THE MODERN ART OF ELECTRONICS

SMART ELECTRONIC GADGETS

KARPAGAM
COLLEGE OF ENGINEERING
Rediscover | Refine | Redefine
Coimbatore - 641 032

Autonomous | Affiliated to Anna University, Chennai
Accredited by NAAC with 'A' Grade | NBA (ECE, EEE, CSE, MECH & IT)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

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About Karpagam College of Engineering

The Karpagam College of Engineering, established in the Year 2000, is an Autonomous institution, Approved by AICTE, NewDelhi and Affiliated to Anna University, Chennai. The college offers various Under Graduate and Post Graduate Engineering programmes. The College is accredited by NAAC with 'A' Grade, TCS and Wipro with 4500 students and 426 teaching and non-teaching staff members, Karpagam College of Engineering strives to impart quality education and an excellent career start to all its students.

The Placement and Training facilities add a feather to its cap ensuring the students get placed on campus. The 10 Centers of Excellence strive to impart practical and experimental exposure to the students and serve as a window to the corporate world.

The College is situated at Myleripalayam, 15kms from Coimbatore Central Railway station. The serene location surrounded by green fields and rich clusters of coconut groves creates a calm atmosphere conducive to learning and growth. Infrastructure with well-equipped laboratories and libraries, well maintained Play grounds, Hostels, Food Court, Gymnasium and an Indoor Stadium.

Vision

To become one of the best institutions at the National and International level by incorporating innovative teaching -learning methods to enable the students to secure a high-value career, motivate to pursue higher education and research to serve the society.

Mission

To bring out knowledgeable engineers and professionals in their field of specialization by having qualified and trained faculty members and staff besides necessary infrastructure and to create highly conducive teaching and learning environment .

To work in close association with stakeholders by way of enhanced industry – institute interaction, to take up need based research and industry specific programmes.

To organize co-curricular and extracurricular activities for character and personality development to produce highly competent and motivated engineers and professionals to serve and lead the society.

About the Department of Electronics and Communication Engineering

The embryonic formation of the Department of Electronics and Communication Engineering was in the year 2000 with the introduction of an undergraduate course. The Department has been accredited by the National Board of Accreditation (NBA) and affiliated to Anna University, Chennai. The Department over the time has grown in several dimensions and provides a magnetic ambience in teaching and learning. Apart from four years B.E course, the Department also offers two full time M.E courses (VLSI Design and Communication Systems) and Anna University approved Ph.D Research Centre to expand the scope of research focus of the department

Students pursuing B.E in ECE have a full and flexible undergraduate curriculum. Numerous streams can be tailored to fit every individual's interests, skills and career goals. ECE has gained a reputation for producing top-notch engineers for industry and academia.

Postgraduate study in ECE prepares students for leadership roles in research, development and design positions that require skill and imaginative engineering solutions.

The major areas of faculty expertise of the department include Biomedical Signal Processing, Communication Systems, Computer networks, Control Systems, Digital Signal Processing, Image Processing, Instrumentation, RF and Microwaves, Microstrip Antennas, Optoelectronic and Optical Communication, VLSI Design, Wireless Communication, Embedded Systems and MEMS.

The Department has Centers of Excellence in the field of VLSI Design, Embedded Systems, Communication and Networks and Signal Processing. The Department has signed MoUs with leading industries and organizations for establishing collaborative research, conducting Workshops, Seminars and for organizing International Conferences. Professional associations such as ECE association and IEEE student chapter are developed for professional interaction.

Vision

To provide innovative teaching and learning methodologies for excelling in a high-value career, higher education and research to the students in the field of Electronics and Communication Engineering to meet the needs of the industry and to be a part of the advancing technological revolution.

Mission

To create engineers of high quality on par with international standards by providing excellent infrastructure and well qualified faculty.

To enhance the collaborative and multidisciplinary activities to develop human and intellectual qualities.

To provide technical expertise to carry out research and development.

Smart watches

Technology revolutions made the things to develop beyond the imagination now-a-days. The innovation in the conventional wrist watches is the best example of innovative developments in electronics era. The wrist watches with more and different kind of features in addition to telling time coined the smart watches to great extent.

The smart watches are designed not only to show time digitally, it is used to get the information through voice/text with comfortably fitting displays. It also makes the things easier when the hands are busy with other works by controlling the watch via voice. Specifically, Moto 360 is a classically-designed, modern timepiece powered by Android Wear. Comfortable, familiar and crafted with the finest materials, Moto 360 keeps you upto-date without taking you away from the moment. Glance at your wrist to see updates or just speak to get the information you need. You can also keep track of your steps and know your heart rate using a built-in pedometer and heart rate monitor.

Further, the friction in the touchscreen has focused by the research team, led by Professor Edward Colgate, found that in order for the touchscreens to be able to provide physical cues, it's important to have a reduction in friction between the fingertips and the glass surface of the device. However, the mechanism behind friction reduction has been unknown so far. To find out how the system works, the scientists performed a study involving seven human participants whose fingers flicked back and forth on a glass late specially designed to reduce friction. They applied ultrasonic vibrations to the plate—known to reduce friction between the fingertips and plate. The finger motion during the vibration was measured and contact between the fingertips and the plate imaged. In order to avoid the moisture problem with human fingertips, the researchers also built artificial fingertips constructed of aluminium cylinder representing the bone and a sponge-like material to represent the soft tissue and repeated the experiments.

Moto 360 watch   OLED wearable watch

Dr. C. Priya
Associate Professor, ECE

FreeStyle portable projector

Introducing the new Samsung Freestyle, a portable projector that weighs less than 2 lbs and includes 360-degree audio. Samsung Freestyle is a portable projector that's lightweight and displays up to 100 inches.

It's a portable projector that's lightweight and can deliver images up to 100-inches. The Samsung Freestyle projector is handy in that it's so small and easy to take with you wherever you go. In fact, its lightweight design weighs in at only 1.83 lbs. There's also a waterproof case and a portable battery as well. It's able to project at a range of 30 to 100-inches at a resolution of 1080p. Not only that, but it even rotates with its 180-degree cradle stand so that you can aim it up at ceilings. This expands your options when looking for places to project your videos onto when moving from place to place.

Another handy feature included with the Samsung Freestyle is 360-degree audio. This means you can use the device as is without needing to hook it up to external speakers. Hopefully, though, that will still be an option should you have a separate preferred listening device. Far-field voice control is also a welcome feature that comes with the Freestyle. Whether you're head over heels about projectors or only recently interested in trying them, the Freestyle seems like this will be an effective option for both parties. Those who enjoy projector-style entertainment devices will appreciate having a capable projector that doesn't require lots of extra equipment, and best of all is extremely simple to take anywhere.

Samsung Freestyle lightweight projector

Mr. G. Arun Francis
Assistant Professor, ECE

Bluetooth Speaker

The Colour Bluetooth speaker is a completely new design and weighs just 0.5 kg, and is 12.7cm (5-inch) wide, 5.3cm (2.08-inch) deep and 13.4cm (5.27-inch) high. It fits easily into a handbag, knapsack or the palm of your hand.

Bose combined exclusive dual-opposing passive radiators with two high-efficiency transducers for full-range sound, including deep, low-note performance. The size and performance of this product makes it a small wonder, making listening undeniably portable, powerful and fun. It connects wirelessly to a smartphone, tablet or other Bluetooth-enabled devices and uses voice prompts, available in several languages, to simplify set-up, and identify which source is connected.

Even when you turn it off, it remembers the last eight devices paired with it when powered back on. It, then, automatically connects to the two most recently used— iPhone, iPad, Android or any other Bluetooth enabled device. A 3.5mm stereo auxiliary input is integrated on the back of the enclosure. It outlasts parties and playlists with rugged durability. Using a lithium-ion battery, it can last for up to eight hours of unplugged play time and fully recharges with most USB power sources in as little as three hours. Its exhaustively tested housing is made of elastomer and plastic. It comes in black, white, blue, red and mint.

Mr. C. Mukuntharaj,
Assistant Professor, ECE

Bluetooth Headphones

The new on-ear Bluetooth headphones deliver a new level of performance. They feature crisp, powerful sound, new features, and a design that's lighter and more comfortable than conventional Bluetooth headphones. The on-ear Bluetooth headphones deliver all the audio performance of a Bose wired headphone. Bose's active equalisation and TriPort technology combine for smoother, more balanced sound. Mid-high frequencies are natural, and Low frequencies are detailed and full. Yet, there are no cords or cables, so you can take calls, or enjoy a video, movie or music freely. These headphones debut new functionality and are so intuitive, anyone can use them. They connect up to two devices at a time and let you switch between each, so you can watch a video from your tablet while staying connected to your smartphone.

Simple voice prompts identify callers, battery status and source connection. With commands on the ear cup, you are in control: turn it on and off, answer and end a call, adjust volume, play/pause, or control tracks, without using your phone. These headphones were precisely engineered for a busy life. They use rugged, impact-resistant materials, glass-filled nylon and non-corrosive stainless steel, yet weigh only 156 gm. Designed to be worn comfortably for hours, they feature soft ear cushions and a headband pad made of fabric used in high-end automotive applications. They fold smoothly for compact storage in a matching case. The Bluetooth headphones come in black or white. They charge easily with a USB cable (included with the headphones) for up to 15 hours of listening or up to two hours after a mere 15-minute charge.

18L143   SWETHA S

II ECE A

A Gaming Mouse

      Roccat Studios once again leads the way in gaming peripheral design and execution with the release of the highly touted and much anticipated Tyon. All Action Gaming Mouse, arriving in the United States, Europe and Australia. The Tyon is a wholly unique gaming mouse that puts every major action in the palm of the player's hand. The Tyon's X-Celerator, a two-way analogue stick, handles throttling, sprinting, rotating tank turrets and more with tried and tested ease of use. With 16 assignable buttons, 31 distinct possible functions and a near limitless level of customisation, thanks to Roccat's dedicated Easy-Shift [+] Button, the Tyon is a game-changer. Land, sea, air, space— mastery of each layer in the FPS gaming sphere is imperative for competitive gamers. Its designers and developers have worked in close collaboration with gaming experts, logging hundreds of hours of testing and fine-tuning to ensure Tyon's abilities elevate play, meeting these challenges head-on. The Tyon's Dorsal Fin Switch, a two-click button set behind the mouse wheel, allows for a comfortable mid-finger action, eliminates the need for major hand adjustments, 576kB of on board memory ensures vast storage of settings and macros, an 8200 DPI Pro-Aim laser sensor provides precision, quickness and accuracy, vivid RGBY two-part illumination for both the lower rim and wheel of the mouse gives the Tyon incredible range of personal style, and with a sleek black or white colour choice for the mouse itself, the Tyon truly is a marvel of form and function.

18L121   MANIRAJ S

II ECE A

Organic LED Display

Over the last few years, organic light-emitting diodes (OLEDs) have found promising applications in flat-panel displays, replacing cathode ray tubes (CRTs) or LED displays. Solid-state OLEDs make it easier to fabricate flexible displays. The emission of light from materials in the presence of an electric field is called electroluminescence. In 1960s, a single crystal of anthracene helped to observe this phenomenon. Despite the huge quantum efficiency obtained with this organic crystal, no application has been reported with fascinating results. In 1987, Tang and Van Slyke from Kodak achieved efficient and low-voltage OLEDs from a p-n heterostructure device.

OLEDs are thin-film organic semiconductor light-emitting devices. These consist of a thin film of organic material sandwiched between two electrodes (anode and cathode) as shown in Fig. 1. Organic electroluminescent materials are contingent upon pi-conjugated molecules and are almost insulators. Light is generated when holes and electrons injected at electrodes recombine. Anode is transparent and made of indium tin oxide. Cathode is reflective and made of metal. When an external potential is applied across electrodes, positive and negative charges (holes from anode and electrons from cathode) are injected. These electrons and holes shift inside the material and recombine to form excitons, emitting photons in the process. Based on their number of layers, OLEDs can be classified as two-layer and three-layer OLEDs. In two-layer OLEDs, electrons are injected from cathode into the lowest unoccupied molecular orbital. Simultaneously, holes are injected from anode into the highest occupied molecular orbital. In three-layer OLEDs, the conductive layer is replaced with electron transport layer and hole transport layer. Compared to LEDs and LCDs, OLEDs use wide-energy-gap semiconductors and exhibit singlet and triplet exciton radiation phenomenon.

Architecture of an OLED

An OLED consists of:

1) Substrate: Regarded as the base of an OLED, it is made up of a thin translucent glass or oil material.

2) Anode: It is also called as emitter. Its main function is to emit electrons when a voltage is applied across terminals.

3) Organic layer: The layer above anode is called organic layer. It contains conductive polymer made of hydrogen or carbon molecules.

4) Conductive layer: This layer is made of organic plastic molecules and helps to move holes from anode.

5) **Emissive Layer:** This layer is made of organic materials that are different from those used in the conductive layer. It helps to transport electrons from cathode.

6) **Cathode:** Cathode is the topmost part of OLED displays. It injects electrons when a potential difference is applied across terminals.
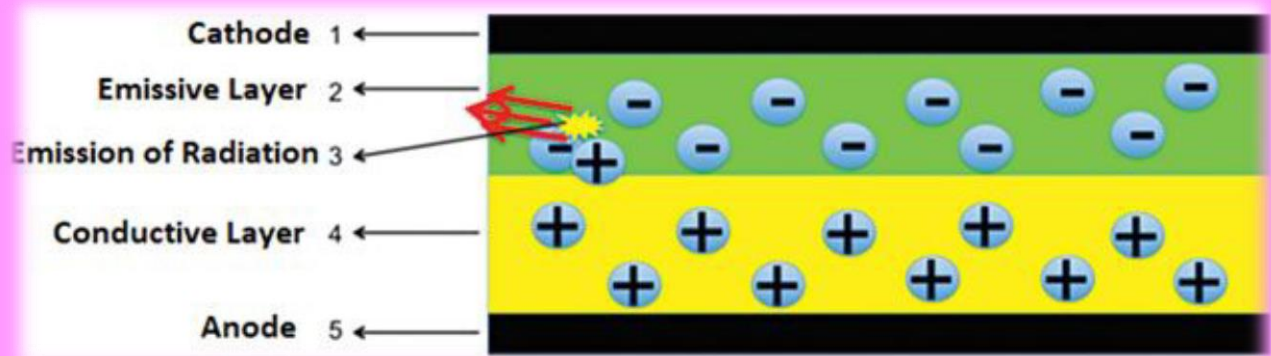

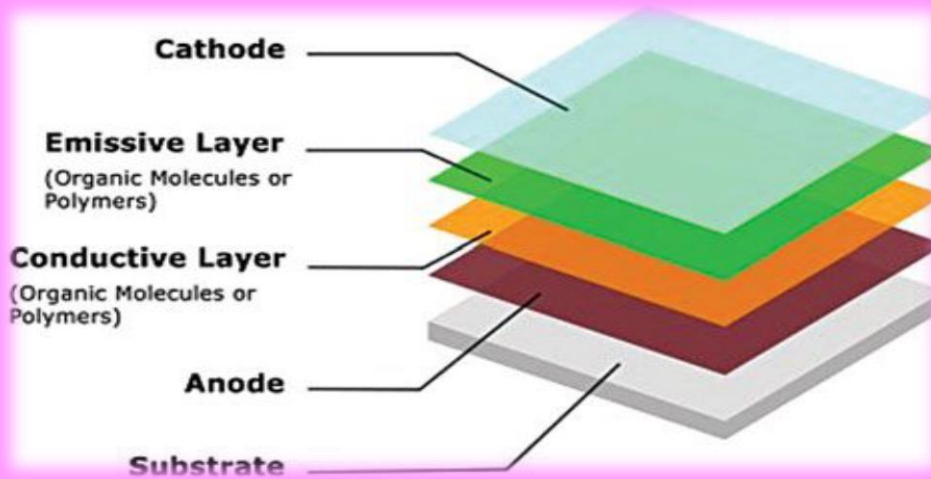**Fig. 1: A flexible OLED display**

Fig. 2: Bilayer OLED

Fig. 3: OLED architecture

18L222   MANASA R

II ECE B

Energy - efficient Microcontrollers for IoT Applications

Energy efficiency is a must, and low-power microcontroller units (MCUs) constitute the cornerstone for efficient electronics. The number of embedded devices that run on battery power, or parasitic power, is increasing. Today, design mobility is synonymous with product profitability, and low power consumption is one of the most important aspects of any design.

32-bit ARM Cortex-M0+ based Freedom Platform of MCUs

Low-power MCUs driven by the Internet of Things:

MCUs with low power consumption are all the rage these days, thanks to the Internet of Things (IoT). One such family of MCUs is the 32-bit ARM Cortex-M0+ based Freedom Platform of MCUs, which draws currents around single-digit micro-ampere levels. "The ARM Cortex-M0+ CPU that powers this Freedom series of MCUs has been designed with a two-stage pipeline for power efficiency, with IoT in mind."

Designers are continuously requesting MCUs that utilise less power and can handle numerous activities at the same time. A designer may use the power-efficient MCU to work on a variety of embedded systems and gain a variety of benefits such as low-power libraries, gate level optimization, and power gating.

In many embedded applications, performance-per-watt levels have grown to enable power-efficient designs that help the end user save energy. In fact, in light of the impending energy crisis, regulatory authorities have mandated that consumer appliance manufacturers improve their goods and show energy-efficiency ratings, allowing consumers to make informed decisions. Low-power MCUs are relatively new to the market, and much innovation is underway to support and assist engineers in developing smarter products and solutions.

MCUs' most recent features:

Most MCUs nowadays not only have small form factors and built-in wireless capabilities, but their development boards also support ZigBee, Bluetooth, and Wi-Fi—all of which can fit on your fingertip. For example, Nordic Semiconductor's nRF51822-mkit, which is based on the ARM Cortex-M0, features a Bluetooth Low Energy (BLE 4.0) processor on the same chip as the ARM Cortex-M0." MetaWear from Mbient Lab Inc. and RFDuino from RFDuino.com are two more development boards with similar ARM-based MCUs. Because of the small form factors of MCUs, these development boards are also small. The ARM Cortex-M3 based Spark core with an on-board Wi-Fi device is another comparable platform.

High-end digital signal processing (DSP) capabilities are also being added to MCUs to handle image processing, speech processing, and other signal processing requirements. A good example is the Cortex-M7.

From ultra-low-cost, small-footprint eight-bit MCUs with one kilobyte (kB) of Flash to high-performance 32-bit MCUs with up to 128kB of Flash, Freescale's low-power MCU portfolio has something for everyone. "Lowpower characteristics include clock several low-power operation modes and a 32kHz oscillator that uses less than one micro-ampere," according to Gupta. The CC430 series from Texas Instruments (TI) is another wireless MCU with tight integration between the MCU core, peripherals, software, and a sub-GHz radio frequency transceiver.

The CC2541 from Texas Instruments is another example of a power-optimized wireless MCU that allows BLE and proprietary 2.4GHz network nodes to be constructed with low total bill of materials prices.

MCUs with ever-increasing interfaces:

MCUs currently feature a plethora of interfaces that allow them to connect to a variety of sensors and actuators. GPIO, analogue in, analogue out, pulse width modulation (PWM), USB

host and device, inter-integrated circuit (I2C), serial peripheral interface (SPI), universal asynchronous receiver/transmitter (UART), RS232, built-in analogue-to-digital converter (ADC), and built-in digital-to-analogue converter (DAC) are just a few of the interfaces. MCUs are much better for IoT because of their interfaces and currents in the single digit microampere range. Today, many developers and applications are migrating from eight and 16-bit MCUs to 32-bit MCUs.

The main reason is that modern-day or Internet-of-Things applications demand more memory (determined by address bus size) and larger data buses for faster and more efficient functioning from a layperson's perspective. High-resolution ADC to 24-bit sigma delta ADC, high-resolution DAC, real-time clock (RTC), and LCD controllers are also available on MCUs. With 32-bit MCUs, several vendors additionally provide a free real-time operating system (OS).

<div align="right">

18L203   AJITH S

II ECE B

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Bio-Metric Flash USB drives for securing Data

The biometric USB flash drive is an improved version of one of the most important biometric security breakthroughs of the twenty-first century. Previously, moving files from one computer or mobile device to another necessitated the use of 100 floppy discs, a slow-burning CD burner, or a massive external hard drive. Transporting data from one computer to another has never been easier or faster than it is now, thanks to the biometric USB devices that are readily accessible. Transporting that information on a biometric USB device has become a lot safer as well, thanks to the inclusion of biometric USB security to fingerprint flash drives.

The biometric USB flash device's main advantage has to be its convenience of use, since it allows you to transfer data fast without the need for an external hard drive. The majority of flash USB drives on the market today have storage capacities of 2 GB or less, while larger capacities of 64 or even 128 GB are rare and expensive. There are hundreds of 8 GB, 16 GB, and 32 GB USB flash drives available, with plenty of free capacity to hold anything you could ever want to bring with you. The biometric flash drive also has the advantage of being extremely secure.

It can carry your information in a safe briefcase that is tied to your wrist and opens with a biometric fingerprint scan, but unless you work for the CIA, it is far more secure than you really need. With the biometric fingerprint scanner incorporated inside the flash drive, you can be certain that your USB flash drive is as secure as it gets, and you'll never have to worry about your data being taken. The fact that the USB flash drive is simple to use is a perk that most

people overlook. Most USB drives come with all of the necessary drivers pre-loaded, and these drivers are automatically installed when you insert them into your system.

The biometric USB sticks come with all of the necessary drivers and will instantly run biometric fingerprint software on your computer. The biometrics software is still on the USB drive, but it just installs the necessary elements on the computer so that your device knows to stay locked until your fingerprint is authenticated using the biometrics scanner. You can quickly locate the biometric USB drive that is just appropriate for you, despite the fact that it may sound foolish. There are flash drives in many forms and sizes, so you may find one that fits in your pocket, is formed in a humorous design, is skilfully camouflaged, and is linked to a watch, pen, or key chain.

While it may appear that finding the proper USB drive for you is unimportant, the fact that you can obtain flash drives in a variety of forms, colours, and sizes is a significant benefit. One of the key advantages of these USB drive gadgets is that they may be stored anywhere. All suitcases and laptop bags come with small slots and compartments for your USB drive, and most flash drives fit easily into your wallet. Because of the easy biometric fingerprint scanner incorporated into the biometric drive, you can be sure that all of your information is safe when you take a finger print USB stick about with you. You'll never have to worry about missing your data anymore.

Moser Baer has created a unique biometric memory stick called Moser Baer Biometric in order to assure data security and protection against data theft. The biometrics pen drive, which is simple to set up, is meant to provide enhanced data privacy, strong passwords, robust user authentication, file encryption, and distinct public and private storage space on the disc. The 16 GB white drive is compatible with Windows ME/2000/XP/Vista, MAC OS 9.0, and Linux Kernel 2.4.2. The pen drive has a two-year guarantee and weighs 13 grammes. This is a new service we're providing to our clients to help them protect their pen drives even further. The software will aid in the battle against cyber-attacks.

18L337   SARASWATHY T

II ECE C

Instrument to find Hot and Cold Spots

FLIR Series: IR thermometer

The TG165 imaging IR thermometer from FLIR Systems Inc. is powerful, cheap, and small equipment that allows you to view unseen heat patterns, reliably measure temperatures, and conveniently save pictures and measurements taken for reporting. The TG165 reduces the guesswork of diagnosing by integrating a single-spot IR thermometer with the power of a thermal camera in a durable, compact design built on FLIR's unique Lepton micro-thermal imaging camera core. This facilitates troubleshooting by allowing you to locate undetectable hot and cold patches from a safe distance, allowing you to examine and resolve issues more rapidly. TG165 is simple to operate and requires no training. The crosshairs identify the midpoint of the measuring area, and the twin lasers clearly mark the perimeter of what has been measured. The TG165 can resist a 2 different drop, making it suitable for industrial application.

IR thermometer   Thermal imaging camera

FLIR Series: Thermal imaging camera

The innovative thermal imaging camera FLIR Exx-Series troubleshoots more efficiently and quickly, locating hotspots and overheated equipment, producing thorough reports and sharing photos. With a temperature range of up to 650°C, you can more accurately monitor hotter-running equipment, ensuring that it is working safely. With a field-of-view of 25°x19°, the available IR resolutions are 160 120 pixels, 240 180 pixels, and 320 240 pixels.
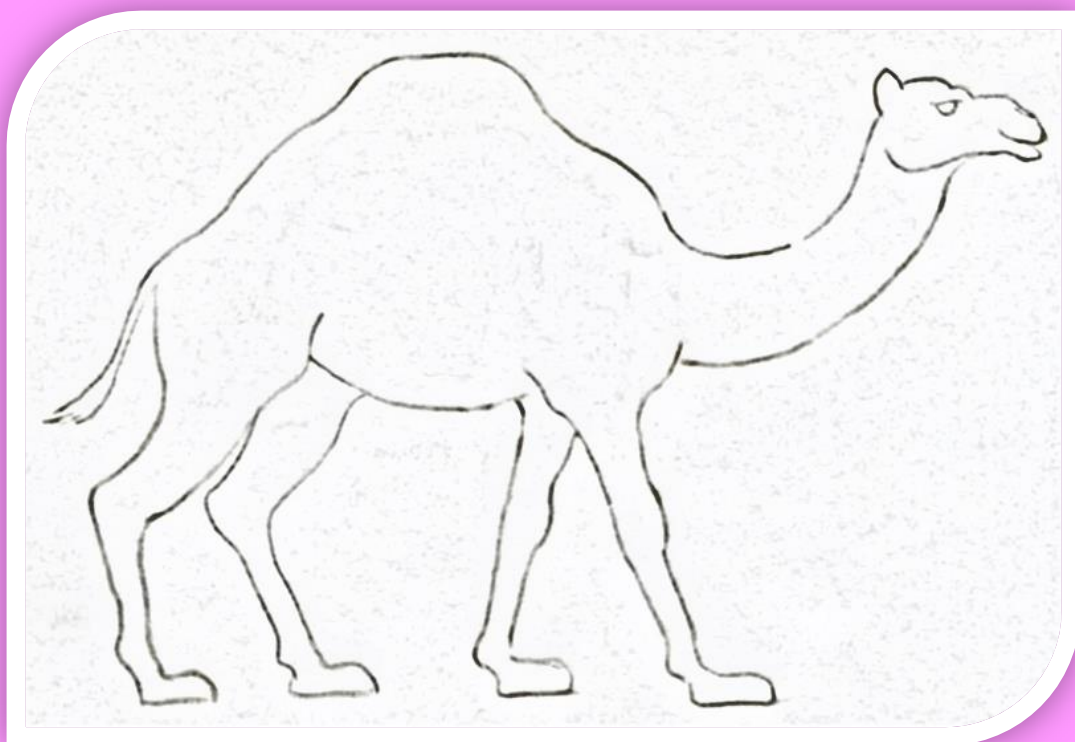
18L321   MADHAVAKUMAR M

II ECE C

DRAWINGS & ARTS

18L329
PAVITHRA C

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ANUSRI A

17L147
SUBHASHINI B

17L140
SANDHIYA A

17L206
ASMITHA P

17L301
ALAGULAKSHMI

16L103
AKALYA P

16L130
PUHAZHENTHI C

16L232
ROOBAAN M T

Programme Educational Objectives (PEOs)

•**PEO1:** Graduates will be able to comprehend Mathematics, Science, Engineering fundamentals, laboratory and work based experience to formulate and solve problems related to the domain and shall develop proficiency in computer based engineering and the use of computational tools.

•**PEO2:** Graduates will be prepared to communicate and work team based on the multidisciplinary projects practicing the ethics of their profession with a great sense of social responsibility.

•**PEO3:** Graduates will recognize the importance of lifelong learning to shine as experts either as entrepreneurs or as employees and thereby broadening their professional knowledge.

Programme Outcomes (POs)
GRADUATES WILL HAVE

•**PO1: Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

•**PO2: Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

•**PO3: Design/ Development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

•**PO4: Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

•**PO5: Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

•**PO6: The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

•**PO7: Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

•**PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

•**PO9: Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

•**PO10: Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

•**PO11: Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

•**PO12: Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)
GRADUATES WILL HAVE

•**PSO1:** Good knowledge and hands-on competence to solve emerging real-world problems related to Electronic Devices and Circuits, Communication Systems, Digital Systems, and Electro-magnetics.

•**PSO2:** Demonstrate proficiency in specialized software packages and computer programming useful for the analysis/design of electronic engineering systems and profession.

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