the entire story from an idea and started developing the story of Harry Potter on that journey. Unfortunately, her mother died later that year which halted her writing process for some time. Her life had different plans when she moved to Portugal in 1992 to teach English as a foreign language. She met a man, married him, and had a daughter. A year later she parted ways with her then-husband and filed for a divorce in 1993. This was the turning point of her life when she along with her infant daughter moved to Edinburgh,

Scotland to be near her sister with *three chapters of Harry Potter in her suitcase.*

It was the most devastating period of Rowling's life where she was divorced, jobless, and a single mother of an infant. She suffered severe bouts of depression but she persevered. When life was dark and gloomy, she found the light at the end of a tunnel - always pushing through the trials and tribulations life would throw at her. 1995 was the year that defined Rowling's life in so many ways. Not one or two, or five, around 12 major publications *rejected the Harry Potter* script. She was shattered but not defeated. She kept approaching other publications and her efforts bore fruit. A small publishing house accepted to publish the book and only 1000 copies were published. Soon after things changed when the book won prestigious awards such as Nestle Smarties Book Prize and the British Book Award for Children's Book of the Year. As of 2013, the book has sold more than 500 million copies worldwide and has been translated into 73 languages. Not to mention, the book was adapted to a movie series making it a franchise of a billion-dollar business.



After hearing such a great story I hope all you guys can come to a conclusion that "LIFE ISN'T ALWAYS FAIR TO BUT WE HAVE TO KEEP GOING FORWARD IN ORDER TO FULLFIL OUR DREAM, BELIVE YOURSELF, DON'T LOSE HOPE."

## UPCOMING EVENTS IN OTHER INSTITUTIONS:

- Satyabhama Institute of Science and Technology (Sep 5) : International conference on recent advances in energy and sensors.
- IIT Hyderabad (Sep 7-Sep 8): Workshop on trends in machine learning and artificial intelligence.
- IIT Kharagpur (Sep 15-Sep 21): Workshop on modern wireless networks and internet of things.
- NIT Trichy (Sep 20-Sep 21): Workshop on theory and practice of sustainable manufacture.
- Anna university (Oct 1-Oct 3): IEEE international conference on security technology.

## RELIANCE JIO, THE KEY TO DIGITAL INDIA

V. V. Anil Kumar (611780)

The famous mantra “TAMASOMA JYOTHIR GAMAYA” which translates into “Lead us from darkness to light”. When the India was data dark with high internet cost, Jio came up and made India data shining. Today JIO’s customer base has crossed 340 million users and still signing up with more than 10 million new customers each month. Jio has become the largest operator in India. Now it is all set to kick start few more engines like IoT and Jio Fiber.



Jio has developed its innovative service on Narrow Band IoT (NB-IoT). Using NB-IoT, data from billions of smart sensors whether residential, industrial or public can be collected from across India with the highest reliability and lowest cost. Digitalization of over 300 million electricity meters is being done to give the consumers full visibility and control over the cost and quality. Within another 2 years, it is estimated that there will be more than 2 Billion Connected IoT devices in our country. IoT platform will be commercially available starting 1st January, 2020.

During the last year, JIOFIBER was installed on a trial basis in nearly half a million homes to fine-tune services based on actual customer feedback. On the eve of its third anniversary on 5th September, 2019 Jio fiber will be launched. The internet speeds range from 100Mbps to 1Gbps and the price from Rs.700-10,000. The users will be provided with 4k HD TV, digital set-top box, landline connection and a router for free. A security deposit of Rs.2500 needs to be paid for the router. The features are ultrahigh definition entertainment, virtual reality content, multi-party video conferencing, voice-enabled virtual assistants, interactive gaming, home security and many other smart-home solutions. The Plan comes bundled with premium OTT applications like Hotstar, Amazon Prime etc.

The premium users can watch movies on the first day of the release and it is called as JIO FIRST-DAY-FIRST SHOW (programme starts in mid 2020).



Rohith (611863)

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## Art Works



Josna (611619)

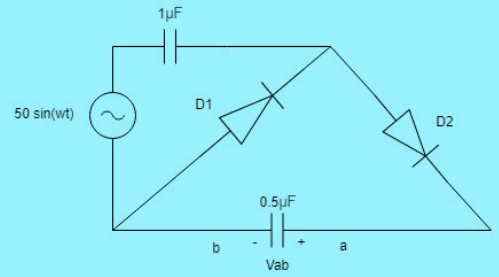
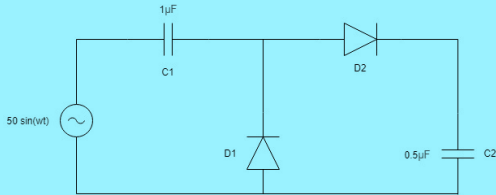
**Sending you smiles for every moment of your special day. Have a wonderful time and a very **HAPPY BIRTHDAY!!****

Y. DHIRAJ-17<sup>th</sup> SEPT  
A. RAVI TEJA-21<sup>st</sup> SEPT  
D. SREEE VIDYA-25<sup>th</sup> SEPT  
T. MAANASA-5<sup>th</sup> OCT

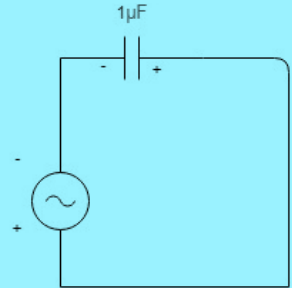
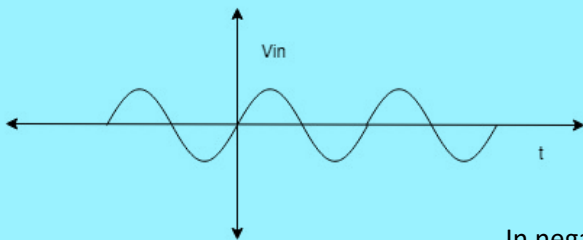


1. In the circuit shown, assume that diodes D1 and D2 are ideal. In the steady state condition the average voltage  $V_{ab}$  (in volts) across  $0.5\mu\text{F}$  capacitor is \_\_\_\_\_

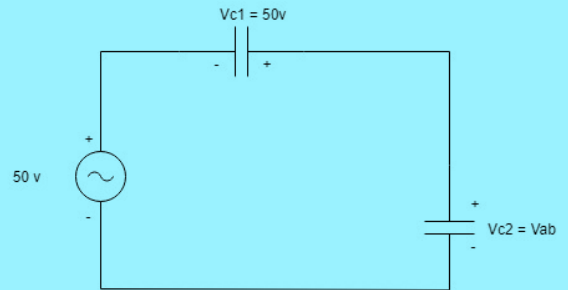
**Solution.**



In negative half cycle  $\rightarrow$  circuit is redrawn as



In negative half cycle



By applying KVL  $\rightarrow$

$$50 + V_{c1} - V_{c2} = 0$$

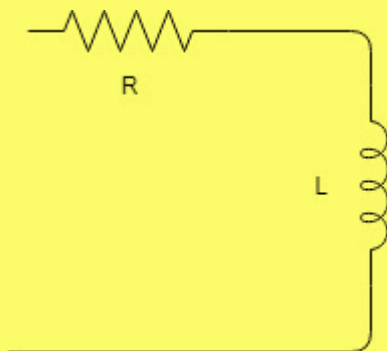
$$\rightarrow V_{c1} = V_{ab} = 50 + 50 = 100 \text{ volts}$$

So Voltage across  $0.5\mu\text{F}$  capacitor = 100v

2) The time domain behaviour of an RL circuit is represented as shown below. For an initial current of  $i(0) = V_0/R$ , the steady state value of current is given by \_\_\_\_\_

$$L \frac{di}{dt} + Ri = V_0 \left( 1 + Be^{-\frac{Rt}{L}} \sin t \right) u(t).$$

**Solution.**



In steady state

$L \rightarrow$  short circuited

$X_L = 0\Omega$

$\rightarrow \omega_L = 0\Omega$

$L = 0H$

$L \frac{di}{dt}$  term is neglected

$$\text{As } t \rightarrow \infty \rightarrow R \cdot i(t) = V_0 (1 + \beta e^{-\infty} \sin(t))$$

$$\rightarrow R \cdot i(t) |_{t \rightarrow \infty} = V_0$$

$$\rightarrow i(t) |_{t \rightarrow \infty} = \frac{V_0}{R}$$