



**NATIONAL ENGINEERING COLLEGE**

(An Autonomous Institution, Affiliated to Anna University, Chennai.)



# EEE NEWSLETTER

**Vol-1 Issue-2**  
**August 2013**

## NATIONAL ENGINEERING COLLEGE

(An Autonomous Institution, Affiliated to Anna University, Chennai.)

# NEWSLETTER

Volume 1 Issue 2 Aug 2013



### ABOUT THE DEPARTMENT:

**T**he Department of Electrical and Electronics Engineering of National Engineering College is fully Equipped with state of art laboratories and its faculties consists of highly experienced professors, well qualified associative professors and dynamic assistant professors with commitment to give the young minds the very best they deserve.

## Office Bearers of EEE Association for the year 2013 - 2014

<b>SECRETARY</b>	Mr.M.Venkadesh	Final Year EEE
<b>JOINT SECRETARY</b>	Mr.A.Venkat Subramaniyam	Third Year EEE
<b>STUDENT COORDINATOR</b>	Mr.K.Shiek Alshaba	Final Year EEE
<b>TREASURER</b>	Ms.B.Aneesha	Final Year EEE
<b>CO-TREASURER</b>	Ms.MuthuMeenaSundari	Third Year EEE
<b>PROGRAM COORDINATORS</b>	Mr.S.Sangeetha Rajesh Mr.S.Sudalai Kumar Mr.K.S.Vignesh Mr.N.Arun Kumar	Final Year EEE Final Year EEE Third Year EEE Third Year EEE
<b>EVENT COORDDINATORS</b>	Mr.R.Ramkumar Ms.T.Jemima Vallimayil Mr.M.Veera Senthil Mr.S.Ahamed Ibrahim	Final Year EEE Final Year EEE Third Year EEE Third Year EEE



## REPORT OF EEE ASSOCIATION INAUGURAL FUNCTION



The Department of Electrical and Electronics of National Engineering College organized an inaugural function of EEE Association on 26.07.2013, 11.30am at assembly hall. The function was inaugurated by chief guest Mrs.N.Eswari, Deputy General Manager, Alstom T&D India limited, Chennai. The function was inaugurated by the chief guest in the presence of Director Dr.Kn.K.S.K.Chockalingam, Principal Dr.P.Subburaj, Dr.M.Willjuice Iruthayarajan (HOD/EEE) and Mr.Kannayeram Assistant professor(Sr.Grade). In the function, welcome address was addressed by Mr.S.Sangeetha Rajesh, Program coordinator of final EEE. Special address about the association was delivered by Mr.B.Vigneshwaran, Assistant professor/EEE. Mr.M.Venkadesh, Secretary of EEE Association proposed the year plan of 2013-2014. Presidential address was delivered by our honorable Principal Dr.P.Subburaj. Video launch was launched by our chief guest. The chief guest suggested the students to gain knowledge about basics in EEE and Latest Technology to enhance their career. Students enriched their knowledge with information given by the chief guest. After the inaugural address the News letter was released by the chief guest. Office bearers of our association were introduced by Mr.M.Venkadesh. Finally the function was concluded with vote of thanks delivered by Mr.K.Sheik Alshaba, Student coordinator of Final EEE. At the afternoon session students had interaction with chief guest. In that, the students clarified their doubts regarding the Career. The function got over by 4.00 pm and ended successfully. The program was well organized and our sincere thanks to the Management Committee, Director, Principal, Head of our Department Dr.M.Willjuice iruthayarajan and other staff members of our EEE department for arranging such a function to enrich our interest in extracurricular activities.

## Releasing Of News Letter On Inaugural Function Of EEE Association...



The Newsletter of EEE Association was released on the Association inaugural function at the assembly hall by the chief guest Mrs.N.Eswari, Deputy Manager, ALTSOM T&D INDIA Ltd with presence of the Director Dr.Kn.K.S.K Chockalingam, Principal Dr.P.Subburaj and Dr.Willjuice Iruthayarajan (HOD/EEE) and Mr.G.Kannayeram – Assistant Professor (Sr.Grade).

## STAFF ACHIEVEMENTS



**Mr.R.Karthick** (Associate Professor) was completed his **Doctorate in Liquid Dielectrics** – High Voltage Engineering on 16.8.2013 from Anna University, Chennai.

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**Mr.M.Ravindran** (Associate Professor) invited as a **Resource Person** on the topic of **Magnetic Motor and Generator** in 25<sup>th</sup> July at Kongu Engineering College, Erode.

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- **Mr.S.Sankarakumar** (Assistant professor/Sr.Grade)
- **Mr.J.Sivadasan**(Assistant professor/Sr.Grade)
- **Mr.S. Arun Sankar**(Assistant professor)
- **Mr.S.Saravana Karthi** (Assistant professor)

Who are all trained in a one day workshop on **Teachers as Counsellors** in 29<sup>th</sup> July, conducted by Training, Counseling & Placement Cell (TCP),National Engineering College, Kovilpatti.

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- **Mr.S.Sankarakumar** (Assistant professor/Sr.Grade)
- **Mr.S. Arun Sankar**(Assistant professor)
- **Mr.B.Venkatasamy** (Assistant professor)
- **Mr.S.Saravana Karthi** (Assistant professor)

Who are all undergone two days hands-on training on **Power Electronics, Power System & Renewable Energy- Design Modelling & Simulation using PSIM** in 9<sup>th</sup> & 10<sup>th</sup> August organized by Department of EEE, Coimbatore Institute of Technology, Coimbatore and Trident echlabs Private Ltd., Chennai sponsored by TEQIP Phase Ltd.

## Technical Articles by Students

### SOLAR POWERED KEYBOARD



#### Logitech Wireless Solar Keyboard K750

If you have opted for a wireless keyboard you know the importance of rechargeable batteries and a wall charger. Although it is easier to charge the batteries after a while it becomes an annoyance to change them repeatedly. Now Logitech is coming out with a solar-powered keyboard that will be free of such hassles

No need for you to be outdoors to charge your solar powered keyboard. You can stay indoors and the solar powered keyboard will charge itself from indoor lights. They have embedded an integrated power-indicator light that will warn you in advance about the power status of the keyboard. Citizen (the watchmaker) has offered solar-powered watches for years that tell time and get power from sunlight or indoor lights. Now Logitech is making use of the same technology in their solar-powered keyboards.

#### **Portability:**

**1/3-Inch Thick** Sleekness and portability are important qualities in marketing an electronic gadget. Logitech has not ignored these important aspects. Their keyboard is only 1/3-inch thick maintain a thin profile. **Benefits of Cord with Convenience of Wireless.** The Logitech Wireless Solar Keyboard K750 takes care of the wireless connectivity too. It offers Logitech Advanced 2.4 GHz wireless connectivity. They also say that Logitech Advanced 2.4 wireless is equipped with 128-bit AES encryption with the keyboard that ensures the one of the highest levels of security available.

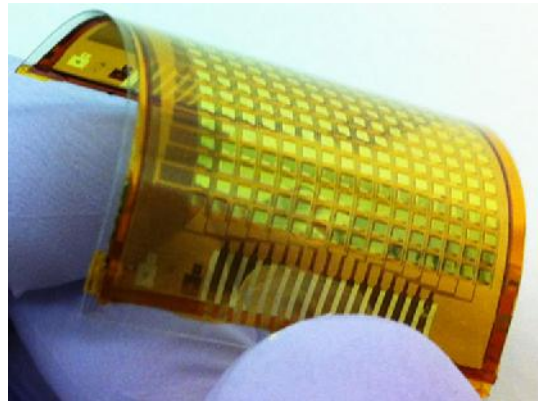
**Keyboard is easy on Fingers** Logitech calls their keyboard as Logitech Incurve keys™. It is a known fact that a concave design, along with incurve keys are easy on the shape of human fingertips, they also say that soft, rounded edges make it easy for your fingers to glide from key to key. Plus, the tiny Logitech Unifying receiver is small enough to stay in your laptop, so there's no need to unplug it when you move around.

**Revathi -- Third Year EEE B**

## Electronic Skin Lights Up When Touched

**Imagine an interactive dashboard or wallpaper inspired by the body's largest organ**

A team of researchers at the University of California, Berkeley, has developed the first user-interactive “electronic skin” that responds to pressure by instantly emitting light. “The goal is to use human skin as a model and develop new types of electronics that would enable us to interface with our environment in new ways,” explains Ali Javey, an electrical engineering and computer science professor at Berkeley and leader of the e-skin research team. The electronic skin is



made up of a network of sensors placed on thin plastic substrates that can spatially and temporarily map pressure. Javey describes the network as an array of 16 by 16 pixels, each one equipped with a carbon-nanotube thin-film transistor (TFT), a pressure sensor, and an organic light-emitting diode (OLED) on top. When the sensor detects touch, the TFT powers up the OLED, which then emits red, green, or blue light. The harder the pressure, the brighter the light will be. The end product is a thin, flexible material that can be placed on top of all sorts of surfaces. Takao Someya, creator of a different type of electronic skin and an associate professor at the University of Tokyo's Quantum Phase Electronics Center, was particularly impressed with the team's use of carbon nanotubes.

Javey, who has been working on developing the e-skin for the past five years, has high hopes for his new material. He'd like to create user-interactive wallpaper or a dashboard that responds to cues such as the driver's eye or body movements. When asked to describe how the interactive wallpaper would work, Javey referred to the scene in *Minority Report* in which Tom Cruise controls a computer by moving his hands. “That's the direction we're heading to—a new type of interfacing,” he says. “Getting rid of the keyboard, getting rid of display, and become in sync with our surroundings so that you don't have these physical components sitting around. It's part of the table; it's part of the wall”. In Javey's proposed system, light sensors would read hand and body motions, and pressure sensors would respond to different degrees of touch.

**Nanthini Devi – Third Year EEE B**



## FACE RECOGNITION

Human faces have generally the same structure, they are at the same time very different from each other due to gender, race, and individual variations. In addition to these variations, facial expressions can change their appearance. The majority of face recognition techniques employ two-dimensional (2D) grayscale or color images. The work presented in this paper is partly motivated by the recent development of novel low-cost 3-D sensors that are capable of real-time 3-D acquisition.

### Why face recognition?

- **Speed.** face enrollment time is **less than 1 sec** and matching speed is up to **65,000 faces per second** in 1:N identification mode **Multiple faces processing.**
- Detects all faces in the current frame and allows processing all of them.
- **Doesn't require any specific hardware .**
- Face image can be obtained from low cost camera or web cam. Image processing and recognition are performed on standard PC.



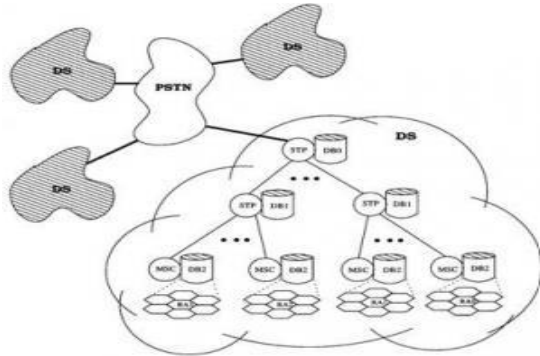
### FACE RECOGNITION USING COLOUR AND DEPTH IMAGES :

Face recognition is most concerned with roughly finding all the faces in large, complex images, which include many faces and much clutter, localization emphasizes spatial accuracy, usually achieved by accurate detection of facial features. Several face detection techniques have been proposed for grayscale images. These may be roughly categorized to those based on the detection of facial features, possibly exploiting their relative geometric arrangement, and those based on the classification of the brightness pattern inside an image window, obtained by exhaustively sweeping the whole image as face or non face. Techniques in the second category were recently shown to be more successful in detecting faces in cluttered backgrounds; however, the correct detection rates reported were below 90%.

However, the parameters of the color distribution were shown to rely on the environmental illumination and the response characteristics of the acquisition device. Furthermore, irrelevant skin colored image regions will result in erroneous face candidates. More robust face recognition may be achieved by using depth information. By exploiting depth information, the human body may be easily separated from the background, while by using a priori knowledge of its geometric structure, efficient segmentation of the head from the body (neck and shoulders) is achieved. The position of the face is further refined using the color image to locate the point that lies just above the nose, in between the eyes, by exploiting face symmetry.

**T.Jemima Vallimayil – Final Year EEE**

## A DISTRIBUTED DATABASE ARCHITECTURE FOR GLOBAL ROAMING IN NEXT- GENERATION MOBILE NETWORKS



The next-generation mobile network will support terminal mobility, personal mobility, and service provider portability, making global roaming seamless. A location-independent personal telecommunication number (PTN) scheme is conducive to implementing such a global mobile system. However, the nongeographic PTNs coupled with the anticipated large number of mobile users in future mobile networks may introduce very large centralized databases. This necessitates research into the design and performance of high-throughput database technologies used in mobile systems to ensure that future systems will be able to carry efficiently the anticipated loads. This paper proposes a scalable, robust, efficient location database architecture based on the location-independent PTNs.

The proposed multitree database architecture consists of a number of database subsystems, each of which is a three-level tree structure and is connected to the others only through its root. By exploiting the localized nature of calling and mobility patterns, the proposed architecture effectively reduces the database loads as well as the signaling traffic incurred by the location registration and call delivery procedures. Analysis model and numerical results are presented to evaluate the efficiency of the proposed database architecture. Results have revealed that the proposed database architecture for location management can effectively support the anticipated high user density in the future mobile networks.

**J.S.Jaysha – Final Year EEE**

## LIQUID DIELECTRICS IN POWER TRANSFORMER – A PERSPECTIVE VIEW

Dr.R.Karthik

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**Abstract:** *Power transformer is a complex and critical component of the power transmission and distribution system. System abnormalities, loading, switching and ambient condition normally contributes towards accelerated aging and sudden failure. Monitoring will reduce operating costs, increase the reliability of operation and improve the availability of power supply. In the absence of critical components monitoring, the failure risk is always high. Insulation is the major component, which plays an important role in the life expectancy of the transformer. The various insulation parameters that are analyzed for critical diagnostics of power transformer are of DGA Analysis of Transformer oil, Breakdown strength of Transformer oil, Partial discharge analysis, Measurement of Tan Delta value, acidity, moisture content, interfacial tension etc. Other than insulation parameters are of FRA techniques for winding movement analysis, Oil temperature, winding temperatures and Short circuit forces analysis. This paper reviews the different critical properties of transformer liquid insulation which predispose the operation of power transformer in brief, and finally summarizes current research efforts taken towards optimizing the operation of power transformer.*

**Keywords-**Monitoring of transformer, DGA, Furan, Antioxidants, Nano materials.

### 1 INTRODUCTION

Transformers play an imperative role in transmission systems. Large power transformers are the most expensive and strategically important components of any power generation and transmission system. The serious failure of power transformers occurs due to insulation breakdown and requires substantial costs for repair and end up with financial loss due to power outage. In the absence of insulation assessment of transformer oil, it is liable that transformers life reduces before reaching their designed technical life. Therefore it is important to investigate the cause of insulation degradation with respect to age and methods should be framed to increase its life period.

Transformer is a stationary device used for transferring power from one circuit to another without change in frequency. The principle of a transformer is mutual inductance between two circuits linked by common magnetic flux through a path of low reluctance. Two coils

possess high mutual inductance, when one coil is connected to a source of alternating voltage; an alternating flux is set up in laminated core, most of which is linked with other coil in which it produces mutually induced emf according to faradays law of electromagnetic induction.

Transformer oil forms very significant part of transformer insulation system and has important task of acting as electrical insulation as well as coolant to dissipate heat losses. Transformer oil consists of organic compounds like paraffins, naphthenes, aromatics and olefins. Since all these are hydrocarbons and hence insulation oil is termed as pure hydrocarbon mineral oil. However for better stability of properties it is necessary to have optimum aromatic or naphthenic hydrocarbons.

Various physical, electrical and chemical properties of transformer oil are discussed below.

**Interfacial Tension (IFT):** It is a measure of the molecular attractive force between oil and water molecules at their interface.

**Flash point:** It is the temperature, at which oil gives much vapour, when this vapour mixed with air, forms an ignitable mixture and gives a momentary flash on application of flame under prescribed conditions.

**Viscosity:** It is a measure of oil resistance to continuous flow without the effect of external forces.

**Breakdown Voltage:** It is the voltage at which breakdown occurs between two electrodes when oil is subjected to an electric field under prescribed conditions.

**Resistivity:** Resistivity in ohm-cm is numerically equivalent to the resistance between opposite faces of a centimeter cube of liquid.

**Dielectric dissipation factor:** It is numerically equal to sine of the loss angle and is a good tool to indicate the quality of insulation.

**Neutralization value:** It is a measure of free organic and inorganic acids present in the oil and expressed in terms of milligrams of KOH required to neutralize the total free acids in one gram of oil.

**Corrosive sulphur:** Crude petroleum usually contains sulphur compounds, most of which are removed during the refining processes. This test is designed to detect any traces of free corrosive sulphur present in oil. Presence of corrosive sulphur in oil will result in pitting and black deposit on surface of bare copper used in transformer, which will affect dissipation of heat and consequently performance of the equipment.

**Insulating paper** is made from vegetable fibers which are felted to form a sheet. The fibrous raw materials are obtained from plants like cotton, hemp, manila etc. The cell or fibres of such plants consists mainly cellulose. Various physical, electrical and chemical properties of insulating papers are discussed below.

**Substance (grammage):** It is the ratio of mass to the area and is a fundamental parameter which influences most of the mechanical and electrical properties.

**Density:** It is a function of thickness and grammage of paper. Density is also a basic property for setting process parameters for the manufacture of paper.

**Moisture content:** Cellulose fibres are hygroscopic. Water has the effect of plasticizing the cellulose fibers and of relaxing, weakening the interfibre bonding.

**Oil absorption:** It is dependent upon the density and air permeability of paper.

**Air permeability:** It is the measure of the rate at which paper allows air to penetrate through it. It is influenced by both the internal structure and surface finish of the paper. Electric strength of the paper is inversely proportional to its air permeability.

**Tensile strength:** Paper should be able to withstand tension exerted during its wrapping over layer winding coils. Paper tape is wound over conductors, if specified tensile strength is not met, breakages of paper will occur during paper lapping operations.

**Heat stability:** It is the ability of paper to withstand thermal stresses during service life of a transformer and is determined by measuring decrease in internal tearing resistance, degree of polymerization etc.

**Electric strength:** It is the basic parameter for deciding the insulation system design of a transformer. Electric strength depends on density and air permeability of paper.

**Dissipation factor:** It is a good tool to indicate the quality of a dielectric. A high value shows the presence of conducting paths and presence of undesirable impurities.

**Chemical stability:** The electrolytic impurities are present as ionizable salts, acids, bases etc. Insulation resistance of paper depends on above said impurities.

**Pressboard** is a widely used insulating material for making a variety of components used in electrical, mechanical and thermal design of transformers. Like paper; pressboard is also made entirely from vegetable fibres, whose cells contain mainly cellulose. Various raw materials used for manufacturing pressboards are sulphate wood pulp, cotton, mixture of sulphate wood pulp and cotton or jute hemp. Various critical parameters for monitoring power transformers is illustrated in figure 1.

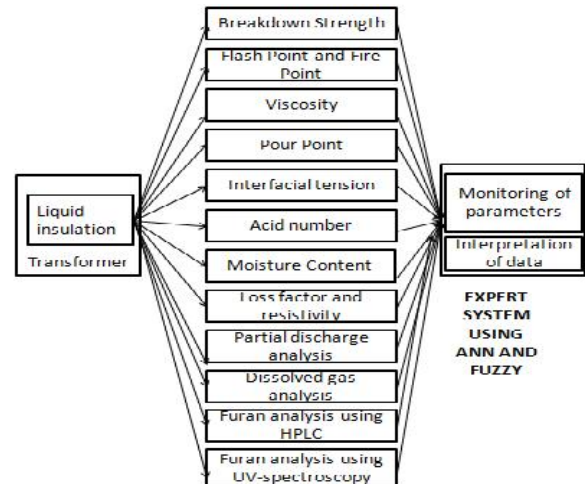


Fig.1 Illustration of critical parameters for Monitoring.

**2 CRITICAL PARAMETERS OF LIQUID INSULATION**

**A. Dielectric Strength (Breakdown Voltage) Measurement**

The breakdown voltage of the samples is measured using breakdown voltage test kit as recommended by IEC 60156. The test kit contains two spherical electrodes of standard diameter and inter-spacing of 2.5mm. The oil is filled in the test cup to a height of 40mm above the surface of electrode. Application of voltage is started at least five minutes after pouring the oil. The test voltage is varied linearly at the rate of 2kV/s using the control knob provided in the test kit. Five successive measurements of breakdown voltages are taken by giving time delay of one minute between each measurement. The time delay is given in order to disperse the byproducts to expel before next consecutive measurements are conducted. The average of five values is taken as breakdown voltage of the sample. The four factors that determine the breakdown voltage of the oil are moisture, air bubbles, suspended solid particles and fluid acidity. The below displayed figure 2(a) is the oil breakdown voltage test kit containing secondary meter and control knob on the front, figure 2(b) displays the internal electrode arrangement with standard spacing.



Fig. 2. (a) Oil Breakdown Voltage Test Kit (front view), (b) Internal view of oil container and electrode.

transformer rating 287.5 kV and above, the acceptable minimum breakdown voltage of transformer oil is 30kV and for under rating transformer of 287.5kV, the acceptable breakdown voltage is 25 kV. The reduction in breakdown voltage reports the presence of moisture in transformer oil and deterioration of paper insulation.

### B. Flash Point and Fire Point Measurement

The flash points of the samples are measured using Pensky Martin Flash point apparatus (figure 3) at room temperature and pressure as recommended by ASTM D 93. The Pensky Martin Flash point apparatus contains a closed brass test cup where the oil sample is filled in test cup and the temperature of oil sample is amplified by energy regulator.

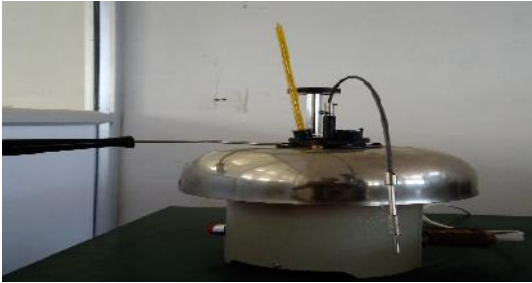


Fig. 3. Pensky Martin Flash point and fire point apparatus.

The flash point is identified by introducing a test flame in the opening provided on the surface. The state at which the vapour thus formed inside the test cup mixes with air to kindle a temporary fire on the oil surface less than one second. Similarly, the fire point temperature is marked during continual fire on



The oil's surface; when a small test flame is directed to the sample.

### C. Viscosity Measurement

The viscosities of the samples are measured using redwood viscometer at room temperature and pressure as recommended by ASTM D 445. The viscometer contains silver plated oil cup with opening called orifice of standard diameter. The redwood viscometer shown in below figure 4 is used for experiment. A quantity of 50 ml oil sample is filled in the test cup and by opening the orifice the time required for collecting the sample is noted to find the kinematic viscosity of the sample. The factors that determine the viscosity of the sample are temperature and fluid resistance offered by the oil.

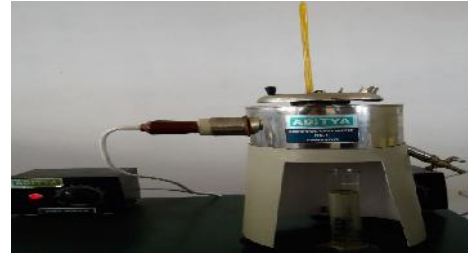


Fig 4. Redwood viscometer

### D. Loss Factor and Resistivity

Dissipation Factor is also known as loss factor or  $\tan \delta$  of transformer oil. The dielectric dissipation factor is measured by Sivananda Electronics OTS2K1 Model Transformer Oil Dielectric Dissipation / Loss Tangent Tester (Tan Delta) using ASTM D 924 standard which is shown in figure 5. When an insulating material is placed between the live and grounded part of electrical equipment, leakage current starts flowing. As insulating material is dielectric in nature the electric current through the insulation ideally leads the voltage by  $90^\circ$ . The voltage indicates the instantaneous voltage between live and ground part of the equipment. By nature no insulating materials are perfect (ideal) dielectric. Hence electric current through the insulator will lead the voltage with an angle a bit shorter than  $90^\circ$ . Tangent of the angle by which it is short of  $90^\circ$  is called Dielectric Dissipation Factor. More clearly, the leakage current through an insulation does have two component one is capacitive or reactive and other one is resistive or active. Simply, it can be said that,  $\tan \delta$  is the measure of imperfection of dielectric nature of liquid insulation materials

Transformer oil resistivity is a measure of its electrical insulating properties (DC resistance) between two opposite sides of one  $\text{cm}^3$  block of oil, which is measured using the ASTM D 924 standard. Its unit is taken as ohm-cm at specific temperature. High resistivity reflects low content of free ions and ion-forming particles and normally indicates a low concentration of conductive impurities. These characteristics are very sensitive to the presence in the oil of soluble contaminants and ageing products. Resistivity is normally carried out at ambient temperature but useful additional information can be obtained if the test is carried out at ambient and a higher temperature such as  $90^\circ\text{C}$ . Unsatisfactory results at both temperatures indicate a greater extent of significant pollutants (contamination) that yields a poor value at the lower temperature only, and the oil is therefore less likely to be restored to a satisfactory level by drying and low temperature filtration.

### E. Furan Analysis using UV Spectrophotometry

Furan concentration in transformer oil is correlated with UV-visible spectral property. 2-FAL is the major furan derivative and the most stable compound of deterioration of insulation paper. High concentration of Furan derivatives indicates that transformer has reached the end life. Therefore continuous monitoring of furan compounds in transformer oil helps to avoid incipient faults. Factors that

accelerate the ageing of solid insulation are of moisture, temperature, oxygen, electrical stress.

American Society for Testing and Materials (ASTM) D5837 recommends HPLC method for estimation of furan compounds. The testing method is time consuming, further it requires expensive devices and trained persons. In order to overcome the above difficulties an initiative has been made to determine furan compounds using UV-visible spectrophotometry. The prototypal view of UV-visible spectrophotometry is shown in below figure 6.



Paper insulation is mainly composed of cellulose. It is a polymeric material linked by D-Glucospyranose monomers. DP is the number of monomeric units in a macromolecule or chain. Furan compounds are generated due to decomposition reaction of cellulose chains. It is a key indicator for determining the mechanical strength of insulation paper. DP of paper can be estimated by Viscometric degree method by ASTM D 4243 standard, the method requires samples of insulation paper which is invasive and needs the entire unit to be in off line.

Hence by alternative methods DP can be identified by presence of 2-FAL compounds in oil, which is a stable one and it is directly related to determination of DP. De Pablo equation relates the concentration of 2-FAL to DP of paper. Whenever DP value is 1200 it indicates the insulation level as healthy one, when the value reaches 250 it specifies termination of solid insulation paper life. DP can be used to investigate the tensile strength of paper insulation based on furan derivatives dissolved in transformer oil. Estimation of DP using 2-FAL doesn't give exact location of damaged insulation system. It provides information about the complete mechanical strength of insulation system based on 2-FAL concentrations.

### 3 ENHANCEMENT TECHNIQUES FOR LIQUID INSULATION

#### A. Nanoparticles and Nanofluids

Nanoparticles modifying technology is one of the newest and effective way of improving the performance of oil-paper insulation system. Nanoparticles have recently attracted significant attention from the materials science community. Nanoparticles are material with size in the range of 1 to 20 nm; promise to play a significant role in developing technologies. They exhibit unique physical properties that give rise to many potential applications. Two fundamental factors, responsible for these unique properties are size of nanoparticle and temperature.

The early research activity in nanofluids focuses in enhancing the cooling effect of the transformer windings. The research on breakdown characteristics of transformer oil modified by nanoparticles under ac, dc and lighting

voltages shows improving characteristics in its aging and deterioration.

Transformer oil treated with the magnetite nanoparticles improves the ac breakdown voltage and impulse breakdown voltage. But there is a possibility of the nanoparticles alignment during the application of external field which forms the bridge between the electrodes. This causes the reduction in the dielectric strength of oil. The investigated performance of transformer oil with conductive nanoparticles shows better performance of base fluid.

Moreover the investigated effect of semiconductive nanoparticles in transformer oil and from the investigation of the paper, 0.075% of the particle volume fraction of nanoparticles shows better electrical characteristics.

#### B. Antioxidants and Antioxidant fluids

In general antioxidants are compounds that delays or slows down oxidation process. Antioxidants interferes the function of chain reaction involved in oils. By eliminating or keeping the amount of free radicals to minimum quantity, it can avoid oxidation of oil and peroxide formation. The main functional properties of antioxidant in oil are free electron scavenging, metal chelating and synergism.

At normal temperature the performance of antioxidant is vivid and one of the important concerns of using antioxidant at high temperature is its percentage diminishes as it was before. Antioxidants are frequently used in combinatorial modes in two or three compositions for being advantageous of their parallel mechanisms. Addition of antioxidants and phenol derivative can increase the oxidative stability of oil in the presence of metal contaminants. The application of antioxidant in static and dynamic conditions is tested and improvement in oxidative stability is observed.  $\alpha$ -Tocopherol shows better oxidative stability at higher composition than BHA (Butylated Hydroxy Anisole), BHT (Butylated Hydroxy Toluene) and TBHQ (Tert Butyl Hydroxy Quinone), whereas at lower composition PG (Propyl Gallate) and BHA (Butylated Hydroxy Anisole) shows better oxidative stability. Based on the source of existence and functional mechanism, the antioxidants are categorized into three types they are natural antioxidants, secondary antioxidants and synergists. All antioxidants used in this work have points of potency and limitation. Therefore, certain points like effective concentration, and synergism, are taken into consideration while selecting antioxidants.

### 4 CONCLUSION

Diagnostics of power transformers are necessary and valuable in purpose of the prevention of major failure and associated guaranteed damages. This review outlines the working criteria of liquid dielectrics, under electrical and mechanical stress, under prolonged ageing and gases formed. More interestingly, this review surely generates more dimensions in the area of research of liquid dielectrics. The parameters so far discussed are considered as a model to predict the severity caused by liquid insulation of power transformer. By means of effective monitoring of parameters like PD characteristics in oil, dissolved gasses present in oil, furan component in oil we shall improve the performance of liquid insulation in power

transformer to a greater degree. Premature failures risk minimization, life extension by implementing correct monitoring technique, operational and cost effective maintenance strategies can be optimized. Furthermore, critical parameter enhancement through addition of nanoparticles and antioxidants is a key asset for optimizing the functions of liquid dielectrics. Finally the above critical parameters, diagnostic techniques and additives options can be suitably utilized as a higher end tool for monitoring, analyzing and enhancing the liquid insulation system used in power transformer.

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**ALUMNI INTERACTION****Dr. G.VENKATESAN**

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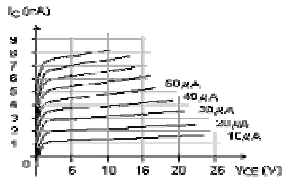
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**SOLVE IT!!!!**

1. Use this table of collector characteristics to calculate  $\beta_{ac}$  at  $V_{CE} = 15 \text{ V}$  and  $I_B = 30 \mu\text{A}$ .



- a)100 b)106 c)50 d)400
2. Determine the value of  $\alpha$  when  $\beta = 100$ .  
a)1.01 b)101 c)0.99 d)0.88
3. If the rms voltage drop across a  $15 \text{ k}\Omega$  resistor is  $16 \text{ V}$ , the peak current through the resistor is  
a)15 b)1.5 c)10 d)1
4. A  $470 \Omega$  resistor and a  $0.2 \mu\text{F}$  capacitor are in parallel across a  $2.5 \text{ kHz}$  ac source. The admittance,  $Y$ , in rectangular form, is  
a)  $212 \Omega$  b)  $2.12 \text{ mS} + j3.14 \text{ mS}$  c)  $3.14 \text{ mS} + j2.12 \text{ mS}$  d)  $318.3\text{S}$
5. The length of the bridge, which a train  $130$  metres long and travelling at  $45 \text{ km/hr}$  can cross in  $30$  seconds, is  
a)  $200\text{m}$  b)  $220\text{m}$  c)  $245\text{m}$  d)  $250\text{m}$
6. Three pumps, working  $8$  hours a day, can empty a tank in  $2$  days. How many hours a day must  $4$  pumps work to empty the tank in  $1$  day?  
a)  $9$  b)  $10$  c)  $11$  d)  $12$
7. If a quarter kg of potato costs  $60$  paise, how many paise will  $200 \text{ gm}$  cost?  
a)  $48$  b)  $54$  c)  $56$  d)  $78$
8. The sum of ages of  $5$  children born at the intervals of  $3$  years each is  $50$  years. What is the age of the youngest child?  
a)  $4\text{yrs}$  b)  $8\text{yrs}$  c)  $10\text{yrs}$  d) none
9.  $B_2CD$ , \_\_\_\_\_,  $BCD_4$ ,  $B_5CD$ ,  $BC_6D$   
a)  $B_2C_2D$  b)  $BC_3D$  c)  $B_2C_3D$  d)  $BCD_7$
10.  $ZA_5$ ,  $Y_4B$ ,  $XC_6$ ,  $W_3D$ , \_\_\_\_\_  
a)  $E_7V$  b)  $V_2E$  c)  $VE_5$  d)  $VE_7$

11. A 15 V source is connected across a 12  $\Omega$  resistor. How much energy is used in three?  
 a)938wh mins    b)0.938wm    c)56.25wm    d)5.6wm
12. If a person walks at 14 km/hr instead of 10 km/hr, he would have walked 20 km more. The actual distance travelled by him is:  
 a)50km    b)56km    c)70km    d)80km
13. Excluding stoppages, the speed of a bus is 54 kmph and including stoppages, it is 45 kmph. For how many minutes does the bus stop per hour?  
 a)9    b)10    c)12    d)20
14. A man complete a journey in 10 hours. He travels first half of the journey at the rate of 21 km/hr and second half at the rate of 24 km/hr. Find the total journey in km.  
 a)220km    b)224km    c)230km    d)234km
15. A sum of money at simple interest amounts to Rs. 815 in 3 years and to Rs. 854 in 4 years. The sum is:  
 a)650    b)690    c)698    d)700

**ANSWERS:**

**1. Option A**

**Explanation:**

$V_{ce}=15v$  at  $I_b=30\text{microamps}$  is to 3mA

$$\begin{aligned} \text{So, } B &= IC/Ib \\ &= 3\text{mA}/30\text{microamps} = 100 \end{aligned}$$

**2. Option C**

**Explanation:**

$$\begin{aligned} \alpha &= (\beta)/(1+\beta) \\ &= 100/(1+100) \\ &= 100/101 \\ &= 0.99 \end{aligned}$$

**3.Option B**

**Explanation:**

It as simple as.....

$$\begin{aligned} V &= 16 \\ R &= 15k = 15000 \\ I_{rms} &= V/R = 16/15000 = 0.001067A = 1.067\text{mA} \\ I_{max} &= 1.414 * 1.067\text{mA} = 1.5\text{Ma} \end{aligned}$$

**4.Option B**

**Explanation:**

$$\begin{aligned} R &= 470\text{ohm}, c = 0.2\mu\text{f} \text{ which are in parallel.} \\ X_c &= 1/2 * \pi * f * c \\ X_c &= 1/2 * 3.14 * 2.5 * 10^3 * 0.2 * 10^{-6} = \end{aligned}$$

$$318.30$$

$$z = R + jX_c$$

$$z = 470 + j318.30$$

$$y = 1/R + 1/X_c$$

$$y. \quad i_s = 2.12 \text{ mS} + j3.14 \text{ mS}$$

**5.Option C**

**Explanation:**

$$\text{Speed} = \left( 45 \times \frac{5}{18} \right) \text{m/sec} = \left( \frac{25}{2} \right) \text{m/sec.}$$

$$\text{Time} = 30 \text{ sec.}$$

Let the length of bridge be x metres.

$$\text{Then, } \frac{130 + x}{30} = \frac{25}{2}$$

$$\Rightarrow 2(130 + x) = 750$$

$$\Rightarrow x = 245 \text{ m.}$$

**6. Option D**

**Explanation:**

Let the required number of working hours per day be x... *More pumps, Less working hours per day (Indirect Proportion) Less days, More working hours per day (Indirect Proportion)*

$$\text{Pumps } 4 : 3 \quad ] \quad :: 8 : x$$

Days 1 : 2

$$\begin{aligned} \therefore 4 \times 1 \times x &= 3 \times 2 \times 8 \\ \Rightarrow x &= \frac{(3 \times 2 \times 8)}{(4)} \end{aligned}$$

$$\Rightarrow x = 12.$$

**7.Option A**

**Explanation:**

Let the required weight be  $x$  kg.

*Less weight, Less cost (Direct Proportion)*

$$\therefore 250 : 200 :: 60 : x \Leftrightarrow 250 \times x = (200 \times 60)$$

$$\Rightarrow x = \frac{(200 \times 60)}{250}$$

$$x = 48.$$

**8.Option A**

**Explanation:**

Let the ages of children be  $x$ ,  $(x + 3)$ ,  $(x + 6)$ ,  $(x + 9)$  and  $(x + 12)$  years.

Then,  $x + (x + 3) + (x + 6) + (x + 9) + (x + 12) = 50$

$$\Rightarrow 5x = 20$$

$$\Rightarrow x = 4.$$

$\therefore$  Age of the youngest child =  $x = 4$  years.

**9.Option B**

**Explanation:**

Because the letters are the same, concentrate on the number series, which is a simple 2, 3, 4, 5, 6 series, and follows each letter in order. In these series, you will be looking at both the letter pattern and the number pattern. Fill the blank in the middle of the series or end of the series.

**10.Option D**

**Explanation:**

There are three series to look for here. The first letters are alphabetical in reverse: Z, Y, X, W, V. The second letters are in alphabetical order, beginning with A. The number series is as follows: 5, 4, 6, 3, 7.

**11.Option D**

**Explanation:**

Energy=power\*time

$p=v*I$

$p=v*(v/R)(i=v/r)$

$p=Vsquare/R$

$=15*15/12=18.75$

NOW,ENERGY IN

3MINUTES= $18.75*3=56.25$ WATT MINUTES

ENERGY IN

HOUR= $18.75*0.05=0.9375$ WATT

HOUR(3MINUTES=0.05HOUR)

**12.Option A**

**explanation:**

Let the actual distance travelled be  $x$  km.

$$\text{Then, } \frac{x}{10} = \frac{x + 20}{14}$$

$$\Rightarrow 14x = 10x + 200$$

$$\Rightarrow 4x = 200$$

$$\Rightarrow x = 50 \text{ km.}$$

**13.Option B**

**explanation:**

Due to stoppages, it covers 9 km less.

$$\begin{aligned} \text{Time taken to cover } \left( \begin{array}{c} x \\ 9 \end{array} \right)_{\text{min}} &= 10 \\ 9 \text{ km} &= \end{aligned}$$

**14.Option B**

**Explanation:**

$$\frac{(1/2)x}{21} + \frac{(1/2)x}{24} = 10$$

$$\Rightarrow \frac{x}{21} + \frac{x}{24} = 20$$

$$\Rightarrow 15x = 168 \times 20$$

$$x = 168 \times 20 / 15 = 224 \text{ km}$$

**15.Option C**

**Explanation:**

S.I. for 1 year = Rs. (854 - 815) = Rs. 39.

S.I. for 3 years = Rs.(39 x 3) = Rs. 117.

$$\therefore \text{Principal} = \text{Rs. } (815 - 117) = \text{Rs. } 698$$

## CRACK GATE and CAT!!!

### About GATE:

GATE (Graduate Aptitude Test in Engineering) is an All-India examination conducted by '7' IITs & Indian Institute of Science, Bangalore on behalf of the National Co-ordinating Board, known as 'GATE BOARD' under the Dept of Education, MHRD, Govt of India. The overall co-ordination and responsibility of conducting GATE 2014 lies with **Indian Institute of Technology Kharagpur**, which is designated as the **Organizing Institute (OI) for GATE 2014**.

### Employment :

Several public sector undertakings (PSUs) have, in the past, used GATE scores for screening for providing a salaried employment. A select few such organizations are: Bhabha Atomic Research Centre, Bharat Heavy Electricals Limited, Indian Oil Corporation Limited, National Thermal Power Corporation, Power Grid India, etc. It is expected that such PSUs would use GATE Scores this year as well.

### GATE 2014 dates of Examination :

Admission to Postgraduate course (Master's and Doctoral) with MHRD and other Government Scholarships / Assistantships in Engineering / Technology / Architecture / Science open to those who qualify in GATE. GATE 2014 score will be valid for a period of TWO YEARS ONLY from the date of announcement of results.

### Important Dates (tentative):

COMMENCEMENT OF ONLINE APPLICATION 2nd September 2013 (Monday)

Last date for submission of Application (Website closure) : 3rd October 2013 (Thursday)

Last date for receipt of hard copy of application with supporting document at respective GATE Offices: 10th October 2013 (Thursday)

Last date for on Saturdays and Sundays between 1st February 2014 and 2nd March 2014. The exact schedule will be given on the GATE 2014 website.

References: <http://gate.iitkgp.ac.in>

## CAT 2014:

The Indian Institute of Management (IIM) has published notification for *Common Admission Test (CAT 2014)*. CAT is a computer based test held only in India. This test scores a person on the bases of Quantitative Ability, Data Interpretation, Verbal Ability and Logical Reasoning. The Indian Institutes of Management (IIMs) started this exam and use the test for selecting students for their business administration programs. The test is conducted every year by one of the IIM's based on a policy of rotation.

### CAT 2014 Eligibility Criteria

Candidate must have **bachelor's degree** in any discipline from a recognized College or University with **at least 50% marks** aggregate i.e. total percentage of all the three year should be more than 50 %.

### CAT Exam Dates

CAT 2013 Registration will start from 05 August 2013

Last date for Registration is 26 September 2013

CAT Test Vouchers can be collected by students from selected Axis Bank branches between 29 July and 24 September 2013.

CAT Test Dates:- 16 October - 11 November 2013

Results - 14th January 2014

### CAT 2014 Syllabus

Most of the student who are planning to give **CAT exam 2014**, the first question arise in their mind will be about the syllabus. In that case the **CAT does not give any predefined syllabus** for any type of preparation. Generally it includes **Verbal Ability** (i.e. English), **Quantitative Ability** (i.e. Mathematics), **Logical Reasoning** (i.e. LR) and **Data Interpretation** (i.e. DI) skills.

To know the complete details about the **registration**, refer the link:

[http://www.cat2013.iimdr.ac.in/registration\\_process.htm](http://www.cat2013.iimdr.ac.in/registration_process.htm)

**INTER COLLEGE SYMPOSIUM & WORKSHOPS & OTHER EVENTS....**

COLLEGE NAME	SYMPOSIUM	DEPT	DATE	LINK
Adhiyaman College of Engineering (autonomous institution), Hosur.	WRISON T13	EIE	29&30.08.2013	<a href="http://www.wrisont13@elinztra.com">www.wrisont13@elinztra.com</a>
SSN College Of Engineering, Chennai.	ORBITCE 2K13	ECE	30.08.2013	<a href="http://www.orbitce.in">www.orbitce.in</a>
T.J.S Engineering College, Gummidipoondi	GNISTA 2K13	EEE	31.08.2013	<a href="http://gnista2k13.wix.com/">http://gnista2k13.wix.com/</a>
SSN College Of Engineering, Chennai.	EUPRAXIA 2K13	EEE	02.09.2013	<a href="http://www.eupraxia.co.in">www.eupraxia.co.in</a>
Alagappa Chettiar College of Engineering and Technology, Karaikudi	ALCONESY-2K13	EEE	04&05.09.2013	<a href="http://www.alconesy.com">www.alconesy.com</a>
SNS College of Engineering, Coimbatore	DESPOTZ'13	ECE	05&06.09.2013	<a href="http://ecesnscce.weebly.com">http://ecesnscce.weebly.com</a>
Mepco Schlenk Engineering College, Sivakasi	AAVISHKAAR'13	ECE	05.09.2013	<a href="http://www.mepcoeng.ac.in/aa_vishkaar13">http://www.mepcoeng.ac.in/aa_vishkaar13</a>
University College of Engineering- Dindigul	SPARKGALA13	EEE	05.09.2013	<a href="http://www.sparkgala13.webs.com/">http://www.sparkgala13.webs.com/</a>
Sri Sairam Engineering College, Chennai	DERROCHE 2K13	EIE	11.09.2013	<a href="http://derroche2k13.wix.com/2k13">http://derroche2k13.wix.com/2k13</a>
University College of Engineering, Arni	Azuretrix13	EEE	11&12.09.2013	etrix.uceaeeee@gmail.com
AMS Engineering College, Namakkal	FANAK'13	ECE	11.09.2013	<a href="http://www.yeesams.com/">http://www.yeesams.com/</a>
SASTRA University, Thanjavur	(ICTFA-2013)	EEE	11&12&13.09.02013	<a href="http://www.sastra.edu/ictfa2013/">http://www.sastra.edu/ictfa2013/</a>
Francis Xavier Engineering College, Tirunelveli	ELITE-13	EEE	12.09.2013	<a href="http://www.elite13.tk/">http://www.elite13.tk/</a>
K.S.Rangasamy College of Technology, Thiruchengode	YANTRA 2K13	EIE	13.09.2013	<a href="http://yantra.eie@gmail.com">yantra.eie@gmail.com</a>



COLLEGE NAME	SYMPOSIUM	DEPT	DATE	LINK
K.L.N College of Information Technology, Pottapalayam.-Madurai	STATISTICAL DATA PROCESSING RESEARCH FOCUS	ECE	14&15.09.2013	<a href="http://www.klncit.edu.in/">http://www.klncit.edu.in/</a>
PSG Tech,Coimbatore	LOGIN 2013	All Branch	14&15.09.2013	domca.login@gmail.com
Sengunthar Engineering College ,Tiruchengode, Namakkal Dt	TRAGGA TALENTA 2K13	ECE	18.09.2013	<a href="http://traggatalenta.wix.com/traggatalenta2013">http://traggatalenta.wix.com/traggatalenta2013</a>
University College of Engineering Panruti	GLITS 2K13	ECE	20.09.2013	glits2k13@gmail.com
Sri Krishna College of Engineering and Technology,Coimbatore	KRISNECSV13 +	ECE	24.09.2013	<a href="http://www.krisnecsv13plus.com/">http://www.krisnecsv13plus.com/</a>
Kongunadu College of Engg & Tech-Trichy	TEK CLUSTER 2013	All Branch	28.09.2013	<a href="http://kongunadu-engg.com/index.php?option=com_k2&amp;view=item&amp;layout=item&amp;id=375&amp;Itemid=294">http://kongunadu-engg.com/index.php?option=com_k2&amp;view=item&amp;layout=item&amp;id=375&amp;Itemid=294</a>
Jeppiaar engg. collage Rajiv Gandhi salai,Jeppiaar nagar,Chennai-119	2 DAYS SEMINARS ON ADVANCED INDUSTRIAL AUTOMATION AND MACHINE VISION USING LAB	EIE	26&27.09.2013	jecei.fdp13@gmail.com

## REPORTS OF SPECIAL INTEREST GROUPS:

### **Embedded System & Image Processing:**

The first meeting of our Special-Interest group was held on Saturday 26-7-13. At around 10:30 PM our class was started. Our first class was about *Basics of Embedded System and Image Processing*. It was presented by our SIG Head Mr.N.B.Prakash (Asso. Professor /EEE). He explained about the basics in embedded system and how to process the image using MATLAB for more than one hours. The next session was conducted in the embedded lab at ECE department. Mr.Devakumar (Asst. Professor (Senior grade)/ECE) explained about recent developments in embedded system and also about the research which are going in ARM Processors. The students were very interested about the ARM processors. Atlast our class came to an end with a conclusion that only by means of interest, embedded system can be learned. The class was well organized and our sincere thanks to the Head of the Department Dr.M.Willjuice Iruthayarajan and other staff members of EEE department for arranging such a program to enrich our interest in extracurricular activities.

## **INTELLIGENT CONTROLLERS AND SOFT COMPUTING TECHNIQUES**

The first Special Interested Group meeting on Intelligent Controllers and Soft Computing Techniques was held on 1-8-2013(Thursday). Dr.M.Willjuice Iruthayarajan first spoke about the introduction of the Intelligent Controllers and Soft Computing Techniques. Then he explained about Fuzzy logic, Neural networks and Genetic Algorithm. The students gained a good knowledge about those topics. On 3-8-2013(Saturday) Dr.M.Willjuice Iruthayarajan conducted a one day workshop on the topic 'Introduction to Genetic Algorithm'. He clearly explained about the concepts and applications of Genetic Algorithm. Some staff members of EEE department also participated in that workshop. The staff members and students enriched their knowledge with the informations gave by him. The class continued again on 5-8-2013 where he spelled out the applications of Genetic Algorithm in day to day life. He demonstrated the implementation of Genetic Algorithm using MATLAB. At the end he invoked the students to actively participate in Special Interested Group.

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