URJA 2018

e - Magazine

Year 2017-18

IPS Academy

Institute of Engineering & Science

Knowledge village, Rajendra Nagar, A.B. Road,

Indore – 452012 (M.P.)

(Approved by AICTE, New Delhi and Affiliated to RGTU, Bhopal)

Department of Electrical & Electronics Engineering

(NBA Accredited)

Department Vision

The vision of the Electrical and Electronics Engineering is to prepare students to compete globally in their profession, in order to reach the highest level of intellectual attainment and making significant contribution to society.

Department Mission

1. To become an internationally leading Electrical and Electronics Engineering department for higher learning and be self reliant.
2. To build upon the culture and values of universal science and contemporary education through understanding of Electrical and Electronics Engineering.
3. To be a center of research and education generating knowledge and technologies, this lay groundwork in shaping the future in the fields of Electrical and Electronics Engineering.
4. To develop partnership with industrial, R&D and government agencies and actively participate in conferences, technical and community activities.

About Department

Electrical Engineers are the backbone of any country. They provide power for industrial & domestic needs. The department of Electrical & Electronics Engineering was established in the year 2003. B.E. (Electrical & Electronics Engineering) is focus on Electrical Machines, Control System, Power System, Network Analysis. Recently the rapid advance in Semiconductors technology and its application in electrical industry, the branch has introduced adequate number electronics subject like Micro Controller & its Interfacing, Power Semiconductor devices, Power Semiconductor drives, DSP, Advance Communication, Analog and Digital Communication etc. With the emphasis on above areas, the student will acquire analytic and practical skills and hence can serve better in industrial, services and research organizational set ups. The Various laboratories in the department are Basic Electrical Engineering, Electrical Instrumentation, Network Analysis, Electrical Machine, Power System & Protection, Power / Industrial Electronics, Control System, Electronic Devices & Circuits, Microcontroller & Interfacing, Software & Simulation Digital Electronics & Logic Design.

Courses Offered

1. B. Tech. (UG Program) in Electrical & Electronics Engineering
2. M. Tech (PG Program) with specialization in Power Electronics

Department Program Education Objective

PEO 1

Education in the fundamental sciences and mathematics that underlie Electrical and electronics engineering with a general breadth and depth in Electrical and electronics engineering analysis and design.

PEO 2

Awareness of current technology and the fundamental background to be able to stay informed and adept at new technologies in Electrical and electronics engineering and to pursue higher studies

PEO 3

The ability to put ideas into practice through effective analysis & problem solving for various Electrical and electronics engineering applications

PEO 4

A broad awareness of the world around them through general education so they are prepared to achieve their potential and make contributions in their Electrical and electronics engineering fields.

PEO 5

The foundation of communications and teamwork skills and professional attitudes and ethics

Scientist of the Quarter

Satyendra Nath Bose was an eminent physicist after whom 'Bosons', one of the two classes of particles in quantum mechanics, was named. He was a self-taught scholar who rose to prominence during the 1920s for his work on quantum mechanics and went on to work with the renowned German physicist, Albert Einstein. He studied science at the Presidency College, Calcutta, where he had the fortune to be taught by illustrious teachers like Jagadish Chandra Bose and Prafulla Chandra Ray. He became a research scholar at a time when new discoveries were being made in the field of physics. Quantum theory and related concepts were creating a stir in the scientific community and Bose did some important work in this field, particularly on the Planck's black body radiation law. He sent his work to Albert Einstein who recognized the significance of the Indian scientist's findings and soon collaborated with him to work on certain important ideas that formed the basis for Bose–Einstein statistics. Bose was a polyglot and also had varied interests in diversified fields, such as, philosophy, arts and music.

Satyendra Nath Bose

Nationality: Indian
Birthday: January 1, 1894 (Kolkata, India); Died At Age: 80 February 4, 1974
Spouse/Ex-spouse: Ushabati Bose

Childhood & Early Life

- Satyendra was the eldest child of Surendranath Bose, a former accountant who worked for the East Indian Railways. He had six younger sisters.
- He went to the New Indian School before moving on to the Hindu school. From a young age he demonstrated a deep interest in mathematics and science.
- After schooling, he enrolled at the Presidency College, Calcutta to study intermediate science. There he was tutored by luminous teachers like Jagadish Chandra Bose and Prafulla Chandra Ray.
- He completed his BSc in mixed mathematics in 1913 and MSc in 1915. He had a brilliant academic record and scored very high marks in his MSc exams setting a record that is yet to be broken.
- He joined the University of Calcutta as a research scholar in 1916. This was a very exciting time in the annals of science as new discoveries were being made.

Career

- He served as a lecturer in the physics department of the University of Calcutta from 1916 to 1921. Along with a former classmate, the future astrophysicist Meghnad Saha, he published the English translations of Albert Einstein's original papers on special and general relativity in 1919.In 1921, he was offered the post of a Reader in the department of physics at the University of Dhaka. There he helped to set up new laboratories to teach advanced courses in science.
- He had been working along with Saha on quantum physics and relativity theory for some years now. In 1924, he wrote a paper on deriving Planck's quantum radiation law that offered a solution that had never been thought of before.
- He sent this paper to Albert Einstein who recognized the significance of Bose's studies and translated the Paper into German. This paper, though just four pages in length was of seminal importance to the new discoveries in the field of physics.
- Bose and Einstein first came up with the prediction of a state of matter of a dilute gas of bosons and its complex interactions in what came to be known as the Bose-Einstein condensate in 1924-25.

- ∞ Bose achieved international recognition when his findings were promoted by Einstein and he got an opportunity to work for two years in European X-Ray and crystallography laboratories. During this time Bose also became acquainted with Louis de Broglie and Marie Curie.
- ∞ He returned to Dhaka in 1926 and applied for the post of a Professor at the University. Since he did not possess a doctorate, he was not qualified enough for the post. But he was made the Head of the Department of Physics on Einstein's recommendation.
- ∞ Continuing his work in research, Bose designed the equipment for an X-ray crystallography laboratory. He served as the Dean of the Faculty of Science at Dhaka University until 1945.
- ∞ At the time of partition he returned to Calcutta where he held the Khaira Chair. He taught at the University of Calcutta till 1956 where he encouraged the students to design their own equipment.
- ∞ Even after his retirement he continued with his research in nuclear physics. Along with physics, he also researched on organic chemistry, geology, engineering and other sciences.

Major Works

- ∞ Satyendra Nath Bose is best known for giving the concepts of 'Boson', which refers to one of the two classes of particles. His work in quantum physics was further developed by Albert Einstein which laid the foundation for Bose-Einstein statistics and the theory of the Bose-Einstein condensate.

Awards & Achievements

- ∞ The Government of India bestowed upon this eminent physicist the title of Padma Vibhushan in 1954 for his services towards science and research. The S.N. Bose National Centre for Basic Sciences was established by the government in Calcutta in 1986.

Personal Life & Legacy

- ∞ He got married to Ushabati when he was 20 years old. The couple had nine children of whom two died in their childhood. He died at the age of 80 in 1974. He was survived by his wife of 60 years and seven children at the time of his death.

Trivia

- ∞ Rabindranath Tagore dedicated his only book on science, 'Visva–Parichay', to this eminent scientist

Students placed On Campus in Session 2017-18

S. No.	Enrollment No.	Name of Student	Company Name	Package in Laces
1	0808EX141006	Amit Kumar	TCS	3.36
2	0808EX141003	Abhishek Upadhyay	TCS	3.36
3	0808EX141020	Jay Solanki	TCS	3.36
4	0808EX141023	Jyoti Jha	TCS	3.36
5	0808EX141024	Kalim Ashraf Khan	TCS	3.36
6	0808EX141026	Manish Sharma	TCS	3.36
7	0808EX141036	Mohit Tripathi	TCS	3.36
8	0808EX141040	Nishi Mallika	TCS	3.36
9	0808EX141053	Rajat Bhargava	TCS	3.36
10	0808EX141063	Saumya Anand	TCS	3.36
11	0808EX141080	Yash Jaiswal	TCS	3.36
12	0808EX141076	Vaishnavi Gupta	Hidden Brains Infotech	4.00
13	0808EX141023	Jyoti Jha	Sofcon India Pvt. Ltd.	2.00
14	0808EX141045	Mukesh Dangi	Sofcon India Pvt. Ltd.	2.00
15	0808EX141071	Subham Lodhi	Sofcon India Pvt. Ltd.	2.00
16	0808EX141016	Avni Kumar Vishvakarma	Byju's	9.00
17	0808EX141019	Himanshu Bhurtiya	Benfie Pvt. Ltd	1.8
18	0808EX141001	Aakash Sinha	Benfie Pvt. Ltd	1.8
19	0808EX141052	Rahul Soni	Jaro Education	4.44
20	0808EX141052	Rahul Soni	Collabera	1.8

Students placed On Campus in Session 2017-18

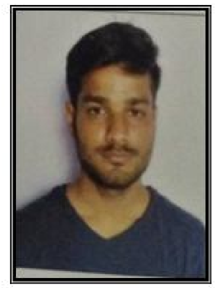
Avani K. Vishwakarma
BYJU'S

Rahul Soni
Jaro Education Collabera

Vaishnavi Gupta
Hidden Brains Info.

Kalim Ashraf Khan
TCS

Manish Sharma
TCS

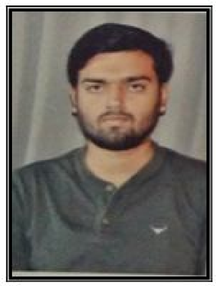


Amit Kumar
TCS

Rajat Bhargava
TCS

Jyoti Jha
TCS

Nishi Mallika
TCS



Abhishek Upadhyay
TCS

Saumya Anand
TCS

Jay Solanki
TCS

Yash Jaiswal
TCS

Mohit Tripathi
TCS

Aakash Sinha
Benefi Pvt. Ltd

Himanshu Bhurtiya
Benefi Pvt. Ltd

Mukesh Dangi
Sofcon India Pvt. Ltd.

Shubham S. Lodhi
Sofcon India Pvt. Ltd

Result of the Department (Batch 2014-18)

Final Year 2014-2018 Batch

Top five students		
Sr. No.	**Student Name**	**CGPA**
1	Vaishnavi Gupta	8.7
2	Amit Kumar	8.44
3	Ankur Nagdiya	8.18
4	Nishi Mallika	8.18
5	Jay Solanki	8.05

	Pass percentage	83
	Total Students Appearing	67
	No/ of students pass	56
	No/ of student passed with Hons/	17
	No/ of students passed in I Div/	30
	No/ of students passed in II Div/	9

Students Articles

Opposites Attract: A Review of Basic Magnetic Theories

Electric machineries are based on the basic principles of electromechanical conversion. They use either the electrostatic or the electromagnetic principle. This technical article deals with the magnetic circuit theory for the conversion of one form of energy to another. This technical article deals with the magnetic circuit theory for the conversion of one form of energy to another. A static device such as a transformer converts the electrical energy to electrical energy while rotating devices such as a DC machine, induction machine, or synchronous machine convert the mechanical or electrical energy into electrical or mechanical energy. Actuators, solenoids, and relays are also based on this conversion process. This conversion process happens in a magnetic material inside these machines. The magnetic material provides the high flux density which can provide high torque and high machine output per unit volume of the machines. This article is dedicated to the properties of these magnetic materials. We will see the basic methodology for the analysis of these machines by using their magnetic circuits.

A Review on Basic Magnetics

If we use a permanent magnet or let electric current flow through a coil, magnetic field is produced. The direction of magnetic field can be found out using the Right-hand rule which says that if the conductor is held in the right hand in such a way that the thumb indicates the direction of current, then the fingertips will indicate the direction of the magnetic field.

The basic laws related to magnetic are given below.

Faraday's Law

The EMF (or voltage) produced around a closed-loop coil is directly proportional to the rate of change of a magnetic field (time-variant) going through or out of that loop.

Lenz's Law

According to this law, the direction of the electromagnetically-induced current is such that its magnetic field opposes direction of the original magnetic field that created the induced current. As a result, the basic equation of Faraday's law of electromagnetic induction will have a negative sign.

Ampere’s Law

This law is based on the discovery of the compass needles used for the detection of direction. We know that a current-carrying conductor produces a magnetic field. Lines of magnetic field form a closed path around the wire. The magnitude of the magnetic field density, B, is same on circular paths. B is directly proportional to the current and inversely proportional to the distance of a point on the closed path from the wire. For a vector B and where dS is small element on the circular path

Parameters and Terminologies in Magnetics

Now, the basic terminologies are given for the construction of magnetic circuit. Later, we will see the process to form the magnetic equivalent circuit for a given machine.

Magnetic Flux Intensity (H)

If V is the potential of any point, then the electric current will produce a magnetic field of intensity $H = -\nabla V$.

The EMF in an electric circuit is analogous to the ampere-turns in a magnetic circuit. This gives the relationship between the current and field intensity.

The relationship between the current and field intensity is given by the Ampere’s circuital law mentioned.

Leakage Flux

The entire magnetic flux through a magnet does not entirely pass through the low-reluctance path of the core; instead part of the flux also goes to the high-reluctance path of air or leaks out from the core.

As the current passes through the path of least resistance, the magnetic flux also has the ability of leaking out to the surrounding air. There is no magnetic insulator available to eliminate them, but magnetic shielding using DC or AC at low frequency can reduce it to some level. In the case of coupled circuits consisting of two or more coupled circuits having more than one winding, the leakage flux links to one coil without interlinking others.

Fringing

This term is used to illustrate the deviations of the flux lines in an air gap of magnetic machine. Fringing is more significant in air medium than to iron. Fringing increases the effective area of the gap. It is proportional to the length of the air gap.

Absolute and Relative Permeability (µ0, µr)

Permeability tells about the capability of the magnetic substance to favor the making of the magnetic field within itself. Absolute permeability is the ratio of the magnetic field density to the magnetic field intensity in a given medium µ=BHµ=BH

Thus, absolute permeability of a material is given by the slope of the curve obtained between flux density and flux intensity for a particular value of the flux intensity.

The permeability changes with the change in flux intensity and change of the material as shown in the figure below. The different materials require the different values of current to establish a particular level of flux density.

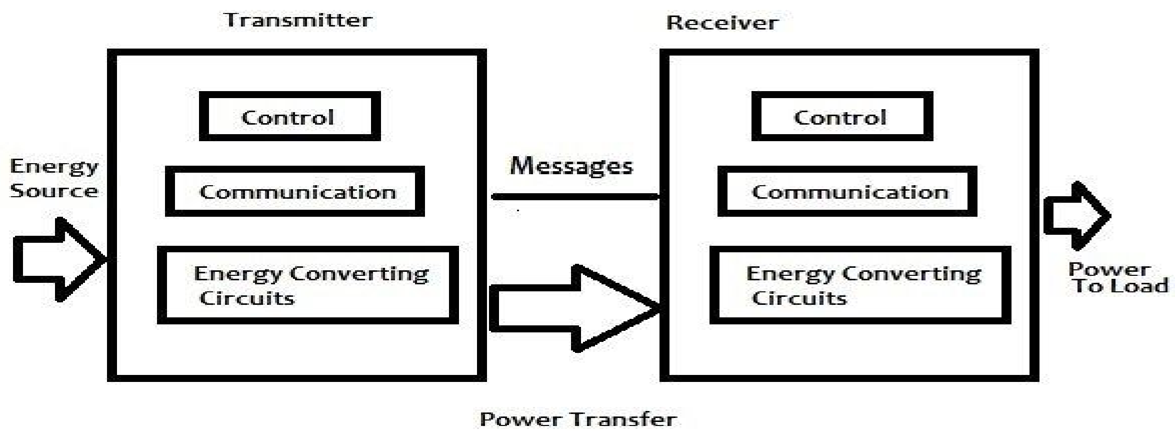
Fahad Khan
3rd year

Wireless Power Technology

Wireless Power Transfer (WPT) makes it possible to supply power through an air gap, without the need for current-carrying wires. WPT can provide power from an AC source to compatible batteries or devices without physical connectors or wires. WPT can recharge mobile phones and tablets, drones, cars, even transportation equipment. It may even be possible to wirelessly transmit power gathered by solar-panel arrays in space. WPT has been an exciting development in consumer electronics, replacing wired chargers. The 2017 Consumer Electronics Show will have many devices offering WPT. The concept of transferring power without wires, however, has been around since the late 1890s. Nikola Tesla was able to light electric bulbs wirelessly at his Colorado Springs Lab using electrodynamics induction (aka resonant inductive coupling).

WPT uses fields created by charged particles to carry energy between transmitters and receivers over an air gap. The air gap is bridged by converting the energy into a form that can travel through the air. The energy is converted to an oscillating field, transmitted over the air, and then converted into usable electrical current by a receiver. Depending on the power and distance, energy can be effectively transferred via an electric field, a magnetic field, or electromagnetic (EM) waves such as radio waves, microwaves, or even light. The following table lists the various WPT technologies as well as the form of power transfer. While some of the companies promising WPT are still working to deliver products, Qi (pronounced "chee") charging is standardized, and devices are currently available. The Wireless Power Consortium (WPC), established in 2008, developed the Qi standard for battery charging. The standard supports both inductive and resonant charging technologies. Inductive charging has the energy passing between a transmitter and receiver coil at close range. Inductive systems require the coils to be in close proximity and in alignment with each other; usually the devices are in direct contact with the charging pad. Resonant charging does not require careful alignment, and chargers can detect and charge a device at distances up to 45mm; thus, resonant chargers can be embedded in furniture or mounted in shelving. The presence of a Qi logo means the device is registered and certified by the Wireless Power Consortium. When first introduced, Qi charging was low power, about 5W. The first smartphones using Qi charging were introduced in 2011.

In 2015, Qi was expanded to include 15W, which allows for quick charging. The following graphic from Texas Instruments shows what the Qi standard covers. WPT for consumer devices is an emerging technology, but the underlying principles and components are not new. Maxwell's Equations still rule wherever electricity and magnetism are involved, and transmitters send energy to receivers just as in other forms of wireless communication. WPT is different, though, in that the primary goal is transferring the energy itself, rather than information encoded in the energy.



The electromagnetic fields involved in WPT can be quite strong, and human safety has to be taken into account. Exposure to electromagnetic radiation can be a concern, and there is also the possibility that the fields generated by WPT transmitters could interfere with wearable or implanted medical devices.

The transmitters and receivers are embedded within WPT devices, as are the batteries to be charged. The actual conversion circuitry will depend on the technology used. In addition to the actual transfer of energy, the WPT system must allow the transmitter and receiver to communicate. This ensures that a receiver can notify the charging device when a battery is fully charged. Communication also allows a transmitter to detect and identify a receiver, to adjust the amount of power transmitted to the load, and to monitor conditions such as battery temperature.

The concept of near-field vs. far-field radiation is relevant to WPT. Transmission techniques, the amount of power that can be transferred, and proximity requirements are influenced by whether the system is utilizing near-field or far-field radiation.

Locations for which the distance from the antenna is much less than one wavelength are in the near field. The energy in the near field is nonradioactive, and the oscillating magnetic and electric fields are independent of each other. Capacitive (electric) and inductive (magnetic) coupling can be used to transfer power to a receiver located in the transmitter's near field.

Locations for which the distance from the antenna is greater than approximately two wavelengths are in the far field. (A transition region exists between the near field and far field.) Energy in the far field is in the form of typical electromagnetic radiation. Far-field power transfer is also referred to as power beaming. Examples of far-field transfer are systems that use high-power lasers or microwave radiation to transfer energy over long distances.

Ankur Nagdia
4th year

An Introduction to Optoelectronics

The term optoelectronics is a specific discipline of electronics that focuses on light-emitting or light-detecting devices. Light-emitting devices use voltage and current to produce electromagnetic radiation (i.e., light). Such light-emitting devices are commonly used for purposes of illumination or as indicator lights.

In contrast, light-detecting devices, such as phototransistors, are designed to convert received electromagnetic energy into electric current or voltage. Light-detecting devices can be used for light sensing and communication. Examples of these include darkness-activated switches and remote controls. In general terms, light-detecting devices work by using photons to liberate bound electrons within semiconductor materials.

Photons are the fundamental units of electromagnetic radiation (EMR). Photons have a frequency of propagation, and we classify EMR based on this frequency—microwave EMR, infrared EMR, optical EMR, and so forth. The human eye is sensitive to optical EMR, which is further categorized into colors. Color is not an inherent property of photons; rather, photons have frequency, and human beings interpret these different frequencies as different colors.

The relationship between a photon's frequency and its wavelength (λ) is given by:

Λ=v/f (in units of meters)

Where, N = velocity, or speed, of the photon (units of m/s), F = frequency (in units of Hz)

In free space, v is the speed of light ($c = 3.0 \times 10^8$ m/s). But in other media, such as glass, v becomes slower than the speed of light.

A photon with a longer wavelength (i.e., a lower frequency) has less energy than a photon with a shorter wavelength (i.e., a higher frequency).

See for more information on a photon's energy, frequency, and wavelength. Lamps, such as incandescent light bulbs, are devices that convert electric current into visible light energy.

Incandescent lamps have a filament made from tungsten wire. As current flows through this filament, the current collides with the filament's atoms causing the filament to generate heat resulting in photons being emitted. This particular process produces photons with a variety of wavelengths, resulting in emitted light that appears whitish in color.

Halogen lamps are similar to incandescent lamps. In fact, halogen bulbs are considered to be an advanced form of the incandescent bulb. Halogen lamps are commonly known for both their brilliant light and their very hot-to-the-touch bulbs. A halogen lamp uses a filament that resides inside a gas-pressurized bulb. The pressurized gas consists of an inert gas and a small amount of a halogen element such as bromine or iodine. Also, the glass of a halogen bulb is stronger than the glass in a regular incandescent bulb.

Fluorescent lamps are quite different. They consist of a mercury vapor–filled glass tube whose inner wall is coated with a material that fluoresces. When electrons, which are emitted from the fluorescent bulb's cathode electrode, collide with the mercury atoms, UV (ultraviolet) radiation is emitted. This UV radiation is absorbed by the lamp's fluorescent coating, which in turn releases visible light.

Light-emitting diodes (leds) are two-lead semiconductor devices that are similar to normal diodes except that they emit light that can be visible, infrared, or ultraviolet. When an LED's anode lead become more positive in voltage than its cathode lead (typically by a voltage ranging from of 0.6 to 2.2V), current flows through the LED device resulting in emitted light.

In historical terms, red was the first LED color; it was developed in 1962 and then mass produced in 1968. Next came yellow, green, and infrared leds. It wasn't until 1989 that the blue LED became commercially available. Nowadays, virtually any LED color, including white, is commercially available.

A laser diode is a semiconductor laser device that is very similar, in both form and operation, to a light-emitting diode (LED). More detailed information about laser diodes can be found here.

Photoresistors are nothing more than light-controlled variable resistors, also known as light dependent resistors (ldrs). Typically, when a photoresistor is placed in the dark its resistance is very high (in the megaohms).

In contrast, when a photoresistor is illuminated, its resistance drops dramatically—depending on the intensity of the light shining on it, the resistance may be as low as hundreds of ohms. Photoresistors are used in light-sensitive switching devices.

Photodiodes are two-lead semiconductor devices that convert light energy (i.e., photons) directly into electric current. A photodiode is constructed using a very thin *n*-type semiconductor together with a thicker *p*-type semiconductor. The *n* side has an abundance of electrons and is considered the cathode while the *p* side has an abundance of holes and is considered the anode. When a photon (i.e., light) of sufficient energy strikes the diode, it creates an electron-hole pair. The holes move toward the anode while the electrons move toward the cathode, thus creating a light-induced current (i.e., a photocurrent).

Solar cells are simply photodiodes with exceptionally large surface areas. These larger areas allow the solar cells to be more sensitive to incoming light as well as more powerful—in terms of both voltage and current—than photodiodes. Solar cells are commonly used in solar panels, but they are also often used as light-sensitive elements in detectors of visible light. Examples include light meters and light-sensitive relays.

As you may have guessed, phototransistors are light-sensitive transistors. There are two common types: the first resembles the BJT (bipolar junction transistor) and the second is similar to a FET (field-effect transistor). The BJT-type phototransistor has its base replaced by a light-sensitive area; when this surface is kept dark the device remains off. The FET-type phototransistor, sometimes referred to as a photo-FET, uses light to generate a gate voltage that controls a drain-source current. FET-type phototransistors are more sensitive to variations in light compared to BJT-type phototransistors.

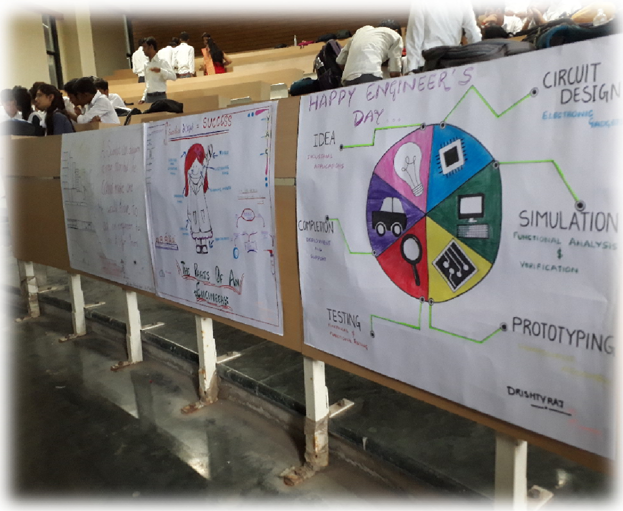
Optoisolators (also known as optocouplers) are electrical devices that interconnect two circuits by means of an optical interface. For instance, a typical optoisolator is composed of an LED and a phototransistor, both of which are encased in a light-tight enclosure. The LED portion of an optoisolator is connected to a driver circuit, and the phototransistor is the output device. Accordingly, when the LED is energized it emits photons that are detected by the phototransistor. A typical application of an optoisolator is to provide electrical isolation between two separate circuits.

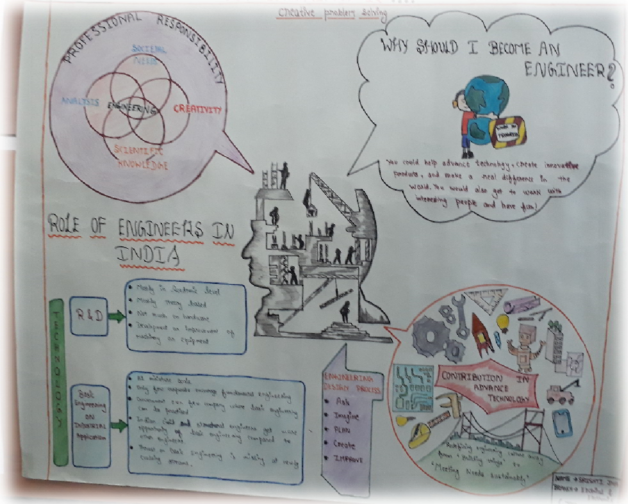
Jay Solanki

4th year

Memorable Moments

Poster Competition on Engineer's Day





Entrepreneurship Awareness Camp

e-Awartan Tech Fest - 2018

Day - I

Inauguration Function

Enlighten the Lamp by Dr. A.G.Kothari along with Prof. Manish Sahajwani, HOD ,Prof. B.N. Phadke Prof. Kamlesh Gupta ,Dr. Aditya Tiwari.

Inaugural speech by Dr. A. G. Kothari, & Prof. Manish Sahajwani (Head, EX Dept) IPS Academy, IES, Indore

Technical Quiz Competitions

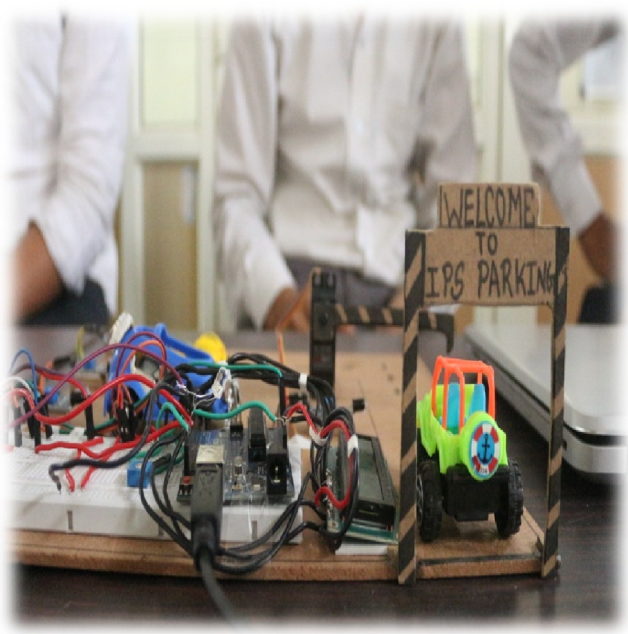
Written test given by student on technical quiz competition.

Winners of Technical Quiz Competition

Runner up of Technical Quiz Competition

Day - II

Project & Model Competition



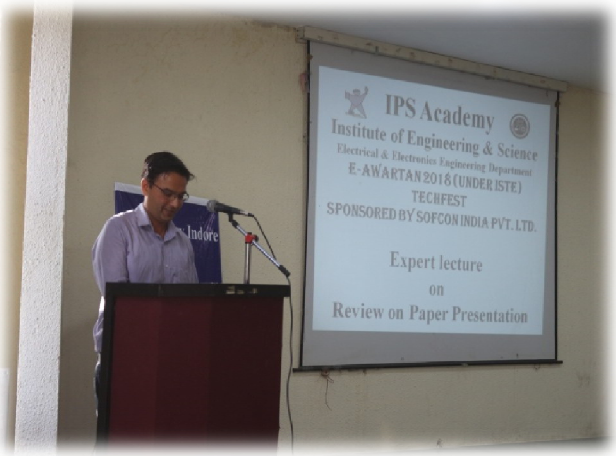
Paper Presentation Competition

Felicitation of Dr. Keshav Patidar, Symbiosis University of Applied Sciences, Indore

Paper Presented By the Students

Judges

Expert Lecture



Expert lecture on "Review on Paper Presentation" by Dr. Keshav Patidar

Students during Expert Lecture

Valedictory Function

Industry Visit

IPS Academy

Institute of Engineering & Science

Knowledge village, Rajendra Nagar, A.B. Road, Indore – 452012 (M.P.)

(Approved by AICTE, New Delhi and Affiliated to RGTU, Bhopal)

Department of Electrical & Electronics Engineering

(NBA Accredited)