RAJ KUMAR GOEL INSTITUTE TECHNOLOGY

VOL.2 NO.4 JULY-AUGUST 2016

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STUDENT TEAM

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ATUL PARASHAR
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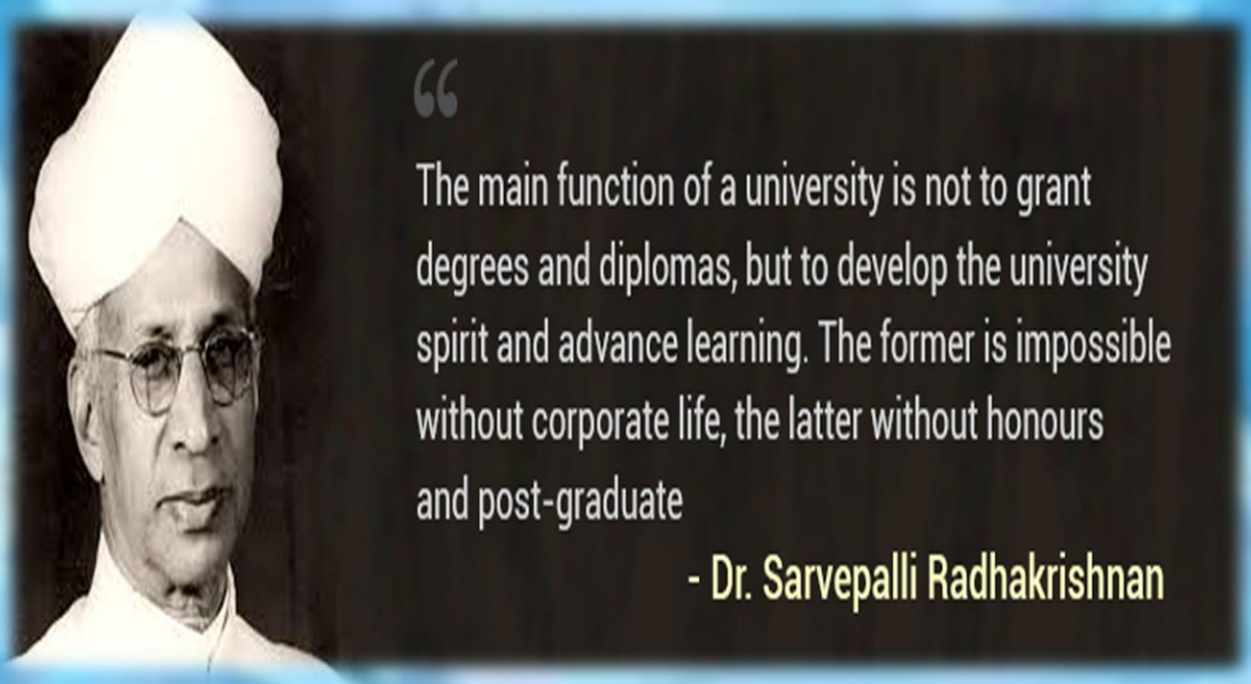
INDRANEEL GANGULI
ASHRAY NIGAM
TWINKLE TEKRIWAL
RAJAT YADAV
SHUBHANGI DUBEY

CONTENTS

"This Edition of UDGHOSH is dedicated to Dr. Sarvepalli Radhakrishnan"



Dr. Sarvepalli Radhakrishnan was first Vice President of India and second President of India. He was also a philosopher and introduced the thinking of western idealist philosophers into Indian thought. He was a famous teacher and his birthday is celebrated as Teacher's Day in India. He was born on September 5, 1888 at Tirutani, Madras.

WELCOME TO OUR FACULTY MEMBERS

"GOOD NEWS FOR THE ECE STUDENTS IN RKGIT"

The management of RKGIT has very good news for ECE students, which will greatly improvise the field of academics in the institution. Five new faculty members have been recruited to the ECE department. The new faculty member have a different area of interest which will be much beneficial for the ECE students as it will create interest in them which can be a boon in the field of academics. The new faculty members are warm welcomed by the Head of the Department of Electronic and Communication Engineering and are introduced to the present faculties.

Ms. Richa Gupta

Assistant Professor

Ms. Richa Gupta completed his B.Tech in 2008 and M.Tech in 2014 from UP, technical university Lucknow. Her interest areas include Digital Electronic, Basic Electronic, Communication Network & Antenna.

Mr. Kunal Lala

Assistant Professor

Mr. Kunal Lala Completed his B.Tech in 2010 and M.Tech in 2013 from Up, Technical University Lucknow. His interest areas include Microprocessors, DSP, Optical Communication and VHDL programming.

Ms. Charu Tyagi

Assistant Professor

Ms. Charu Tyagi received her B.Tech degree in electronics and communication engineering from UPTU in 2008-09 and M.Tech degree in Communication from Shobhit University in 2011-12. She has experience in communication and electronics engineering.

Mr. Maneesh Kr. Srivastava

Assistant Professor

Mr. Maneesh Kumar Srivastava completed his B.Tech in 2002 from VBS Purvanchal University, Jaunpur and M.Tech from MD University, Rohtak Haryana in 2011. His areas of interest include VLSI design and Electronic Circuits.

Ms. Pawan Kumar Verma

Assistant Professor

Pawan Kumar Verma received his B.E. degree from Institute of Engineering and Technology, Agra University, India, in 2005 and M.Tech degree from C-DAC, Mohali, India in 2009, respectively. He has worked as a consultant at the Cadence Design Systems, Noida, India. He was a Visiting Research Scholar at the University of Waterloo, Canada during April 2012 up to October 2012. He is currently working towards his Ph.D. from the Motilal Nehru National Institute of Technology, Allahabad, India. He is a student member of IEEE. His main research interests are M2M communications, Internet-of-Things, MANETs, VANETs, wireless networks and mobile computing.

ORIENTATION PROGRAMME

On 3rd of August 2016, an orientation programme was organized by the college management for the first year students. The orientation programme began with the video clippings of RKGIT in which "Life at RKGIT" was basically emphasized. It was followed by "Deep Prajjwalan" and "Saraswati Vandana", which was performed by the students of 2nd and 3rd year.

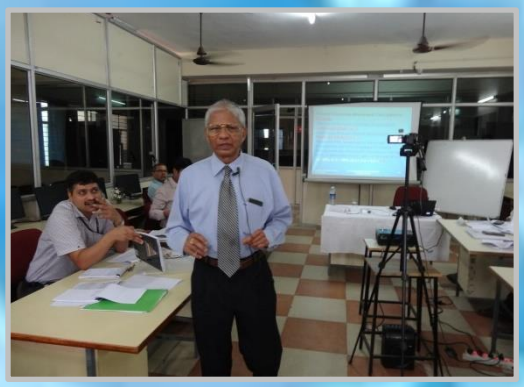
Then, Mr. H.G Garg, Dean(Student Welfare),threw some light on the important points regarding the hostel ragging cases, discipline and women cell. Prof Dr. Y.K Gupta (Dean academic) gave a brief introduction of all the HOD's of all branches. The introduction was followed by the address from the Director, Dr. RP Maheshwari, he motivated the students and conveyed some useful thoughts which the students should keep in mind for a bright future. Then Dr. Laxman Prasad (Director R & D) addressed the gathering.

Then, the students were made to visit the college campus by the committee members. After the visit, a plantation programme was arranged by the students, which was followed by the lunch. After lunch, the dignitaries interacted with the parents of the students & informed them about the college. With this, the orientation programme came to an end.

WORKSHOP ON OBE

The National Board of Accreditation (NBA), India was established by AICTE (All India Council of Technical Education) as an autonomous body under section 10(u) of AICTE act 1994 for periodic evaluations of technical institutions and program basis according to specified norms and standards as recommended by AICTE council.

It is an Outcome Based Education (OBE) and a performance-based approach which offers a powerful and appealing way of reforming and managing engineering education. RKGIT organized a Three Day Workshop on Outcome Based Education (OBE) on 11th, 12th, & 13th August 2016.



The Resource Person was Dr. V.V. Rao, Senior Consultant, VRV Consultants Pvt. Ltd., Hyderabad.

He has more than 45 years of experience as a Director, Principal, Dean, Senior Consultant, General Manager, Team Leader & BTEC Coordinator, Lecturer and Associate Lecturer in Electronics & Telecommunications, IT, Training & Human Resources Development, as on to-date .He has 20 years of experience in Competence Based Education (CBE) and Outcome Based Education (OBE) & Accreditation in Shell International.

The workshop was inaugurated on 11th August 2016 in CAD Lab, ECE department in the presence of Dr. R. P. Maheswari (Director R.K.G.I.T), Dr. Y.K. Gupta (Dean 1st shift), Dr. Puneet C. Srivastava (Dean 2nd shift), HODs from all Department and NBA coordinators.

This workshop was attended by 35 members. The Coordinator of the workshop was Mr. Ramendra Singh, Associate Professor (ECE Department).

Dr. R. P. Maheshwari (Director R.K.G.I.T) addressed the gathering and emphasized the importance of adopting Outcome Based Education in the present scenario

The first session of the workshop began with an introduction to Outcome Based Education, and Competence Based Education. Dr. V.V. Rao told about the constituents of OBE like Program Educational Objectives (PEOs), Program Outcomes (POs), Course Objectives (Cobs) and Course Outcomes (COs). He said that knowledge, skills and attitude along with abilities are important for OBE and an engineer is a unique combination of different kinds of knowledge, skills and attitudes. Dr. Rao added that the quality of education system can be judged from the three perspectives – Input, Process and Output. In the post-lunch session Dr. Rao briefed about the history of Accreditation. The resource person advised to have the students, the parents and the alumni as the stakeholders in designing the curriculum.

On 12thAug 2016, Dr. V.V. Rao talked about the need to have ABET Accreditation which will be considered for the Quality Assurance of Technical Education in the near future.

He even discussed the Assessment Planning by making the comparison of ABET, NBA & NAAC Criterion and also advised to constitute OBE Administration System and IQAC.

In the post lunch session Dr. V.V. Rao explained Teaching and Learning Methods in OBE System – Problem Based Learning (PBL), Project Based Learning (PBL), Cooperative Learning (CL), Problem Based Cooperative Learning (PBCL), Jigsaw Classroom Cooperative Learning (JCCL)

On 13th august 2016 160 members attended workshop at seminar hall. Dr. Rao explained that OBE is an approach to planning, delivering and evaluating instruction that requires administrators, teachers and students to focus their attention and efforts on the desired results of education, results that are expressed in terms of individual student learning.

Learning is not significant unless the outcomes reflect the complexities of real life and give prominence to the life roles that learners will face after they have finished their formal education.

In Outcome Based Education, you develop the curriculum from the outcomes you want students to demonstrate, rather than writing objectives for the curriculum you already have.

Outcomes based programming attempts to focus clearly and deliberately on student learning. The most important feature of outcomes based education is that all students are expected to be successful. All teaching and learning efforts are directed towards helping students to achieve significant program/learning outcomes

The workshop was very much useful for processing NBA accreditation and it was immensely informative and beneficial.

70TH INDEPENDENCE DAY

70th Independence Day was celebrated on 15th August 2016 in RKGIT. The function commenced at 9:30 AM. The chief guest of the event was Chandra Mohan Garg, IAS(Elide) and has qualified UP(Cadre). He belongs to Ghaziabad. The chief guest hoisted the flag, which was followed by the National Anthem. He,then gave a motivational speech and emphasised on important points which are fruitfull for a student's success. Shaini and Shubhangi (students of MBA 1st year)sang patriotic songs. The progarmme concluded with the distribution of sweets.

LIST OF AECE MEMBERS

1. Rohan Sharma	1503331096
2. Shubhangi Dubey	1503331121
3. Anmol Gupta	1503331029
4. Ishank Gupta	1503331058
5. Shiv Shakti Singh	1503331110
6. Ashish Tyagi	1503331034
7. Divya	1503331047
8. Nishit Mishra	1503331077
9. Divyanshi Nandanwar	1503331049
10. Dishank Singh	1503331046
11. Paarul Rai	1503331082
12. Varun Mishra	1503331133
13. Alok Bharti	1503331015
14. Lakshay Panwar	1503331064
15. Manish Kumar	1503331066
16. Twinkle Tekriwal	1503331128
17. Ankit Mishra	1503331026
18. Ayushi Pal	1503331041
19. Atul Parashar	1503331038
20. Akhil Gupta	1503331014

FACULTY TECHNICAL CORNER

Emergence of Machine –to-Machine Communication

By: Pawan Kumar

Machine-to-machine (M2M) communication is a promising technology for next generation communication systems. This communication paradigm facilitates ubiquitous communications with full mechanical automation, where a large number of intelligent devices connected by wired/wireless links, interact with each other without direct human intervention. As a result, M2M communication finds applications in wide areas such as smart grids, e-healthcare, home area networks, intelligent transportation systems, environmental monitoring, smart cities, and industrial automation.

Machine-to-Machine (M2M) communication has its origin in the supervisory control and data acquisition (SCADA) systems, where sensors and other devices being connected through wired or radio frequency networks are used with computers to monitor and control industrial processes.

A key factor behind the growth of M2M communications today is the pervasive accessibility of low cost, ubiquitous connectivity. We have already become used to low cost, high-speed home and commercial internet access. Now-a-days, in many regions around the globe, 3G and LTE mobile networks are providing almost similar access speeds at highly competitive prices. The use of IP-connected devices such as sensors, monitors, and actuators, in homes and in the industries, has enabled the growth of new

interconnected, inter-operable services, which are capable to renovate our daily lives. Exploiting multiple novel sources of information, the M2M technologies present a number of applications, sometimes known as "Internet of Things" (IoT). Sometimes, both the terms (M2M and IoT) are interchangeably used. However, the most important feature of IoT is the information, which the "connected things" provide us, how this information can be combined and presented, and how the decisions can be made based on it.

It is important to take into account the variety and range of applications, device functionalities and other requirements as key features of M2M communications and its future market. By doing so, we will be able to understand, how can a flexible M2M architecture be developed so that present and future technologies can be put together into it; how to enable interoperability; how can confidentiality and privacy of information be preserved without restricting potentially beneficial applications; how can the reliability of these systems be ensured, as we become used to them increasingly. An individual or a single organization cannot provide all these solutions. Instead, it requires collaboration and co-ordination of cross industries at international level. The solution to most of these challenges can be provided by an agreement based international standards to make sure the growth of M2M technologies and markets.

ACADEMIC ACHIEVEMENTS

Congratulations to Mr. Pawan Kumar Verma, Assistant Professor, ECE Departments for his high quality publication.

Paper Title- ***A Novel Hybrid- MAC Protocol for- M2M Communications***

Journals- Journals of Network and Computer Applications, Elsevier Publications.

Impact Factors- 2.485

LINK:

http://www.sciencedirect.com/science/article/pii/S1084804516301722

STUDENT'S FRAME

BLU-RAY HD TECHNOLOGY

Blu-ray (not Blue-ray) also known as Blu-ray Disc (BD), is the name of a new optical disc format jointly developed by the Blu-ray Disc Association (BDA), a group of the world's leading consumer electronics, personal computer and media manufacturers (including Apple, Dell, Hitachi, HP, JVC, LG, Mitsubishi, Panasonic, Pioneer, Philips, Samsung, Sharp, Sony, TDK and Thomson). The format was developed to enable recording, rewriting and playback of high-definition video (HD), as well as storing large amounts of dat. The format offers more than five times the storage capacity of traditional DVDs and can hold up to 25GB on a single-layer disc and 50GB on a dual-layer disc. This extra capacity combined with the use of advanced video and audio codecs will offer consumers an unprecedented HD experience.

While current optical disc technologies such as DVD, DVD±R, DVD±RW, and DVD-RAM rely on a red laser to read and write data, the new format uses a blue-violet laser instead, hence the name Blu-ray. Blu-ray is currently

supported by about 200 of the world's leading consumer electronics, personal computer, recording media, video game and music companies.

We have two great high capacity optical formats for future which correspond to two different manufacturer strategies. HD-DVD is clearly an evolution of DVD format and a cheaper solution both for disc manufacturers and for customers. With its improved codecs it seems to be good enough to fill current HD TV needs. Blu-ray features superior data density and offers a more innovative approach which would support for a longer time. Both Blu-ray disc and HD DVD have two main options for interactivity (on screen menus, bonus features, etc.), one of which is relatively basic whilst other one is advanced.

ADVANTAGES:

- Large Storage Capacity
- Digital Rights Management (DRM)- like ITunes Blu-ray will only let a disc be copied a certain number of times to help prevent piracy
- Universality, meaning major corporations already are or are planning to support Blu-ray compatibility in recent and future technology
- Inclusion in gaming consoles (one device multiple benefits)

DISADVANTAGES:

- High Definition capacity is not a substantial amount even though storage space is great.
- There is a slim selection of enticing movies titles that are Blu-ray, should increase in the future but currently the daunting price for Blu-ray without a large selection of films leaves the technology at a disadvantage.
- Due to increasing popularity of High Definition DVD players, Blu-ray may be nullified because consumers will settle for the less expensive competitor.
- Not only is the technology expensive but Blu-ray discs have a higher price tag as well.

Significance of article : The current DVD has minimal storage and sales eventually slowed down to seven percent growth in 2008. With HD video on the rise, consumers will grow less tolerant to low-resolution DVDs and will opt for better options. Two technologies, HD-DVD and Blu-ray, promise to deliver high definition video into consumers. With HD-DVD promising lower prices and Blu-ray delivering greater storage, it will ultimately be up to the consumer which format will prevail.

BY: PAARUL RAI

ECE 2ND YEAR

ENTER 4G WITH LTE

Communication is a process or act of using words, sounds, signs, or behavior to express or exchange information or to express your thoughts, feelings etc. to someone else e.g. a message, letter, call.

ECE denotes a broad engineering field that covers sub fields such as analog electronics, digital electronics, consumer electronics, embedded systems, power electronics.

The focus of the article is on mobile communication and latest development in this field.

The fourth generation of mobile communication to nobody's surprise offers extremely high download link rates and in this case of LONG TERM EVOLUTION (LTE) this can theoretically reach 100 MB per second.

Now what is LTE?

LTE is a bundle of improvements to the Universal Telecommunications Systems (UMTS), one notch higher than the second generation of mobile communications.

What makes LTE faster than other mobile communication technology?

The answer lies within the access technique employed by LTE.

One of fastest technique LTE uses is orthogonal frequency division multiplexing (OFDM) which increases the amount of information that can be carried over a wireless network.

In frequency division multiplexing (FDM), multiple signals or carriers are sent simultaneously over different frequencies between two points. In OFDM a mathematical formula is used to ensure that multiple carriers sent out are orthogonal(separated by an angle, so they do not overlap) to each other.

Another tool used by LTE is a multiple input multiple output (MMO) antenna.

LTE can theoretically support downloads at 300 megabits per second or more based on experimental trials.

LTE uses radio waves unlike 3G and Wimax which uses microwaves. This is what it causes it to work on existing hardware.

Thus LTE will bring about the much needed change in mobile communications and help people in faster communications.

By: ALOK BHARTI
ECE (2nd year)

ALUMNI SPEAK

NAME: SAKSHI HANDA

BATCH: 2012-16

CURRENT PROFILE

Recruited as a Software Developer in

TORRY HARRIS BUSINESS SOLUTIONS,

Bangalore.

What do you feel about our faculties of RKGIT?

Faculty members of EC Dept. are worth appreciating. Each one of them leaves no stones unturned to bring laurels to the life of students. I feel really thankful to the college administration for the ways they have helped us bloom. Recalling the days when we as a team had to visit IIT Mumbai to participate in the national round of the Indo US Robo League (IURL), without college's support it wouldn't have been possible.

Any particular faculty which had left a deep impact on you…

Each one of them been distinctly special in some way or the other for their love and support in all walks of my college life. Latha Kurain Ma'am (Asstt. Professor, Applied Science Dept.) has always been one of the most inspirational teachers of my life. I cannot define in words about my gratitude for her nobility.

Any particular memory of your college/history life…

I feel fortunate to have collected gobs of fond memories in my college life. All credits to my extra special friends. The most special memory was the day I was presented the tittle of Ms. Farewell 2k16.

One thing which RKGIT taught you…

RKGIT has been the place where we got to dramatically reinvent ourselves time and again until we finally landed on the winning version. Being a part of various college events, I learned to wiggle room to budget my time to multiple things at a time.

How the course you studied helps you presently in your today's work?

Ways of implementation may vary, but the basic concepts of the course study are of great help everywhere.

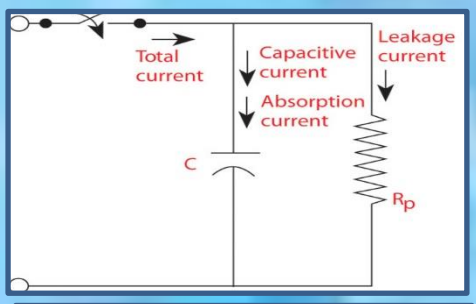
Any message to young engineers like us…

You should always set your schedule so you can best study when you are at your prime, rest when you need and most of all, tone up your partying just to the level you need to relax from studying. Crucial part is making true friends that count and help you achieve your goals along with partying at just the right notch.

COROLLARY:

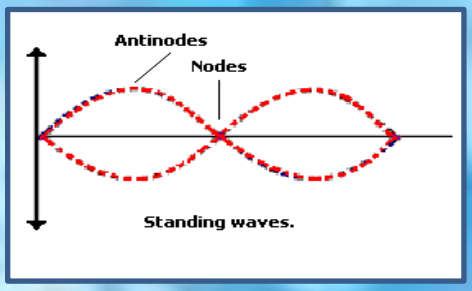
1. ***Absorption Current*** –

   In a capacitor, the current resulting from absorption of energy by the dielectric material.



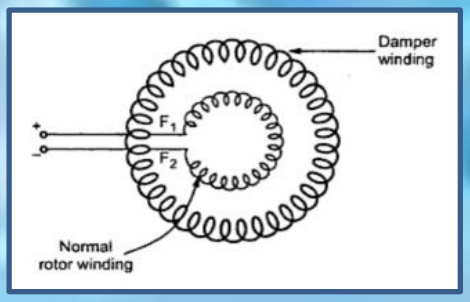
2. ***Antinode*** –

   A point of maximum amplitude in a standing wave.



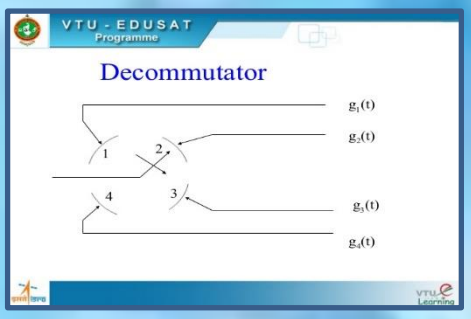
3. ***Damper Winding*** –

   A special short-circuited motor winding that opposes pulsation or rotation of the magnetic field.



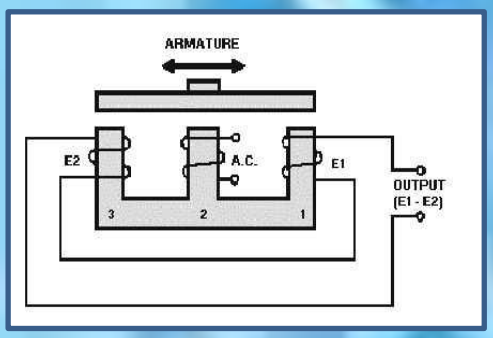
4. Decommutator –

A circuit or device for performing decommutation, including demodulators, demultiplexers, and signal separators.



5. E Core –

A transformer or transducer core having the shape of an E Coils can be wound on one, two, or all three of the crosspieces.

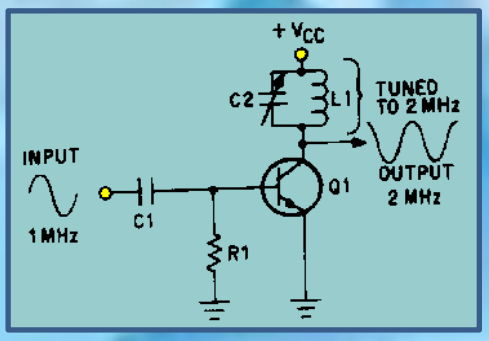


6. Contact Microphone –

A microphone placed in direct contact with a vibrating surface for pickup actuated by the vibration of a solid, rather than by the movement of air molecules.

7. *Multiplier Amplifier* –

A frequency-multiplying amplifier such as a doubler, tripler, or quadrupler, whose output circuit is tuned to an integral multiple of the input frequency.



BIRTHDAY CELEBRATION

The Department of ECE celebrated the birthday of Dr. Puneet Chandra Srivastava on 24th August. We wish him every day to be filled with lots of love, laughter, happiness and warmth of sunshine.

FREEDOM FIGHTERS OF INDIA

1.RAJ GURU

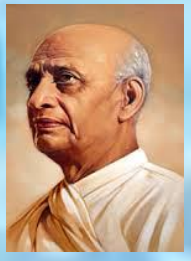
Shivaram Hari Rajguru (24 August 1908 – 23 March 1931) was an Indian revolutionary from Maharashtra, known mainly for his involvement in the assassination of a British Raj police officer.

Rajguru was born at Khed, near Pune, in what was then British India. He was a member of the Hindustan Socialist Republican, who wanted India to be freed from British rule by any means necessary. He believed that ferocity against oppression was far more effective against British rule than the nonviolent civil disobedience preferred by Mahatma Gandhi Association.

2.KHUDI RAM BOSE

Khudiram Bose was born on 3 December 1889 in the village of Mohaboni at Keshpur Block in Midnapore (now Paschim Medinipur) district of West Bengal. Khudiram Bose was an Indian Bengali revolutionary, one of the youngest revolutionaries early in the Indian independence movement. At the time of his hanging, he was 18 years, 8 months and 8 days old.

3. SardarVallabhai Patel



A prominent leader of Indian National Congress, Sardarvallabhai Patel played a leading role in India's struggle for independence. Vallabhai Patel took part in Satyagraha and while Mahatma Gandhi was in prison he led the Satyagraha in Nagpur. SardarVallabhai Patel also actively participated in Civil Disobedience Movement and Quit India Movement.

4. Subhash Chandra Bose

Another great freedom fighter was Subhash Chandra Bose who was the founder of Indian National Army, more popularly known as "Azad Hind Fauj". Subhash Chandra Bose was a believer in Swami Vivekananda's teachings and had a patriotic zeal even as a student.

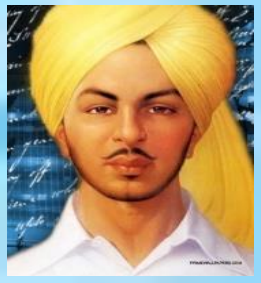
"Tum mujhekhoon do, main tumheazadidunga" (You give me blood, and I promise you freedom). These are the ever famous words said by Netaji in his speech which motivated a large number of Indians to take up intense and serious actions towards freeing their motherland from colonial powers.

5. Chandra Shekhar Azad

One of the greatest freedom fighters and a revolutionary, Chandra Shekhar Azad was committed to free India by any means. First participating in Gandhi's non cooperation movement, Azad later implemented the use of arms for the struggle of freedom. Association, mentoring and encouraging other young revolutionaries like Bhagat Singh

and Sukhdev and establishment of Jhansi camp. Chandra Shekhar Azad loathed the British rule to such extent that he ended his life by shooting himself because he preferred dying with pride rather than by the hands of British police.

6. Bhagat Singh



Bhagat Singh is rightly considered to be the most influential revolutionary during the Independence movement for India. When we think of all the martyrs who gave away their life for the pride and honor of their motherland, we often remember "Shaheed" Bhagat Singh. From seeking revenge on LalaLajpatRai's death and 1929 assembly bomb throwing incident to the 116 days fast in jail, Singh was not a believer in Gandhian ideology of Satyagraha and non-violence. At the age of 23 Singh was sentenced to death along with Rajguru and Sukhdev while all three of them kissed the rope, put it around their neck themselves and died for the sake of Bharat Mata.

7. MangalPandey

A soldier in the army of British East India Company, MangalPandey was one of the first freedom fighters of India. Pandey was a Sepoy who rose against the British rule during the Great Revolt of 1857. MangalPandey attacked his British officers, revolted against the greased cartridges being used by the British forces and played a pivotal role in the Barrack pore Unrest. MangalPandey fought with diligence for the freedom of this country and due to his rebelliousness he was hanged till death in 1857.

8.DurgaBai Deshmukh

She was a follower of Mahatma Gandhi and thus played active role in Gandhi Satyagraha movement and played role of Indian struggler, a lawyer, a social activist and a politician. While being member of Planning Commission she launched a Central Social Welfare Board through which she improved condition of education, women, children, handicap and rehabilitation of needy persons.

UPCOMING EVENTS IN NCR

EVENTS	DATE	WEBSITE	VENUE
Home Automation System Workshop at Skyfi Labs Center, Delhi	10TH Sep – 11TH Sep, 2016	http://www.roboversity.com/	Skyfi Labs Center, DELHI
SARC-International Conference on Industrial Electronics and Electrical Engineering (ICIEEE)	2ND SEPT 2016	http://sarc.net.in/Conference2016 /Delhi/ICIEEE9	DELHI
IFERP-World Conference on Recent Trends in Computer Science and Electronics Engineering(WCRTCSEE-16)	3RD TO 4TH SEPT	http://iferp.org/Conference/September/3rd-4th-September-Delhi-WCRTCSEE/	DELHI
IJIEEE-International Conference on Industrial Electronics and Electrical Engineering (ICIEEE-2016)	4TH SEPT	http://ijieee.org.in/Conference2016 /NewDelhi/ICIEEE3/	DELHI
IISTEM-International Conference on Electrical, Electronics & Computer Science (ICEECS)	11TH SEPT	http://iistem.org/Conference/September/Delhi/ICEECS/	DELHI
One day Workshop with Hands on Training On Neural Networks in Engineering Applications using MATLAB Electronics and Communications Engineering	3RD SEPT	http://www.workshopalerts.com/	DELHI

UPCOMING EVENTS

EVENTS	DATE	VENUE
FDP ON OPTICAL COMMUNICATION	5TH SEPT TO 9TH SEPT 2016	RKGIT, GHAZIABAD
EDTIC WORKSHOP DEVELOPMENT	10TH SEPT 2016	RKGIT, GHAZIABAD
FDP ON WIRELESS COMMUNICATION	3RD TO 7TH OCT 2016	RKGIT, GHAZIABAD
COLLEGE IS GOING TO CELEBRATE SPORTS WORKS	14TH SEPT TO 23TH SEPT 2016	RKGIT, GHAZIABAD

QUESTIONNAIRE

1. Find V_{TH}, R_{TH} and the load current flowing through and load voltage across the load resistor in fig (1) by using Thevenin's Theorem.

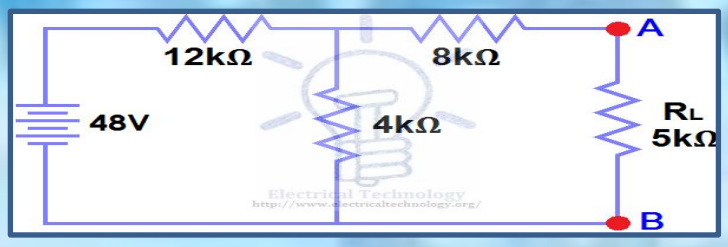


Fig (1)

2. An AC circuit is composed of a serial connection of a 50 Ω resistance, a coil of inductance 0.3 H and a capacitor with capacitance 15μF. The circuit is connected to an AC voltage source of amplitude 25V and frequency 50 Hz. Determine the amplitude of electric current and phase difference between the voltage and the current. See fig (2).

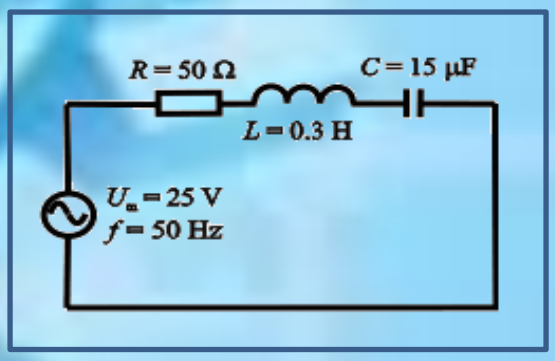


Fig (2)

3. An ideal operational amplifier has –
   a. infinite output impedance
   b. zero input impedance
   c. infinite bandwidth
   d. all of the above

4. When transistors are used in digital circuits they usually operate in the –
   a. active region
   b. breakdown region
   c. saturation and cutoff region
   d. linear region

5. The output will be a LOW for any case when one or more inputs are zero in
   a. OR gate
   b. NOT gate
   c. AND gate
   d. NAND gate

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