



Vel Tech
Rangarajan Dr. Sagunthala
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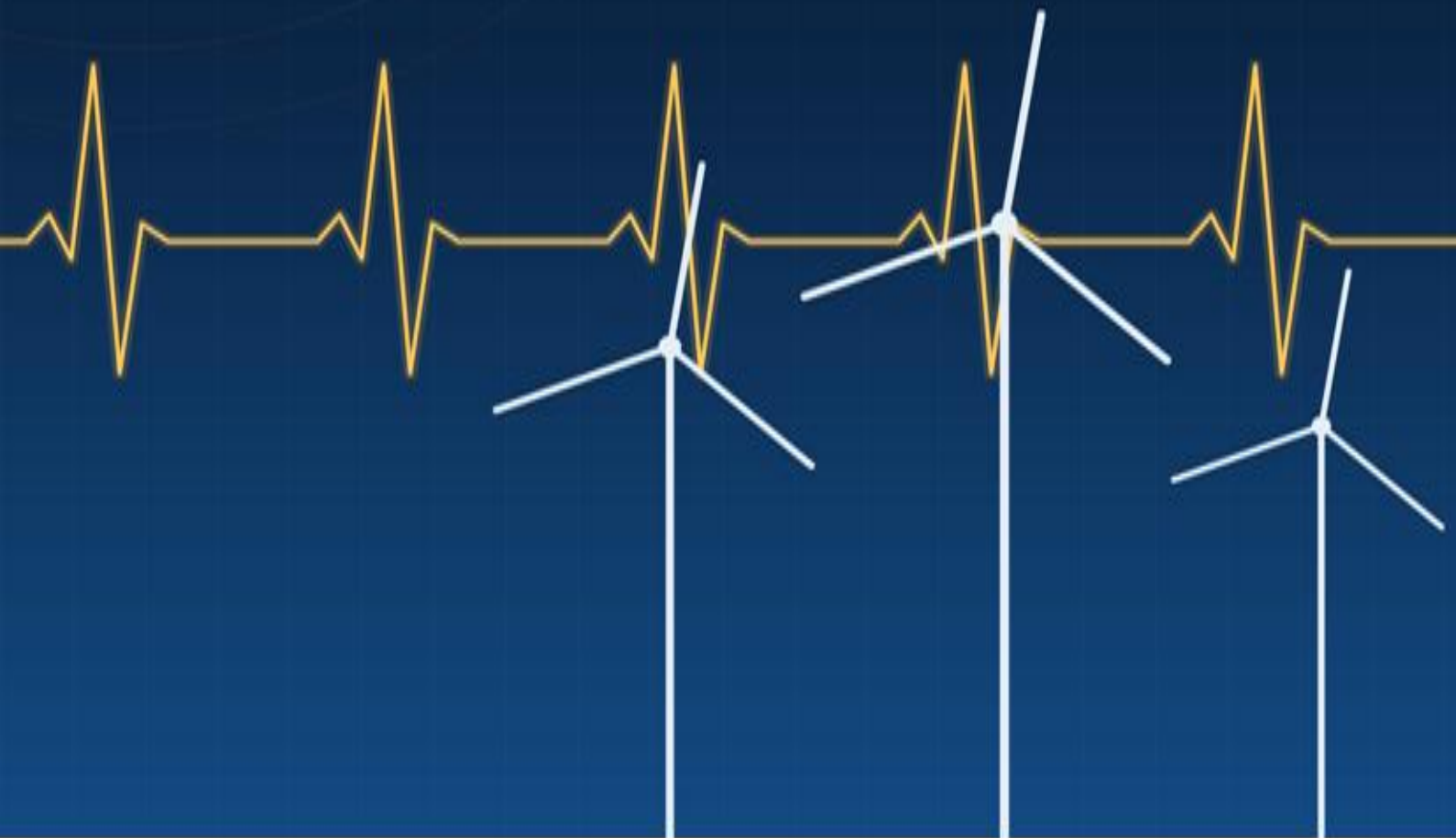
SCHOOL OF ELECTRICAL AND COMMUNICATION

**DEPARTMENT OF
ELECTRICAL AND ELECTRONICS ENGINEERING**

Spark Magazine

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Foreword



Col. Prof. Vel. Dr. R. Rangarajan
Founder President & Chancellor



Dr. Mrs. Sagunthala Rangarajan
Foundress President

We remain committed to building an educational environment that nurtures knowledge, character, innovation, and excellence. Our institution continues to encourage students and faculty to pursue meaningful academic, research, and technological endeavors, supported by modern infrastructure, well-equipped laboratories, and a dedicated faculty. The Department of Electrical and Electronics Engineering reflects this vision through its academic achievements, research initiatives, funded projects, industry collaborations, and the accomplishments of its students and faculty.

Foreword



Mrs. Rangarajan Mahalakshmi Kishore
Chairperson & Managing Trustee

Delighted to witness the achievements of faculty and students across academic and research activities, the Chairperson congratulates the entire team on the effort behind this report and commends the department for producing talent-driven, innovative engineers to meet society's new and challenging issues.



Foreword



Prof. Dr. Rajat Gupta
Vice Chancellor

I am delighted to present the latest edition of Spark, the flagship magazine of the EEE Department. This magazine reflects our continuous pursuit of research excellence, creativity, co-curricular activity and technical learning of our students. Kudos to the editorial team, faculty, and brilliant students whose hard work and contributions made this edition possible.



Prof. Dr. E. Kannan
Registrar

I warmly congratulate the EEE Department on launching this vibrant edition of Spark. This platform beautifully captures the dynamic activities, student achievements, and academic excellence of the department. I wish the EEE team continued success in inspiring our community through such creative and meaningful initiatives.



Message from Dean and Head of the Department

Dr. R. S. Valarmathi

Professor & Dean
School Of Electrical and Communication



The School continues to make remarkable progress, driven by the achievements of our faculty, students and staff in cutting-edge research, academic excellence, and industry collaboration. Spark, the magazine of EEE department serves as a wonderful window into this journey—reflecting our focus on innovation, hands-on learning, and community impact. I commend the entire team for shaping our students into future-ready professionals and bringing these milestones to light.

Dr. S. Ramesh

Professor & Head
Department of Electrical and Electronics Engineering



It is with great pleasure and a deep sense of pride that to present the SPARK-Magazine of the Department of EEE. I encourage you to delve into the pages of this magazine to gain a deeper understanding of the remarkable work that has taken place within our department. Together, we can look forward to an even brighter future filled with groundbreaking research, transformative education, and meaningful contributions to the field of electrical and Electronics engineering.

VISION OF THE DEPARTMENT

To provide intellectual curiosity in the field of Electrical and Electronics engineering that produces skilled interdisciplinary engineers to serve the society.

MISSION OF THE DEPARTMENT

M1: To inculcate knowledge among the students through comprehensive curriculum.

M2: To enrich the academic experience in terms of flexibility, teamwork, design skills, practice and industrial trainings.

M3: To produce competent graduates suitable for a successful career in Industry and Research.

PROGRAMME EDUCATIONAL OBJECTIVE

PEO1: Design and analyse electrical and electronic systems by applying the knowledge of mathematics and engineering.

PEO2: Provide practical solution to multidisciplinary societal problems through innovative ideas.

PEO3: Secure positions and continue as valued, creative and proficient employees in a wide variety of fields and industries for a rewarding career.



Kavach 4.0



Shielding Indian Rails

Kavach 4.0 is an advanced indigenous Automatic Train Protection (ATP) system developed to enhance the safety and efficiency of Indian Railways. It uses advanced signalling, radio communication, and electronic control systems to continuously monitor train movements and prevent accidents.

Kavach, meaning “shield,” is India’s indigenous Automatic Train Protection system developed to make railway journeys safer. It continuously monitors a train’s speed, location, and movement authority and assists the loco pilot in maintaining safe operation. If a train exceeds the permitted speed or approaches a danger signal without appropriate action, Kavach can automatically apply the brakes. It can also provide signal information inside the locomotive cabin, which is especially useful in situations such as poor visibility and fog. Kavach was adopted as India’s National Automatic Train Protection system in July 2020. It has been developed by the Research Designs & Standards Organisation (RDSO) in collaboration with Indian industry and is designed to provide an additional layer of protection against accidents caused by situations such as signal violations and over speeding. As Indian Railways continues expanding Kavach across its network, the system represents an important step toward safer and more reliable train travel. It is an example of how innovation and careful engineering can help protect millions of passengers and support the future of railway transportation in India.

Smart Grids, Bright Futures



Grid Of Tomorrow

Highlights

Smart Grid Technology, Future Power Systems, Renewable Energy Integration, Artificial Intelligence (AI), Internet of Things (IoT), Smart Meters, Advanced Metering Infrastructure (AMI), Grid Automation, Energy Storage Systems, Demand Response Management, Electric Vehicle Integration, Vehicle-to-Grid (V2G), Smart Grid Cybersecurity

The future of electricity is becoming cleaner, smarter, and more decentralized. Microgrids, rooftop solar panels, and energy storage can work together to provide reliable power for homes, schools, hospitals, businesses, and communities. Rooftop solar panels convert sunlight into electricity during the day, while batteries can store excess energy for use when the sun is not shining or when electricity demand is high. Microgrids can bring local sources of generation, storage, and electricity users together and can help maintain power during disruptions to the main grid. India is expanding its use of renewable energy and energy storage as part of its long-term energy transition; the Ministry of New and Renewable Energy notes that storage can help manage the variable nature of renewable generation and improve grid stability. Together, solar power, batteries, and microgrids can help create a more resilient and sustainable energy system for the future.

VTU27176 AREDDULA RAJESH

6G and IoT: Building Tomorrow

Speed Meets
Intelligence



Features

- Ultra-High Data Speed
- Ultra-Low Latency
- AI-Integrated Networks
- Massive Device Connectivity
- Enhanced Energy Efficiency

The future will be more connected than ever before. 6G and the Internet of Things (IoT) could allow people, devices, vehicles, homes, and cities to communicate more intelligently and efficiently. While 5G is already supporting many IoT applications, 6G—officially referred to by the ITU as IMT-2030—is being developed to support advanced connectivity, massive communication, artificial intelligence, and integrated sensing. In the future, smart homes could automatically manage energy, connected vehicles could communicate with their surroundings, farmers could monitor crops using intelligent sensors, and healthcare systems could support remote services. 6G is also expected to improve connectivity in rural and remote areas and support new applications in fields such as education, agriculture, healthcare, transportation, and environmental monitoring. Together, 6G and IoT could help create a world where technology works quietly in the background, making everyday life more connected, efficient, and intelligent.

VTU27293 KALLURU NITHIN SAI CHOWDARY

Energy Without Limits

Limitless
Clean Energy



Energy storage is becoming increasingly important as electrical systems incorporate more variable renewable generation. Batteries can store electricity when supply is available and deliver it later when demand increases, helping improve flexibility and grid stability. Lithium-ion batteries are widely used in electric vehicles, portable electronics and stationary storage. A battery pack contains many cells connected in series and parallel to achieve the required voltage and capacity. The Battery Management System monitors cell voltage, temperature and current and helps keep the battery within safe operating limits. Large-scale storage can support renewable integration, peak-demand management, backup power and grid services. Engineers also study alternatives and improvements such as sodium-ion batteries, flow batteries and other emerging storage technologies. The future of storage depends on safety, cost, lifetime, charging speed, recyclability and material availability. For electrical engineers, battery systems combine electrical circuits, power electronics, control, thermal management and energy management—making energy storage an important multidisciplinary field.

VTU27174 RAVURI.MANJUNADH

Biomass Conversion: Fuelling Tomorrow

Greener
Future Power



Biomass conversion is an important part of the future of clean and renewable energy. Biomass refers to organic materials such as agricultural waste, crop residues, wood, animal waste, and other biodegradable materials. Instead of allowing these resources to go to waste, they can be converted into useful forms of energy such as biogas, biofuels, heat, and electricity. Technologies such as anaerobic digestion, fermentation, gasification, and pyrolysis provide different ways of converting biomass into useful energy and fuels. In the future, biomass conversion could help address two important challenges at the same time: waste management and energy production. Organic waste can be processed to produce biogas or biomethane, while agricultural and forestry residues can be used to produce heat, electricity, and advanced biofuels. The International Energy Agency estimates that modern bioenergy use could grow significantly toward 2050, with sustainable waste streams playing an increasingly important role.

TTS 3550 Dr. R.A.Priya

The World after 100 Years!



Imagine the world 100 years from now. Cities may be greener, cleaner, and filled with advanced technology that makes everyday life easier. Buildings could use renewable energy, vehicles may travel with little pollution, and intelligent systems could help manage water, transport, and energy. People may communicate instantly across great distances, explore space, and use new discoveries to improve healthcare and education. At the same time, nature may become an even more important part of human life, with forests, parks, clean rivers, and sustainable communities protected for future generations. The world after 100 years is impossible to predict, but it gives us a chance to imagine a future where technology and nature exist together and where human creativity helps build a safer, cleaner, and more peaceful world.

VTU 29637 Vikas

Roots in the Concrete

A patch of green amidst the concrete grey,
Where morning roosters crow through city noise,
Old clay-tiled roofs defy the modern day,
Preserving simple, long-forgotten joys.

The mud-paved lane turns off the busy street,
Where elders sit beneath a banyan tree,
A slow-paced refuge from the hurrying feet,
Where life unfolds unhurried, calm, and free.

Fresh jasmine scents the warm and evening air,
While children play with marbles on the ground,
A taste of village peace, preserved with care,
Right in the heart where urban dreams abound.

VTU 29637 Vikas

Art: Shading Some Real Truth!



The pencil rangoli artwork presents a beautiful combination of traditional Indian art, floral patterns, symmetry, and creativity. The design features a central flower surrounded by multiple layers of petals, leaves, curved lines, and decorative dots, forming an elegant and balanced composition.

Rangoli: Dots, Dust, Delight



VTU24058 GUNDOJI KEERTHI

Electrical Puzzle

1 Find the equivalent resistance between A and B.

A) 2 Ω B) 4 Ω
C) 6 Ω D) 25 Ω

Answer: D) 25 Ω

Explanation:
All resistors are in series.
 $R_{eq} = 4 + 6 + 3 + 12 = 25 \Omega$

2 What is the current through the 5 Ω resistor in the given circuit?

A) 0.5 A B) 1 A
C) 1.33 A D) 2 A

Answer: C) 1.33 A

Explanation:
Total resistance $R = 5 + 10 = 15 \Omega$
Current $I = V / R = 20 / 15 = 1.33 \text{ A}$
(Same current flows through 5 Ω)

3 Which logic gate is represented by the following symbol?

A) AND B) OR
C) XOR D) NAND

Answer: C) XOR

Explanation:
The symbol has an additional curved line at the input, which represents the XOR gate.

4 For a three-phase balanced system with line voltage 415 V, what is the phase voltage (V_{ph})?

A) 240 V B) 415 V
C) 720 V D) 230 V

Answer: A) 240 V

Explanation:
 $V_{ph} = V_L / \sqrt{3} = 415 / 1.732 \approx 240 \text{ V}$

5 What is the synchronous speed of a 4-pole generator operating at 50 Hz?

$$N_s = \frac{120 f}{P}$$

A) 750 rpm B) 1000 rpm
C) 1500 rpm D) 3000 rpm

Answer: C) 1500 rpm

Explanation:
 $N_s = 120 \times 50 / 4 = 1500 \text{ rpm}$

6 Identify the electrical device shown below.

A) Induction Motor
B) Transformer
C) Alternator
D) Rectifier

Answer: B) Transformer

Explanation:
The device has core tank, cooling fins and high-voltage bushings, typical of a transformer.

7 Which of the following is used to protect a circuit from overcurrent?

A) Capacitor
B) Circuit breaker
C) Transformer
D) Inductor

Answer: B) Circuit breaker

Explanation:
A circuit breaker automatically interrupts the circuit during overcurrent conditions.

8 Determine the output Y for the given logic circuit when A = 1, B = 0.

A) 0 B) 1
C) 2 D) Cannot be determined

Answer: B) 1

Explanation:
AND output = $A \cdot B = 1 \cdot 0 = 0$
After NOT gate, $Y = 1$.

9 A single-phase AC supply is 200 V (rms) at 50 Hz. The peak value of the voltage is:

A) 141 V B) 200 V
C) 283 V D) 400 V

Answer: C) 283 V

Explanation:
 $V_{max} = V_{rms} \sqrt{2} = 200 \times 1.414 \approx 283 \text{ V}$

10 Which renewable energy source is most suitable for charging a large-scale battery energy storage system?

A) Coal power
B) Solar photovoltaic
C) Nuclear power
D) Natural gas

Answer: B) Solar photovoltaic

Explanation:
Solar PV provides clean and intermittent renewable energy, which is effectively stored in battery energy storage systems.

1 In the circuit shown, find the current through the 4 Ω resistor.

A) 0.5 A B) 1 A
C) 1.5 A D) 2 A

Answer: A) 0.5 A

Explanation:
Each branch has 12 V across it.
Current through 4 Ω resistor, $I = V/R = 12/4 = 0.5 \text{ A}$.

2 The equivalent resistance between A and B is:

A) 6 Ω B) 8 Ω
C) 10 Ω D) 12 Ω

Answer: A) 6 Ω

Explanation:
Top branch = $4 + 8 = 12 \Omega$.
This is in parallel with 6 Ω.
 $R_{eq} = \frac{12 \times 6}{12 + 6} = 6 \Omega$.

3 In the given circuit, find the voltage V_o using voltage divider rule.

A) 2 V B) 4 V
C) 6 V D) 8 V

Answer: C) 6 V

Explanation:
 $V_o = V \times \frac{R_2}{R_1 + R_2} = 10 \times \frac{3}{2 + 3} = 6 \text{ V}$.

4 Which waveform represents a DC voltage?

Answer: A)

Explanation:
A DC voltage has constant magnitude and does not change with time.

5 A 3-phase induction motor has 4 poles and is supplied at 50 Hz. What is the synchronous speed?

A) 750 rpm B) 1000 rpm
C) 1200 rpm D) 1500 rpm

Answer: D) 1500 rpm

Explanation:
 $N_s = \frac{120 f}{P} = \frac{120 \times 50}{4} = 1500 \text{ rpm}$.

6 Which of the following is used to step up the AC voltage?

A) Autotransformer
B) Step-up transformer
C) Step-down transformer
D) Isolation transformer

Answer: B) Step-up transformer

Explanation:
A step-up transformer increases the voltage from primary to secondary side.

7 Identify the logic expression for the given circuit.

A) A OR B
B) A AND B
C) A NOR B
D) A NAND B

Answer: C) A NOR B

Explanation:
The inputs are inverted and then ORed. This is equivalent to NOR gate: $Y = \overline{A + B} = (\overline{A} \cdot \overline{B})$.

8 A capacitor of 50 μF is charged to 100 V. What is the energy stored in it?

A) 0.1 J
B) 0.25 J
C) 0.5 J
D) 1.0 J

Answer: B) 0.25 J

Explanation:
 $W = \frac{1}{2} \cdot C V^2 = \frac{1}{2} \times 50 \times 10^{-6} \times (100)^2 = 0.25 \text{ J}$.

9 Which device is used to protect electrical equipment from lightning surges?

A) MCB
B) Fuse
C) Surge arrester
D) Thermal relay

Answer: C) Surge arrester

Explanation:
A surge arrester diverts high voltage transients (such as lightning surges) to the ground, protecting equipment.

10 A 12 V, 36 W lamp is connected to a 12 V supply. What is the current drawn by the lamp?

A) 1 A
B) 2 A
C) 3 A
D) 4 A

Answer: C) 3 A

Explanation:
 $P = VI \Rightarrow I = \frac{P}{V} = \frac{36}{12} = 3 \text{ A}$.

Brain Teaser

1. What happens if an ideal transformer is connected directly to a steady DC voltage source?

- A) Works normally B) Steps up voltage C) Burns out primary winding D) Converts DC to AC

Answer: C) Burns out primary winding

2. Why can a standard synchronous motor not self-start on an AC supply without auxiliary equipment?

- A) Zero starting torque due to high inertia B) Rotor locks due to high resistance C) Counter-EMF exceeds supply voltage D) Stator magnetic field rotates too fast for stationary rotor

Answer: D) Stator magnetic field rotates too fast for stationary rotor

3. If an incandescent bulb rated at 100W, 230V is connected to a 115V DC source, what happens to its power consumption/brightness?

- A) Half brightness B) Quarter brightness C) Same brightness D) Double brightness

Answer: B) Quarter brightness

4. In an electrical circuit, if a zero-resistance wire (an ideal short) is placed directly in parallel across a resistor, what is the current flowing through that resistor?

- A) Maximum current B) Zero current C) Infinite Current D) Half the total current

Answer: B) Zero current

5. An ideal diode is connected in series with a resistor and a DC source. If it is reverse-biased, what is the voltage drop across the ideal diode?

- A) Zero volts B) Half the supply voltage C) Equal to the supply voltage D) Infinite volts

Answer: C) Equal to the supply voltage

◆ CREDITS

Editorial Team & Acknowledgements**ACKNOWLEDGEMENTS**

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