Applied Physics

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Applied Physics

COURSE OBJECTIVES

1. To impart knowledge in basic concepts of wave optics, fiber optics, properties of solid crystal materials and magnetic materials, acoustics, superconductors.
2. To familiarize the applications of materials relevant to engineering field.

COURSE OUTCOMES

After successful completion of this course, the students will be able to

CO 1: Interpret the experimental evidence of wave nature of light and interference in thin Films, Diffraction grating and Polaraisation in various fields.

CO 2: Analyse and understand various types of lasers and optical fibers.

CO 3: Identify the crystal structures and XRD techniques.

CO 4: Apply the magnetic materials in engineering field.

CO 5: Identify the various applications of semiconductors in engineering field.

Unit-1: Interference and Diffraction

Introduction -Interference in thin films by reflection - Newton's rings, introduction to diffraction - difference between Fresnel's and Fraunhofer diffraction - Fraunhofer diffraction at single slit (qualitative) - Diffraction grating.

Polarization: Introduction - Types of Polarization - Double refraction - Nicol's prism-Quarter wave plate and Half Wave plate - Applications

Unit-2: Lasers

Introduction - Characteristics of lasers - Spontaneous and Stimulated emission of radiation - Population inversion - Ruby laser - Helium Neon laser - Applications.

Fiber Optics: Introduction- Basic Structure and Principle of optical fiber - Acceptance angle - Acceptance cone - Numerical Aperture-Applications.

Unit-3: Crystallography

Introduction - Space lattice - Basis - Unit Cell - Lattice parameters - Bravais lattices - Crystal systems - Structures and packing fractions of SC,BCC and FCC.

X-Ray Diffraction: Directions and planes in crystals - Miller indices - Separation between successive (h k l) planes - Bragg's law.

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Unit-4: Electromagnetic Fields

Gauss divergence theorem - Stokes theorem (Quantitative) - Fundamental laws of electromagnetism - Maxwell's Electromagnetic Equations.

Magnetic materials: Magnetic Susceptibility- Magnetic permeability - Classification of Magnetic materials - Dia, Para, and Ferro - Hysteresis Loop- Soft and Hard magnetic materials - Applications- Superconductivity- Properties, Meissner effect - Type-I and Type-II super conductors.

Unit-5: Quantum Mechanics

Introduction - de-Broglie's concept of Matter waves - Physical significance of wave function - Schrodinger Time Independent wave equations - Particle in a one dimensional potential box.

Semiconductor Physics: Origin of energy band formation in solids- classification of materials into conductors, semiconductors and insulators, Intrinsic and Extrinsic semiconductor - Hall Effect.

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COURSE OUTCOMES

After successful completion of this course, the students will be able to:

CO 1: Recognize the experimental evidence of wave nature of light and interference in thin films, Diffraction grating and Polaraisation in various fields.

CO 2: Analyze and understand various types of lasers & optical fibers.

CO 3: Identifies the crystal structures and XRD techniques.

CO 4: Knowing the applications of magnetic and superconducting materials in engineering field.

CO 5: Identifies the use of Acoustics and Ultrasonics in engineering field.

Unit - 1

Interference & Diffraction: Introduction -Interference in thin films by reflection - Newton's rings, introduction to diffraction - difference between Fresnel's and Fraunhofer diffraction - Fraunhofer diffraction at single slit (qualitative) - Diffraction grating.

Polarization: Introduction - Types of Polarization - Double refraction - Nicol's prism-Quarter wave plate and Half Wave plate - Applications

Unit - 2

Lasers: Introduction - Characteristics of lasers - Spontaneous and Stimulated emission of radiation - Population inversion - Ruby laser - Helium Neon laser-Applications.

Fiber Optics: Introduction - Basic Structure and Principle of optical fiber - Acceptance angle - Acceptance cone - Numerical Aperture-Applications.

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Unit - 3

Crystallography: Introduction - Space lattice - Basis - Unit Cell - Lattice parameters - Bravais lattices - Crystal systems - Structures and packing fractions of SC, BCC and FCC.

X-Ray Diffraction: Directions and planes in crystals - Miller indices - Separation between successive (h k l) planes - Bragg's law.

Unit - 4

Magnetic materials: Magnetic dipole moment- Magnetization- Magnetic Susceptibility- Magnetic permeability - Classification of Magnetic materials - Dia, Para, and Ferro - Hysteresis Loop- Soft and Hard magnetic materials - Applications of Magnetic materials

Superconductivity: Introduction- Properties, Meissner effect - Type-I and Type-II super conductors- BCS theory (Qualitative) – AC and DC Josephson effects - Applications of Superconductors

Unit - 5

Acoustics: Introduction - requirements of acoustically good hall - Reverberation - Reverberation time - Sabine's formula - Absorption coefficient and its determination - Factors affecting acoustics of buildings and their remedial measures.

Ultrasonics: Introduction - Properties - Production by Magnetostriction and Piezoelectric methods – Non Destructive Testing (Qualitative) - Applications.

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Engineering Physics

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Engineering Chemistry

COURSE OBJECTIVES:

- To analyze water for its various parameters and its significance in industrial and domestic allocations.
- To acquire the knowledge on types of polymers, fuels and their applications.
- To provide information on exciting advanced materials available in engineering.
- To apply the electrochemical principles, understand the fundamentals of corrosion and development of different techniques in corrosion control.
- To learn the importance of engineering materials used in daily life and industry.

COURSE OUTCOMES

After successful completion of this course, the students will be able to:

CO 1: Analyze the suitable method of water treatment depending on the quality treatment.

CO 2: Compare different types of polymers, fuels and their importance

CO 3: Utilize the advanced materials as engineering materials and apply them in domestic and industrial life

CO 4: Distinguish electrical energy sources and importance of corrosion science

CO 5: Identify different types of engineering materials and applications in engineering.

Unit-1: Water Chemistry

Characteristics of Water: Sources, Impurities - Hardness & its units - Industrial water characteristics - Softening of water by external treatment methods (Lime soda process, Zeolite and Ion exchange process) - Numerical problems on lime soda process - Desalination of brackish water (Reverse osmosis and Electrodialysis).

Water analysis techniques: Alkalinity - hardness (Complexo-metric) - Break point chlorination - Free chlorine-DO-BOD and COD.

Unit-2: Polymers and Fuel Chemistry

Polymers: Introduction to polymers - Chain growth (free radical, ionic) - Step growth polymerization - Coordination polymerization - Copolymerization with specific examples - Thermoplastics and thermosets - Plastic moulding methods (Compression & Injection moulding) - Rubbers - Natural rubber - Processing - Vulcanization.

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Fuels: Types of fuels - Calorific valu - Numerical problems based on calorific value - Analysis c coal - Liquid fuels - Refining of petroleum - Cracking of heavy oil - Knocking and anti-knockin agents - Octane and cetane values.

Unit-3: Chemistry of Advanced Materials

Nano materials: Introduction - Sol-gel method & Chemical reduction method of preparation. Characterization by BET method and TEM methods - Carbon nano tubes and fullerenes: Types Preparation - Properties and Applications.

Liquid crystals: Introduction - Types - Applications.

Composite materials: Introduction - Definition - Types - Applications - Cermets.

Unit-4: Electrochemistry and Corrosion

Electrochemistry: Galvanic cells - Single electrode potential - Reference electrodes - Electro chemical series - Batteries (primary, secondary and fuel cells) - Applications of secondary batte ies in E-vehicles.

Corrosion: Causes and effects of corrosion - Theories of corrosion (chemical and electrochem cal corrosion) - Factors effecting corrosion - Corrosion control methods - Cathode protection Sacrificial anodic, Impressed current methods - Surface coatings - Methods of application o metals (Hot dipping, Galvanizing, Tinning, Cladding, Electroplating, Electroless plating) - Organ surface coatings - Paints - Constituents and their functions - Pigment Volume Concentration.

Unit-5: Chemistry of Engineering Materials

Lubricants: Introduction - Mechanism of lubrication - Classification of lubricants - Propertie and testing of lubricating oils.

Cement & Refractories: Manufacture - Setting and hardening of cement - Failures of cemer - Slag cement - Refractory: Introduction - Classification and properties of refractories.

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Technical and Communicative English

COURSE OUTCOMES

Learners are able to

1. Interpret explicit and implicit meaning of a text, recognize key passages; raise questions and summarize it.
2. Compose paragraphs, essays, emails, letters, reports, resume and transfer information into tables, Pie and bar diagrams.
3. Build grammatically correct sentences using a variety of sentence structures.
4. Enhance word power and usage of lexicons.

Teaching Methodology

The methodology of teaching will be chalk and talk, PPT, audio-visual, flipped class and activity based teaching.

Unit-I: A Drawer full of Happiness

a. **Listening** : Dialogues, Task based listening activities.

b. **Speaking** : Asking and answering general questions.

c. **Reading** : Skimming, Scanning.

d. **Writing** : Punctuations, Paragraphs.

e. **Grammar & Vocabulary** : Nouns, Adjuncts, GRE Vocabulary, Technical Vocabulary.

Unit-II: Nehru's Letter to daughter Indira on her Birthday

a. **Listening** : Individual and pair based listening to the audio track.

b. **Speaking** : Discussion in pairs / small groups on specific topics.

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c. **Reading** : Identifying sequence of ideas; recognising verbal techniques.

d. **Writing** : Summarising, Paraphrasing.

e. **Grammar & Vocabulary** : Articles, Adjectives, Prepositions, Verbal Competence, Synonyms & Antonyms, Analogy, GRE Vocabulary, Technical Vocabulary.

Unit-III: Stephen Hawking- Positivity 'Benchmark'

a. **Listening**: Listening for global comprehension and summarising.

b. **Speaking**: Discussing specific topics in pairs (or) small groups and reporting the discussion. Complaining, Apologising.

c. **Reading**: Reading between the lines, Critical reading for evaluation.

d. **Writing**: Official Letter writing, E-Mail etiquette, General Netiquette, Covering Letter & Resume writing.

e. **Grammar & Vocabulary** : Phrasal verbs, Verbs, Tenses (Present, Past & Future), Concord: Subject-Verb Agreement, Verbal reason, Using equivalents, Word associations, GRE Vocabulary, Technical Vocabulary.

Unit-IV: Like a Tree, Unbowed: Wangari Maathai- Biography

a. **Listening** : Making predictions while listening to conversations (or) transactional dialogue.

b. **Speaking** : Role plays for practice of conversational English in academic contexts (formal and informal) .

c. **Reading** : Information transfer (Tables, Bar Diagrams, Line Graphs, Pie Diagrams)

d. **Writing** : Interpreting visual information, Statement of Purpose (SOP)

e. **Grammar & Vocabulary** : Gender inclusive language (Gendered Noun, Gender- neutral Noun), Quantifying expressions, Adjectives, Adverbs, Degrees of comparison, GRE Vocabulary, Technical Vocabulary.

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Unit-V: "Stay Hungry, Stay Foolish"- Rushmi Bansal

a. **Listening**: Identifying key terms, understanding concepts, interpreting the concepts.

b. **Speaking**: Formal oral presentations on topics from academic contexts.

c. **Reading**: Reading comprehension, The RAP strategy for in- depth reading, Intensive reading and extensive reading.

d. **Writing**: Academic proposals, Poster presentation.

e. **Grammar & Vocabulary**: Reported Speech, Reporting verbs for academic purposes, Corrections of sentences, GRE Vocabulary, Technical Vocabulary.

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VEMU INSTITUTE OF TECHNOLOGY
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Numerical Methods and Statistics

COURSE OBJECTIVES

- To elucidate the different numerical methods to solve nonlinear algebraic equations.
- To propagate the use of different numerical techniques for carrying out numerical integration.

COURSE OUTCOMES

Upon successful completion of the course, the students should be able to

CO1: Evaluate approximating roots of polynomials and transcendental equations by different algorithms.

CO2: Apply Newton's forward backward and Lagrange's interpolation for equal and unequal intervals.

CO3: Apply different algorithms for approximating solutions of ordinary differential equation to its analytical computations.

CO4: Decide whether to accept or reject a statement about parameter in decision making problems.

Unit-I: Iteration Methods

Solution of Algebraic and Transcendental Equations: Introduction- Bisection method, Method of false position, Iteration method, Newton-Raphson method (One variable and simultaneous Equations).

Unit-II: Interpolation

Interpolation: Introduction- Errors in polynomial interpolation - Finite differences- Forward differences- Backward differences - Central differences - Symbolic relations and separation of symbols - Differences of a polynomial-Newton's formulae for interpolation - Interpolation with unequal intervals - Newton's Divided difference formula, Lagrange's interpolation formula.

Unit-III: Numerical Differenation and Integration

Numerical Differentiation, Ordinary differential equations-Taylor's series, Euler and modified Euler's methods. Runge-Kutta method of fourth order for solving first and second order equations. Numerical integration- trapezoidal rule, Simpson's 1/3rd and 3/8th rules.

Unit-IV: Sampling Distribution

Estimation: Point Estimation, Interval Estimation, Bayesian Estimation.

Unit-V: Testing of Hypothesis

Formulation of null hypothesis, critical regions, level of significance.

Large sample tests: test for single mean test for single proportion.

Small Sample tests: Student t-distribution (single mean, two means and paired t-test), Testing of equality of variances (F-test), χ^2 - test for goodness of fit, χ^2 - test for independence of attributes.

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Matrix Algebra and Calculus

(Linear Algebra & Vector Calculus)

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Matrix Algebra and Calculus

(Linear Algebra & Vector Calculus)

COURSE OUTCOMES

Upon successful completion of the course, the students should be able to

1. Solve the system of linear equations.
2. Analyze the applications of matrices in various fields and obtain Eigen values and Eigenvectors.
3. Apply the mean value theorems in calculus to Engineering problems.
4. Apply the functions of several variables to evaluate the rates of change with respect to Time and space variables in engineering.
5. Determine the area and volume by interlinking them to appropriate double and triple integrals.

Unit-I: Linear Systems of Equations

Rank of a matrix - Echelon form, Normal form, Solution of linear systems, Direct Methods, Gauss elimination, Gauss Jordon and Gauss Seidal Methods. Solutions of linear simultaneous equations: LU decomposition.

Application: Finding the current in a electrical circuit, Traffic flow

Unit-II: Eigenvalues and Eigenvectors

Eigenvalues, Eigenvectors, Properties, Cayley - Hamilton Theorem(without proof), Quadratic forms, Reduction of quadratic form to canonical form, Rank, Positive definite, negative definite, semi definite, index, signature.

Application: Finding powers and inverse of a square matrix using Cayley Hamilton's Theorem.

Unit-III: Mean Value Theorems

Review on limits and continuity, Mean Value theorems (without proofs): Rolle's theorem, Lagrange's theorem, Cauchy's theorem, Taylor's (Generalized mean value) theorem, increasing and decreasing functions, Maxima and minima of function of single variable.

Unit-IV: Partial Differention

Function of two or more variables, Partial derivatives, Total derivatives, change of variables, Jacobian - functional dependence, Taylor's theorem for Two variables, Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

Unit-V: Multiple Integrals

Double and triple integrals, Change of Variables, Change of order of Integration, volume.

Application: Momenta of Inertia.

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Matrix Algebra and Calculus

(Linear Algebra & Vector Calculus)

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Differential Equations and Vector Calculus

N. Nagarjuna

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IQAC

Principal
NARASARAOPET ENGINEERING COLLEGE
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Differential Equations and Vector Calculus

COURSE OBJECTIVES

1. To formulate and solve first order ordinary differential equations.
2. To solve second order differential equations of various kinds.
3. To find the solution of first order linear and non-linear partial differential equations.
4. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

COURSE OUTCOMES

Upon successful completion of the course, the students should be able to

1. Apply first order ordinary differential equations to real life situations. [Apply - K3]
2. Identify and apply suitable methods in solving the higher order differential equations. [Apply - K3]
3. Solve the partial differentiation equations. [Apply - K3]
4. Interpret the physical meaning of different operators as gradient, curl and divergence. [Understanding - K3]
5. Estimate the work done against a field, circulation and flux using vector calculus. [Evaluating - K5]

Unit-I: Differential Equations of First order and First Degree

Linear-Bernoulli's-Exact equations and equations reducible to exact form.

Applications: Newton's Law of cooling, Law of natural growth and decay, Orthogonal trajectories, Electrical circuits.

Unit-II: Linear Differential Equations of Higher Order

Finding the complementary functions, Inverse operator, Rules for finding the particular integrals; Method of variation of parameters. Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients.

Application: L-C-R Circuit problems.

Unit-III: First Order Partial Differential Equations

Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange's) equations.

Unit-IV: Vector Differentiation

Scalar and vector point functions, vector operator del, del applies to scalar point functions- Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

Unit-V: Vector Integration

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

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Differential Equations and Vector Calculus

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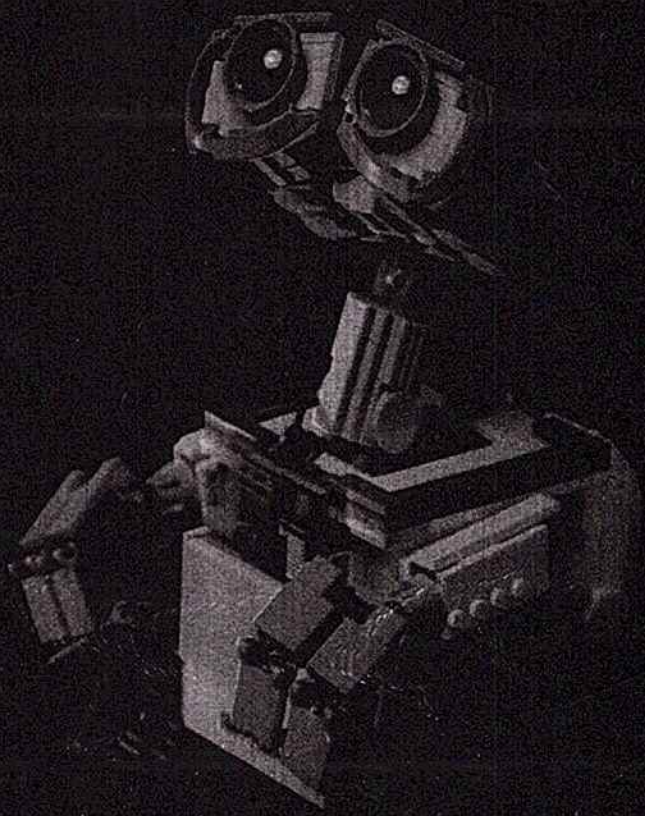

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Making this book a reality has been a challenging task. At this juncture, I deeply remember my Father, S.Mahaboob vali & my Mother Late.Syed Aktharunnisa Bibi. My parents spent their life time in making me what I am today.

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Ms. E. V. Santhi

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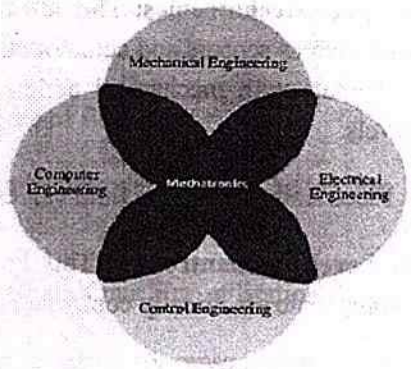
1. MECHATRONICS

1.1 INTRODUCTION

Mechatronics is a concept of Japanese origin (1980's) and can be defined as the application of electronics and computer technology to control the motions of mechanical systems.

Mechatronics is the combination of mechanical engineering (mecha from mechanisum), Electronic engineering (tronics from electronics) and software engineering.

It is a multidisciplinary approach to product and manufacturing system design (Figure). It involves application of electrical, mechanical, control and computer engineering to develop products, processes and systems with greater flexibility, ease in redesign and ability of reprogramming. It concurrently includes all these disciplines.



Mechatronics: A multi-disciplinary approach

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COMPUTER NETWORK AND SECURITY

Dr. Ratnababu Pilli

M. Pavithra

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Dr. MD. Javeed Ahammed

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Preface

It is never impossible for a hacker to break into a computer system, only improbable.

Computer hackers routinely break into corporate, military, online banking, and other networked environments. A systems generally become more secure, the methods used by the attackers are becoming more advanced, involving intricate repositioning, social engineering, physical compromise (stealing disks from servers or installing rogue wireless access points), and use of specific zero-day exploits to attack peripheral software components such as antivirus or backup solutions that are widely deployed internally within corporate networks.

This book will clearly explain the cryptography concepts, various network security issues and how the issues can be solved by using various approaches. It explains the layer wise security issues and solving the issues by various approaches.

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I would like to thank my Father Mr. Punnaiah, Mother, Dhanalakshimi Wife Mrs. Mary Veronica my son Joel, and Daughter NofiPravya for their constant encouragement and moral support throughout the challenging task of creating this book.

Also, I wish to thank everyone in my Lovely Family and my Friends for their support in helping me to develop this book.

I would like to take this occasion to thank my Head of the Institution, Head of the Department and my Colleagues for their Inspiration, Support & Motivation to write this book.

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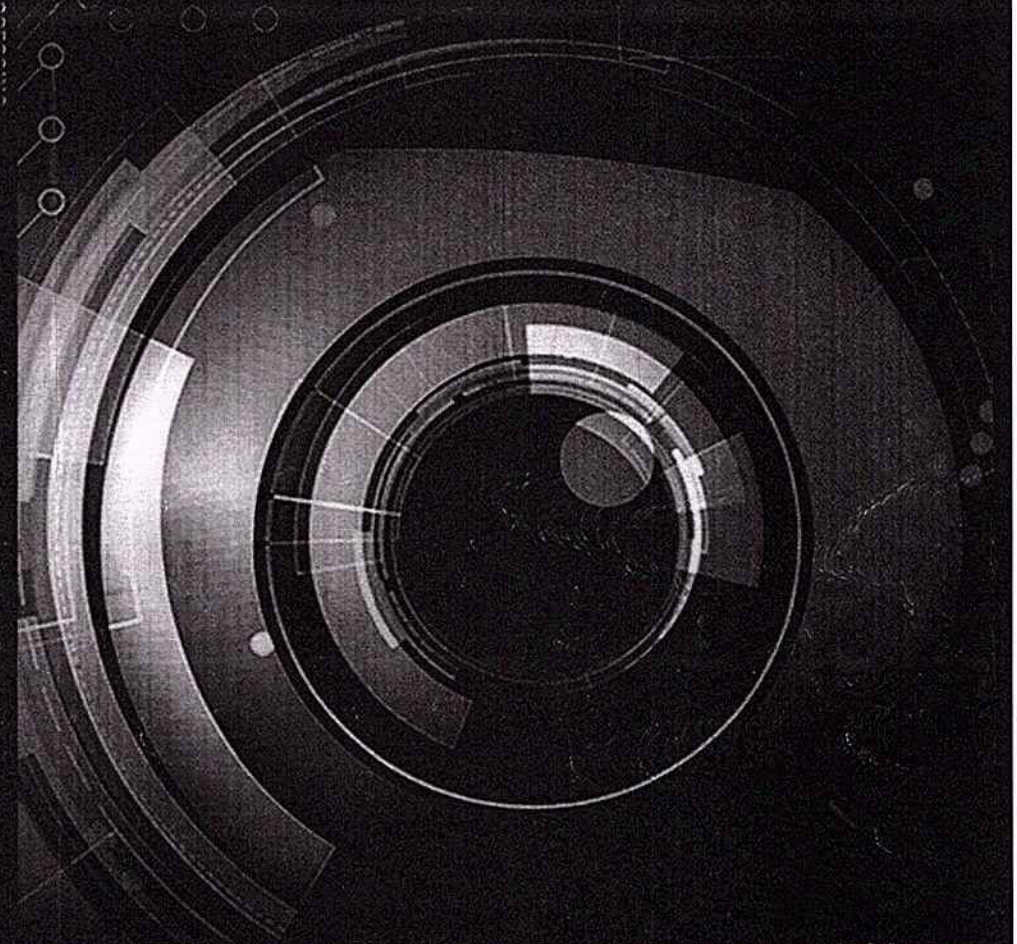

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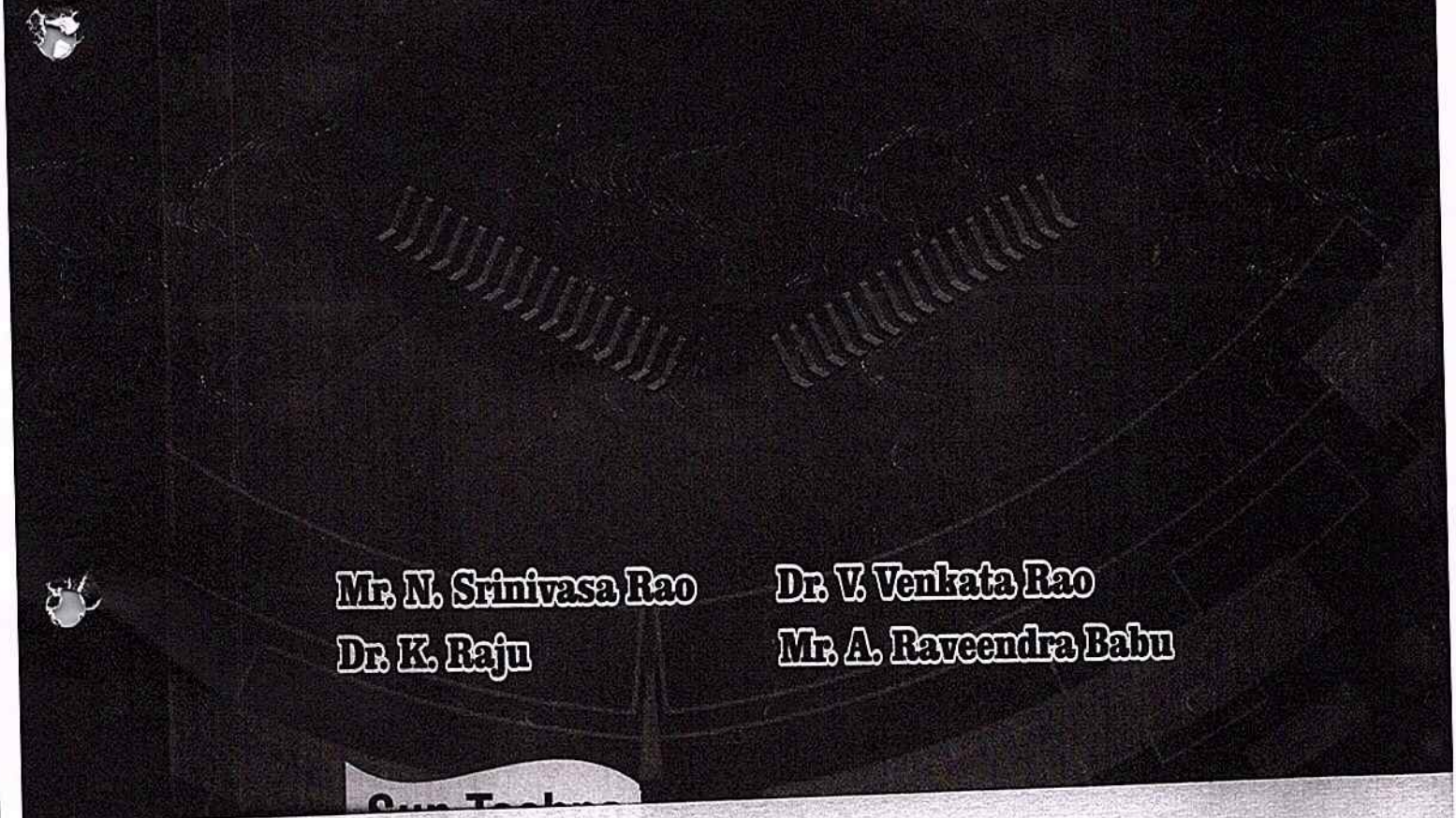

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Electronic Devices and Logic Design

COURSE OBJECTIVES

- To discuss the characteristics of semiconductor diodes.
- To illustrate the different types of Transistors and their applications.
- To demonstrate the basics of Boolean algebra and reduction techniques.
- To design of combinational circuits.
- To design sequential circuits like registers and counters.

COURSE OUTCOMES

After completion of this course, the students will be able to

CO1: Apply P-N diodes and Special diodes in electronic circuits.[K3]

CO2: Compare different types of transistors (BJT, FET and MOSFET) with their working principles.[K2]

CO3: Make use of Boolean algebra and K-map and to minimize combinational functions.[K3]

CO4: Develop combinational circuits and sequential circuits.[K3]

CO5: Construct different types of registers and counters.[K3]

Unit-I: Junction Diode Characteristics — Part - A

Open circuited PN Junction, Forward and Reverse bias, V-I characteristics, Applications of Diode - Switch, Rectifiers (without and with filters), Zener Diode characteristics, Zener as voltage regulator, LED.

Unit-II: Transistors

BJT, Configuration of BJT, Input and Output Characteristics of CB, CE and CC Configuration, JFET, MOSFETs - Construction, Characteristics and Applications, Comparison between BJT and JFET, Comparison between JFET and MOSFET.

Unit-III: Number Systems, Logic Gates and Boolean Algebra — Part - B

Binary, Octal, Decimal and Hexadecimal Number Systems, Conversion of Numbers from one Radix to another Radix, 1's Complement and 2's Complement.

Basic Gates- AND, OR and NOT, Universal Gates- NAND and NOR, EX-OR and EX-NOR Gates, De-Morgan's Laws, Minimization of Logic Functions using Boolean Theorems and Karnaugh map method.

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Dr.R.Sambasiva Nayak

Digital Signal Processing

Principles and Applications

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DIGITAL SIGNAL PROCESSING

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DIGITAL SIGNAL PROCESSING

SYLLABUS

UNIT I

Introduction to Digital Signal Processing: Introduction to Digital Signal Processing: Discrete Time Signals & Sequences, Linear Shift Invariant Systems, Stability, and Causality.

Realization of Digital Filters: Solution of Difference Equations Using Z-Transform, Realization of Digital Filters - Direct, Canonic forms.

UNIT II

Discrete Fourier Transforms: Properties of DFT. Linear Convolution of Sequences using DFT. Computation of DFT: Over-lap Add Method, Over-lap Save Method.

Fast Fourier Transforms: Fast Fourier Transforms (FFT) - Radix-2 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse FFT.

UNIT III

IIR Digital Filters: Analog Filter Approximations - Butterworth and Chebyshev, Design of IIR Digital filters from Analog Filters, Bilinear Transformation Method.

UNIT IV

FIR Digital Filters: Characteristics of FIR Digital Filters. Design of FIR Filters: using Window Techniques, Comparison of IIR & FIR filters.

UNIT V

Multirate Digital Signal Processing: Introduction, Down sampling, Decimation, Up sampling, Interpolation, Sampling Rate Conversion, Applications of Multi Rate Signal Processing.

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UNIT I: INTRODUCTION TO DIGITAL SIGNAL PROCESSING

1.1 INTRODUCTION

Signals constitute an important part of our daily life. Anything that carries some information is called a signal. A signal is defined as a single-valued function of one or more independent variables which contain some information. A signal is also defined as a physical quantity that varies with time, space or any other independent variable. A signal may be represented in time domain or frequency domain. Human speech is a familiar example of a signal. Electric current and voltage are also examples of signals. A signal can be a function of one or more independent variables. A signal may be a function of time, temperature, position, pressure, distance etc. If a signal depends on only one independent variable, it is called a one- dimensional signal, and if a signal depends on two independent variables, it is called a two- dimensional signal.

A system is defined as an entity that acts on an input signal and transforms it into an output signal. A system is also defined as a set of elements or fundamental blocks which are connected together and produces an output in response to an input signal. It is a cause-and- effect relation between two or more signals. The actual physical structure of the system determines the exact relation between the input $x(n)$ and the output $y(n)$, and specifies the output for every input. Systems may be single-input and single-output systems or multi-input and multi-output systems.

Signal processing is a method of extracting information from the signal which in turn depends on the type of signal and the nature of information it carries. Thus signal processing is concerned with representing signals in the mathematical terms and extracting information by carrying out algorithmic operations on the signal. Digital signal processing has many advantages over analog signal processing. Some of these are as follows:

Digital circuits do not depend on precise values of digital signals for their operation. Digital circuits are less sensitive to changes in component values. They are also less sensitive to variations in temperature, ageing and other external parameters.

In a digital processor, the signals and system coefficients are represented as binary words. This enables one to choose any accuracy by increasing or decreasing the number of bits in the binary word.

Digital processing of a signal facilitates the sharing of a single processor among a number of signals by time sharing. This reduces the processing cost per signal.

Digital implementation of a system allows easy adjustment of the processor characteristics during processing.

Linear phase characteristics can be achieved only with digital filters. Also multirate processing is possible only in the digital domain. Digital circuits can be connected in cascade without any loading problems, whereas this cannot be easily done with analog circuits.

Storage of digital data is very easy. Signals can be stored on various storage media such as magnetic tapes, disks and optical disks without any loss. On the other hand, stored analog signals deteriorate rapidly as time progresses and cannot be recovered in their original form.

Digital processing is more suited for processing very low frequency signals such as seismic signals.

Though the advantages are many, there are some drawbacks associated with processing a signal in digital domain. Digital processing needs 'pre' and 'post' processing devices like analog-to-digital and digital-to-analog converters and associated reconstruction filters. This increases the complexity of the digital system. Also, digital techniques suffer from frequency limitations. Digital systems are constructed using active devices which consume power whereas analog processing algorithms can be implemented using passive devices which do not consume power. Moreover, active devices are less reliable than passive components. But the advantages of digital processing techniques outweigh the disadvantages in many applications. Also the cost of DSP hardware is decreasing continuously. Consequently, the applications of digital signal processing are increasing rapidly.

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DIGITAL SIGNAL PROCESSING

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Signals and Systems

Fourier Transform, Linear Systems, Convolution & Correlation

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SIGNALS AN

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UNIT I: INTRODUCTION TO SIGNALS Ele
Discrete Time (DT) signals, Classification of Signals
Representation of Fourier series, Continuous time per
Fourier Series, Exponential Fourier Series, Properties

UNIT II: FOURIER TRANSFORMS Deriving Fou
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Sampling theorem – Graphical and analytical proof fo
and Flat top Sampling, Reconstruction of signal from i

UNIT III: SIGNAL TRANSMISSION THROUGI
Classification of Systems, Linear Time Invariant (LTI
of a LTI system. Filter characteristics of linear syste
Signal bandwidth, System bandwidth, Ideal LPF, HPF,

UNIT IV : CONVOLUTION AND CORRELATIO
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density spectrum, Parseval's theorem, Power densit
correlation.

UNIT V : LAPLACE TRANSFORMS Review o
Concept of region of convergence (ROC) for Laplace
L.T's, and F.T. of a signal.

Z–TRANSFORMS : Concept of Z- Transform of
Fourier and Z transforms, Region of convergence in Z-T
Z-transforms.

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SIGNALS AND SYSTEMS

SYLLABUS

UNIT I: INTRODUCTION TO SIGNALS Elementary Signals - Continuous Time (CT) signals, Discrete Time (DT) signals, Classification of Signals, Basic Operations on signals. FOURIER SERIES: Representation of Fourier series, Continuous time periodic signals, Dirichlet's conditions, Trigonometric Fourier Series, Exponential Fourier Series, Properties of Fourier series, Complex Fourier spectrum.

UNIT II: FOURIER TRANSFORMS Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Properties of Fourier transforms. SAMPLING: Sampling theorem – Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing.

UNIT III: SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS Introduction to Systems, Classification of Systems, Linear Time Invariant (LTI) systems, impulse response, and Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics.

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UNIT IV : CONVOLUTION AND CORRELATION OF SIGNALS Concept of convolution in time domain, Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between convolution and correlation.

UNIT V : LAPLACE TRANSFORMS Review of Laplace transforms, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, Properties of L.T's relation between L.T's, and F.T. of a signal.

Z–TRANSFORMS : Concept of Z- Transform of a discrete sequence. Distinction between Laplace, Fourier and Z transforms, Region of convergence in Z-Transform, Inverse Z- Transform, and Properties of Z-transforms.

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Unit I

INTRODUCTION TO SIGNALS :

1.1 INTRODUCTION

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variables which contain some information A sign
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one or more independent variables. A signal may be
pressure, distance, etc. If a signal depends on only
one-dimensional signal, and if a signal depends on
two-dimensional signal. In this book we discuss on
chapter we discuss about various basic signals av
classification of signals.

1.2 REPRESENTATION OF DISCRETE-TI

In general signals may be continuous-time signals
signals are defined for all instants of time, whereas
discrete instants of time. Continuous-time signals a
signals are represented by $x(n)$ where t and n are
Continuous-time signals are represented by a functi

There are four ways of representing discrete-ti

1. Graphical representation
2.
3. Tabular representation
4.

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1

1.2.1 Graphical Representation

Consider a signal $x(n)$ with values

$x(-2) = -3$, $x(-1) = 2$, $x(0) = 0$, $x($

This discrete-time signal can be represented graphi

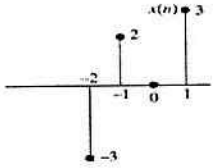

Figure 1.1 Graphical representati

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Electronic Devices and Logic Design

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COURSE OBJECTIV

- To discuss the chara
- To illustrate the diffe
- To demonstrate the b
- To design of combina
- To design sequential

COURSE OUTCOMES

After completion of this co

CO1: Apply P-N diodes

CO2: Compare differen principles.[K2]

CO3: Make use of Boole

CO4: Develop combinati

CO5: Construct different

Unit-I:

Open circuited PN Junction, ode - Switch, Rectifiers (witl regulator, LED.

BJT, Configuration of BJT, I JFET, MOSFETs - Constructi JFET, Comparison between J

Unit-III: Number Sys

Binary, Octal, Decimal and H Radix to another Radix, 1's Co

Basic Gates- AND, OR and N Gates, De-Morgan's Laws, Mini map method.

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Electronic Devices and Logic Design

COURSE OBJECTIVES

- To discuss the characteristics of semiconductor diodes.
- To illustrate the different types of Transistors and their applications.
- To demonstrate the basics of Boolean algebra and reduction techniques.
- To design of combinational circuits.
- To design sequential circuits like registers and counters.

COURSE OUTCOMES

After completion of this course, the students will be able to

CO1: Apply P-N diodes and Special diodes in electronic circuits.[K3]

CO2: Compare different types of transistors (BJT, FET and MOSFET) with their working principles.[K2]

CO3: Make use of Boolean algebra and K-map and to minimize combinational functions.[K3]

CO4: Develop combinational circuits and sequential circuits.[K3]

CO5: Construct different types of registers and counters.[K3]

Unit-I: Junction Diode Characteristics — Part - A

Open circuited PN Junction, Forward and Reverse bias, V-I characteristics, Applications of Diode - Switch, Rectifiers (without and with filters), Zener Diode characteristics, Zener as voltage regulator, LED.

Unit-II: Transistors

BJT, Configuration of BJT, Input and Output Characteristics of CB, CE and CC Configuration, JFET, MOSFETs - Construction, Characteristics and Applications, Comparison between BJT and JFET, Comparison between JFET and MOSFET.

Unit-III: Number Systems, Logic Gates and Boolean Algebra — Part - B

Binary, Octal, Decimal and Hexadecimal Number Systems, Conversion of Numbers from one Radix to another Radix, 1's Complement and 2's Complement.

Basic Gates- AND, OR and NOT, Universal Gates- NAND and NOR, EX-OR and EX-NOR Gates, De-Morgan's Laws, Minimization of Logic Functions using Boolean Theorems and Karnaugh map method.

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Electronic Devices and Circuits

COURSE OBJECTIVES

1. Understand the operation and principles of P-N diode.
2. Understand various types of Special diodes, rectifiers and filters.
3. Know the working of BJT.
4. Know the need for transistor biasing and stabilization.
5. Know the working of FET and other Transistors.

COURSE OUTCOMES

After completion of the course, students will be able to

CO1: Use P-N diodes in electronic circuits.

CO2: Use special diodes and rectifiers in electronic circuits.

CO3: Explore the operation of BJT and its applications.

CO4: Analyse the thermal stability of BJT.

CO5: Explore the operation of FET, other transistors and their applications.

Unit-I: P-N Junction Diode Characteristics

Insulators, Semiconductors and Metals - Classification using Energy gap, Intrinsic and Extrinsic Semiconductors. P-N Junction Diode - Formation of P-N Junction, Open Circuited P-N Junction, Biased P-N Junction - Forward Bias, Reverse Bias, Current Components in PN Junction Diode, Law of Junction, Diode Current Equation - Quantitative Analysis, V-I Characteristics of Diode - Forward Bias, Reverse Bias, Breakdown in P-N Junction Diode, Temperature Dependence on V-I Characteristics, Diode Resistance-Static Resistance, Dynamic Resistance, Reverse Resistance, Diode Capacitance - Transition Capacitance, Diffusion Capacitance, Energy Band Diagram of PN Junction Diode.

Unit-II: Special Diodes and Rectifiers

Special Diodes: Zener Diode - V-I Characteristics, Applications, Breakdown Mechanisms - Zener Breakdown and Avalanche Breakdown, Construction, Operation, Characteristics and applications of LED, LCD, Photodiode, Varactor Diode and Tunnel diode.

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Unit-I

Semiconductor and Junction Diode Characteristics: Qualitative Theory of P-N junction, P-N Junction as Diode, Current Components in a Diode, Quantitative theory of diode equation, Volt-Ampere Characteristics, Diode Resistance, Quantitative theory of transition and Diffusion Capacitance, Break down in a diode, Problems.

Special Devices: Operation and Characteristics of Zener diode, Tunnel Diode, Varactor Diode, Photo Diode, PIN Diode, LED and SCR.

Unit-II

Rectifiers and Filters: Introduction to power supplies, Rectifiers-Qualitative treatment of Half wave rectifier, Qualitative treatment of Full wave rectifier, Quantitative treatment Bridge rectifier and related problems.

Filters and Regulators: Introduction to Filters, Types of filters and their significance, Qualitative treatment of Capacitive filter, Inductor Filter, L-section, π-section single and multiple, Voltage Regulator using Zener diode, Related Problems.

Unit-III

Bipolar Junction Transistor, Biasing and Stabilization: Introduction to Bipolar Transistor, Construction Operation of BJT, Working of P-N-P and N-P-N Transistors, BJT as Amplifier and Switch, Transistor Current Components - Input and Output Characteristics of BJT in CE, CB,CC Configurations, Relation between α, β, γ.

Stabilization & Biasing: BJT Biasing Techniques, Need for Biasing, Operating Point, DC & AC Load Line Analysis, Types of Biasing, Stability Factors of Biasing, Thermal Runaway, Heat Sinks, Thermal Stabilizations, Diode Compensation Techniques.

Unit-IV

Junction Field Effect Transistor & MOSFET's: Introduction to J-FET, Types of J-FET, V-I Characteristics of J-FET in CS configuration, FET as an amplifier, J-FET Biasing.

MOSFET's: MOSFET's Construction, Operation & Characteristics Enhancement & Depletion Mode, MOSFET, UJT Construction, working and its characteristics. UJT as Relaxation Oscillator.

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Electronic Devices and Circuits

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Chapter-I

Semiconductor and Junction Diode Characteristics

Semiconductor and Junction Diode Characteristics

Qualitative Theory of P-N junction, P-N Junction as Diode, Current Components in a Diode, Quantitative theory of diode equation, Volt-Ampere Characteristics, Diode Resistance, Quantitative theory of transition and Diffusion Capacitance, Break down in a diode, Problems.

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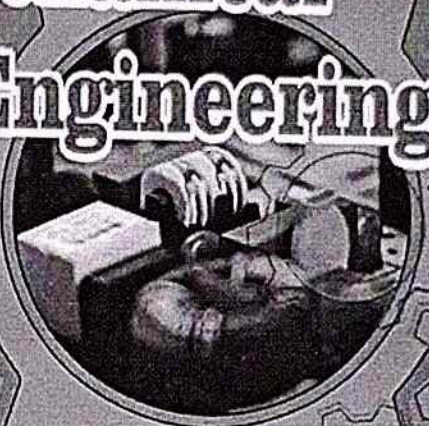



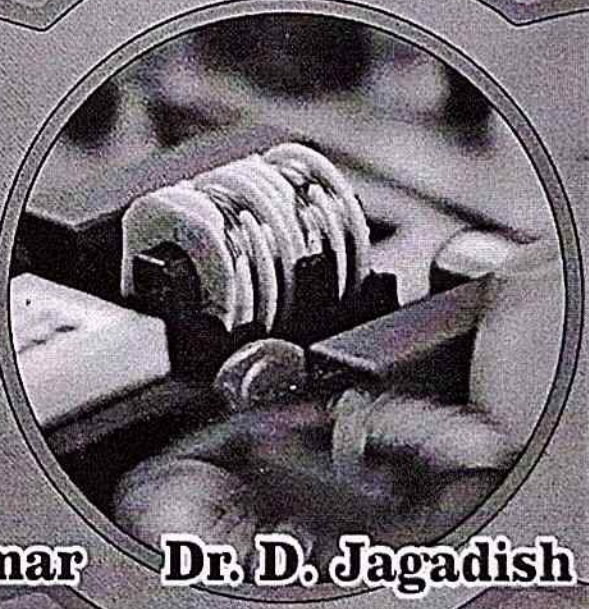

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Elements of Mechanical and Electrical Engineering

COURSE OBJECTIVES

- To provide required knowledge on joining, forming, welding and power transmissions.
- To provide required knowledge on power plants and gas turbines.
- To familiarize with the basic DC network.
- To explain the concepts of electrical machines and their characteristics

COURSE OUTCOMES

After successful completion of this course, the students will be able to:

- Illustrate the types of power plants and applications.
- Demonstrate various methods of joining and material processing.
- **Analyze** the behaviour of an electrical circuit.
- **Measure** the performance quantities such as losses, efficiency of DC machines.

Unit-I

Heat Power Generation: Introduction, Steam power generation- Basic cycle, applications. Internal combustion Engines-Classification, applications, Gas turbine-Basic cycle, components of a gas turbine, Types of fuels, Refrigeration cycles-Basics, VCR system.

Unit-II

Power Transmission: Different types of power transmission-belt drives, rope drives, chain drives. Gears:-Classification of gears, applications.

Unit-III

Joining and Forming Processes: Types of joining-Arc welding, Resistance welding, Gas welding, Brazing and Soldering, Metal forming-Forging, Rolling, Extrusion operations.

Basic laws and Circuits: Active and passive elements-voltage-current-power-power factor-energy-Ohms law-Kirchhoff's Laws-series and parallel circuits-source transformations-delta-wye conversion.

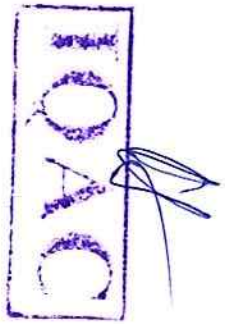
Unit-IV

DC Machines: Principle Operation-Constructional features-induced EMF-Types of DC generators-Working of DC motor-Torque expression-3point starter-Speed controls-Losses and Efficiency by direct loading.

Unit-V

Transformers: Constructional details-working principle-EMF equation-voltage regulation-losses and efficiency-open/short circuit tests.

Induction Motors: 3 - Phase Induction motor Construction-working principle - Types - slip - Performance characteristics - 1 - phase Induction motor working principle-applications





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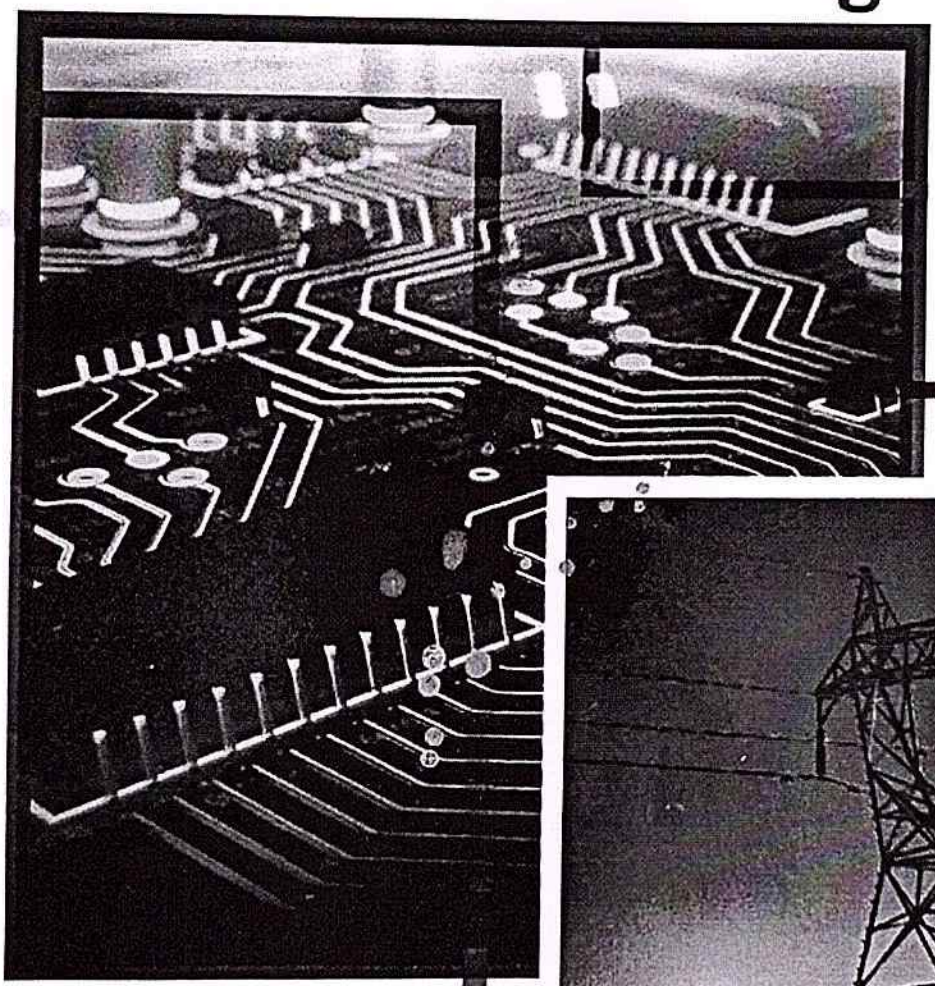

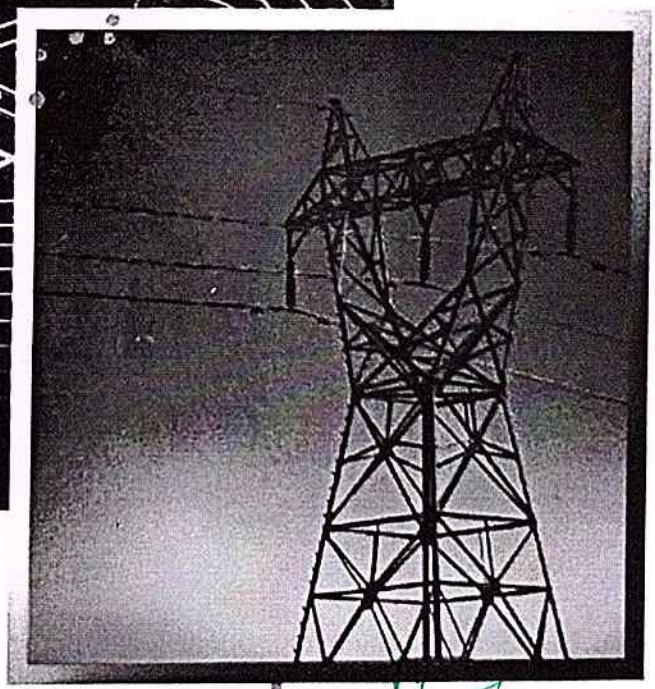

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Elements of Electrical and Electronics Engineering

COURSE OBJECTIVES

- To familiarize with the basic DC network.
- To explain the concepts of electrical machines and their characteristics.
- To identify the importance of transformers and induction motor.
- To impart knowledge about the characteristics of semiconductor devices.
- To expose basic concepts and applications of Transistor.

COURSE OUTCOMES

After successful completion of this course, the students will be able to:

CO 1: Analyze the behaviour of an electrical circuit.

CO 2: Measure the performance quantities such as losses, efficiency of DC machines

CO 3: Create the construct of transformer and Induction motor

CO 4: Classify the importance and applications of p-n junction diode.

CO 5: Evaluate the configurations and applications of Transistor.

Unit-I: Basic Laws and Circuits

Active and passive elements-voltage - current - power - power factor-energy - Ohms law-Kirchhoff's Laws-series and parallel circuits-source transformations-delta-wye conversion.

Unit-II: DC Machines

Principle Operation - Constructional features-induced EMF - Types of DC generators - Working of DC motor - Torque expression-3 point starter-Speed controls - Losses and Efficiency by direct loading.

Unit-III: Transformers and Induction Motors

Transformers: Constructional details - working principle-EMF equation - voltage regulation - losses and efficiency - open/short circuit tests.

Induction Motors: 3-Phase Induction motor Construction - working principle - Types - slip-Performance characteristics - 1- phase Induction motor working principle - applications

Unit-IV: Semiconductor Devices

Introduction-Bonds-extrinsic-intrinsic-p-n Junction diode-current and voltage characteristics-rectifier circuits-half wave-full wave-bridge rectifier - Zener diode as Voltage Regulator - Characteristics of operation amplifiers (OP-AMP) - application of OP-AMPs (inverting, non-inverting, integrator and differentiator)

Unit-V: Transistor Configurations

Transistor Configurations: Construction - working - Transistor as amplifier - Transistor as switch - Analysis of CE, CB and CC Characteristic's-Comparison of CE, CB and CC configurations.

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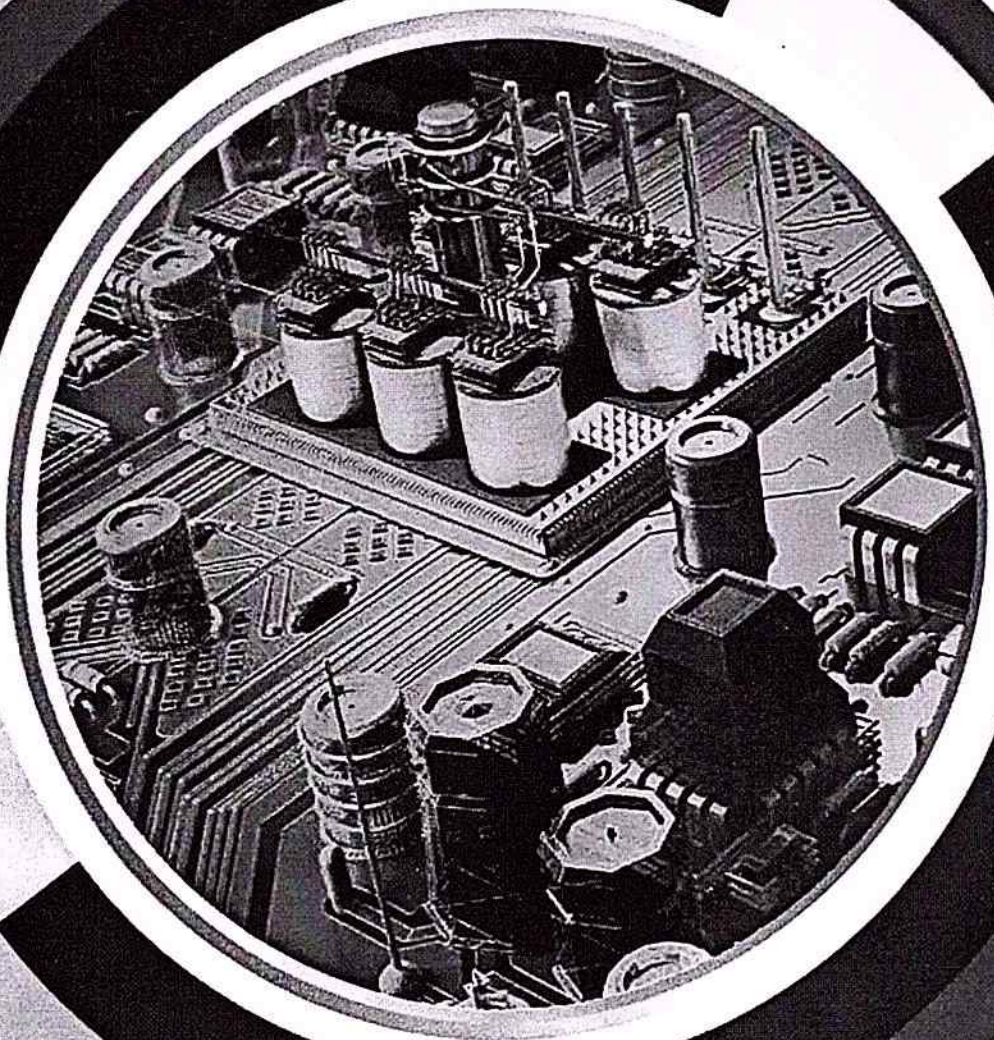

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Electrical Circuit Analysis - I

COURSE OBJECTIVES

1. To introduce fundamental laws, basic electrical elements, sources and their characteristics.
2. To learn the concept of phase and phase relationship of basic electrical elements.
3. To impart the basic knowledge about the Resonance and coupled circuits
4. To compute electrical parameters like current, voltage and power using network theorems for AC and DC circuits.

COURSE OUTCOMES

After successful completion of this course, the students will be able to:

CO 1: Analyze basic electrical circuits using mesh and nodal analysis.

CO 2: Illustrate phase and phase relationship of basic electrical elements and circuits.

CO 3: Design of tank circuit for given frequency and analyse the coupled circuits.

CO 4: Analyze the electrical circuits using network theorems for D.C. excitation.

CO 5: Analyze the electrical circuits using network theorems for A.C. excitation.

Unit-I: Introduction to Electrical Circuits

Passive components and their V-I relations. Sources (dependent and independent), Ohm's Law-Kirchhoff's laws, Network reduction techniques (series, parallel, series - parallel, star- to-delta and delta-to-star transformation). Source transformation technique, nodal analysis, mesh analysis, super node and super mesh analysis for D.C. excitations.

Unit-II: Single Phase A.C. Circuits

Periodic waveforms (determination of rms, average value and form factor). Concept of phase and phase difference. Complex and polar forms of representations, steady state analysis of R, L and C circuits with sinusoidal excitation, Power Factor and its significance, Real, Reactive power and apparent Power.

Unit-III: Resonance and Coupled Circuits

Series and parallel resonance - Q factor and bandwidth - Resonant frequency of a tank circuit - Coupled circuits - Self and mutual inductances - Coefficient of Coupling - Analysis of coupled circuits - Dot rule for coupled circuits - Equivalent circuit of coupled circuits - Coupled circuits in Series and Parallel.

Unit-IV: Network Theorems (DC Excitation)

Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman's theorem, Tellegen's theorem and compensation theorem.

Unit-V: Network Theorems (AC Excitation)

Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman's theorem, Tellegen's theorem and compensation theorem.

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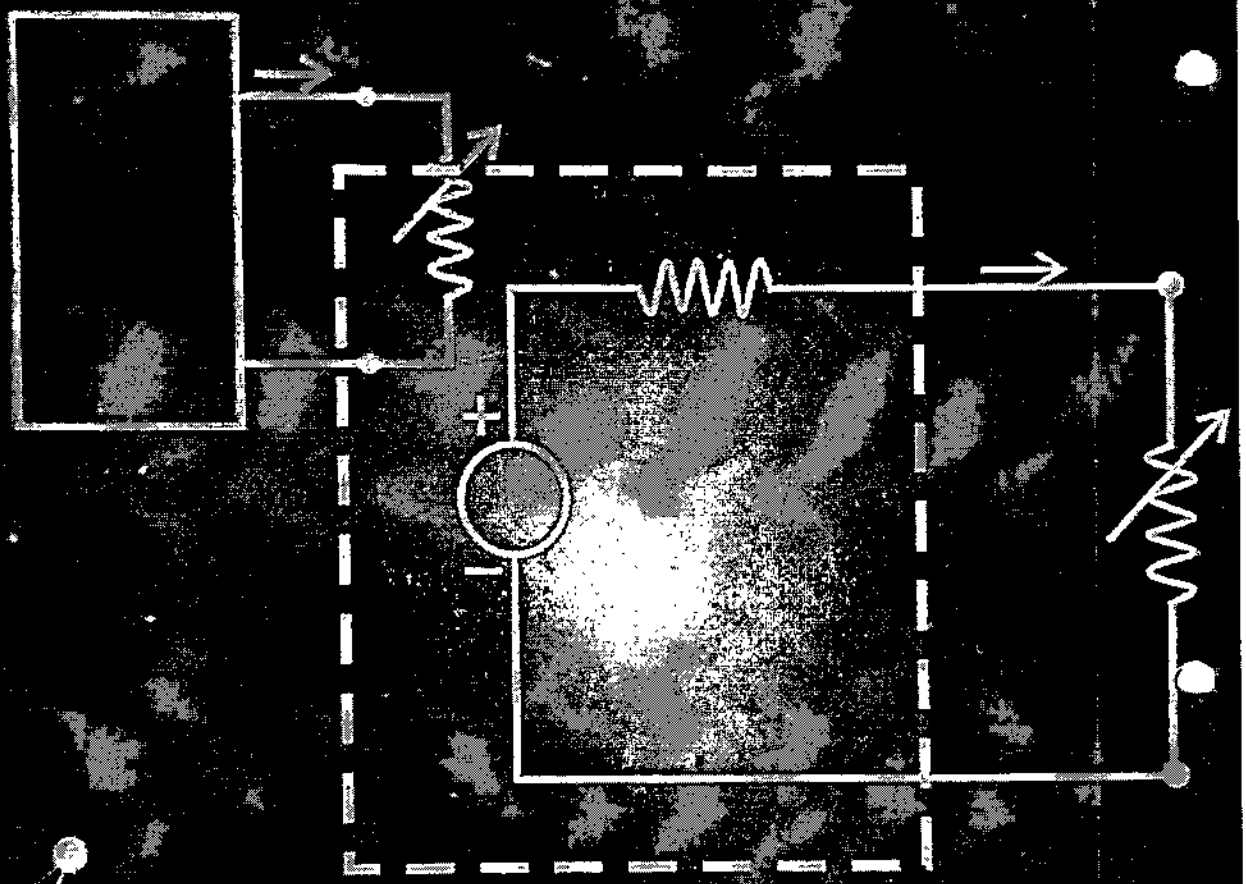

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COURSE OBJECTIVES

- To make understand the concepts of Electric Circuits, Network Theorems and the transients.
- To impart the concept of steady state and applying phasor analysis to AC circuits and analysing magnetic coupled circuits.
- To familiarize resonant circuits, two port network parameters.

COURSE OUTCOMES

After successful completion of this course, the students will be able to:

CO 1: Analyze the basics of electrical circuits with nodal, mesh analysis and network theorems.

CO 2: Apply Laplace Transform for steady state and transient analysis

CO 3: Analyze the phasor representation for ac circuits and magnetic coupled circuits.

CO 4: Describe resonance circuits, two port network parameters and their interconnections.

Unit-I: Introduction to Electrical Circuits

Electric charge and current, Electric energy and potential, Network elements classification, Energy sources: Ideal, Non-ideal, Independent and dependent sources, Source transformation, Y to Δ & Δ to Y conversion, Problem solving using Kirchhoff's laws, Mesh analysis and Nodal analysis.

Unit-II: A.C. Fundamentals

Definitions of terms associated with periodic functions: Time period, Angular velocity and frequency, RMS value, Average value, Form factor and peak factor, Phase angle, Phasor representation, Addition and subtraction of phasors. Concept of self, mutual inductance, co-efficient of coupling, dot convention rules and analysis of simple circuits – simple problems.

Unit-III: Steady State Analysis of A.C. Circuits & Theorems

Response to sinusoidal excitation - pure resistance, pure inductance, pure capacitance, impedance concept, series RL, RC and RLC circuits, parallel RL, RC and RLC with complex impedance and phasor notation. Thevinin's, Norton's, Superposition, Max Power Transfer theorems, simple problems.

Unit-IV: Resonance & Two Port Networks

Series resonance, Parallel resonance, concept of band width and Q factor. Z-parameters, Y parameters, Transmission line parameters, H-parameters, Relationship between parameter sets.

Unit-V: Transient Analysis

First order differential equations, homogeneous and non-homogeneous equations, evaluating initial conditions, RL circuit, RC circuit with DC excitation, second order differential equations, applications of Laplace transform to electrical circuits, problem only on DC excitation.

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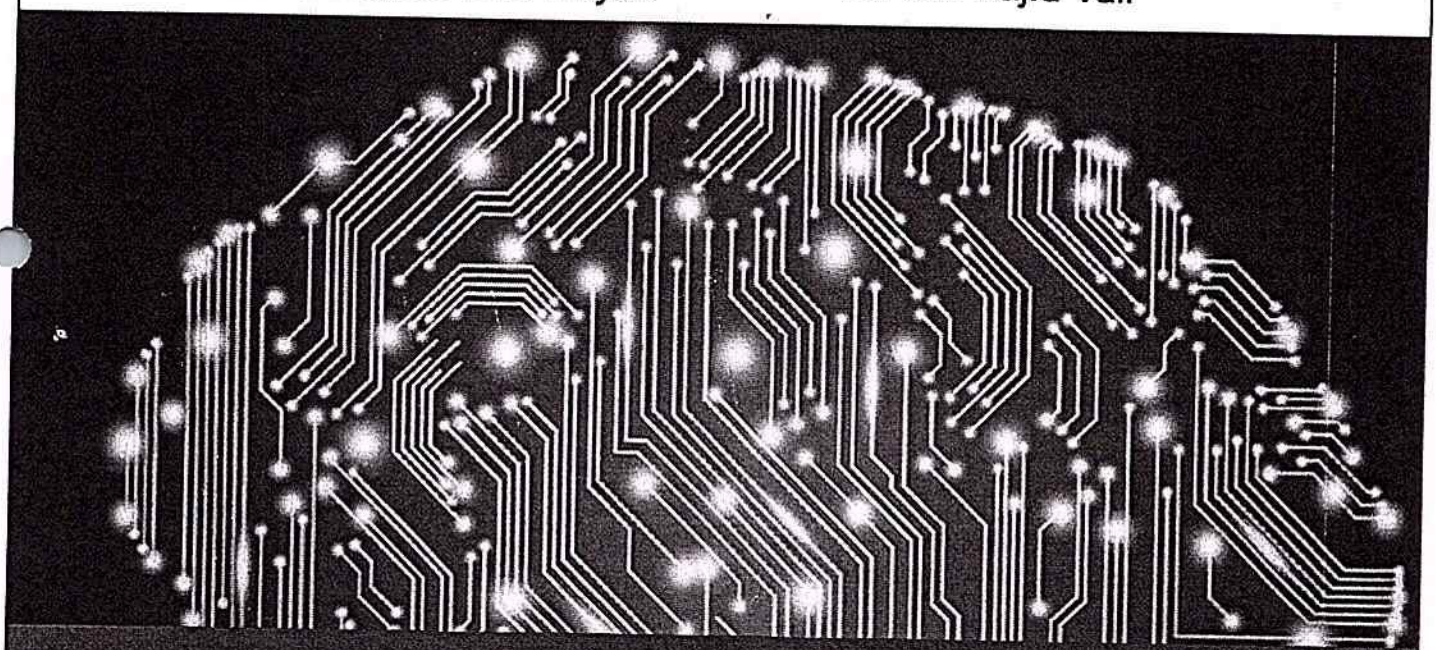

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from Narasaraopeta Engineering College

Participated/ Presented a paper entitled with OCR Based FASTag using Raspberry Pi in the Virtual - International Conference on Advances in Signal Processing and Communications– 2K21 (NEC ICASPC-2K21) held at Department of Electronics and Communication Engineering, Narasaraopeta Engineering College, Narasaraopet during 23rd & 24th July, 2021

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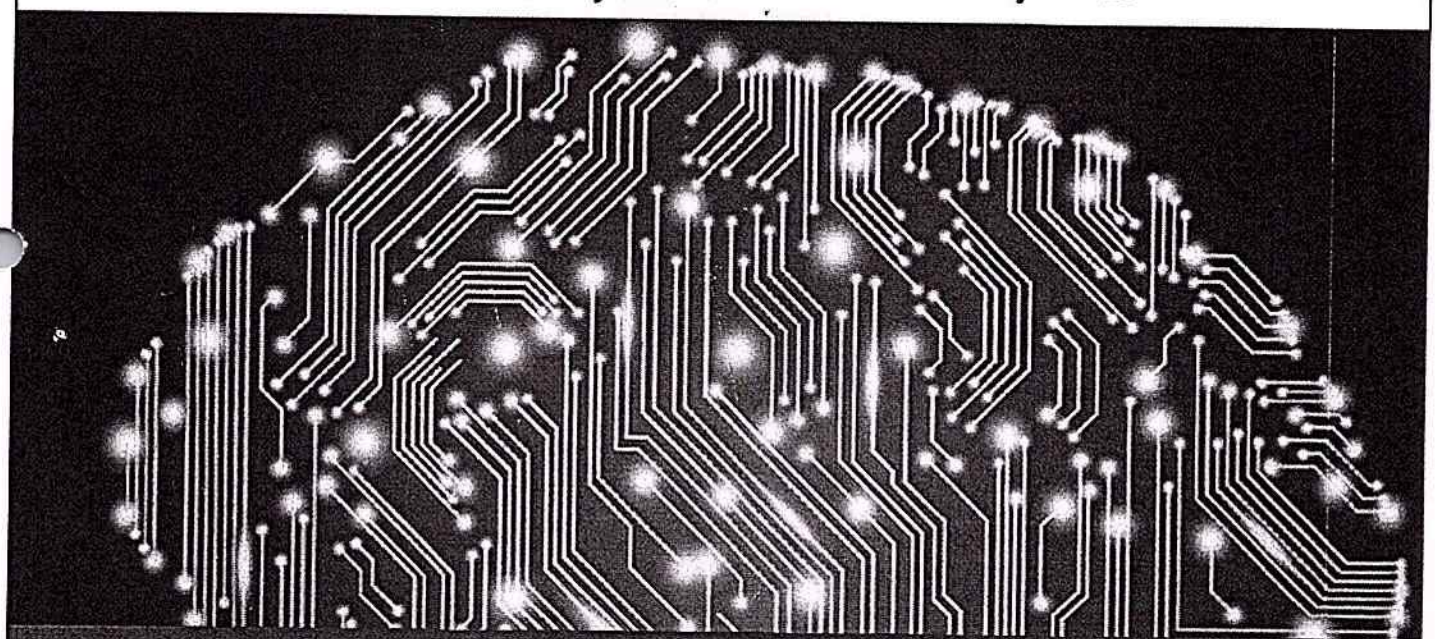

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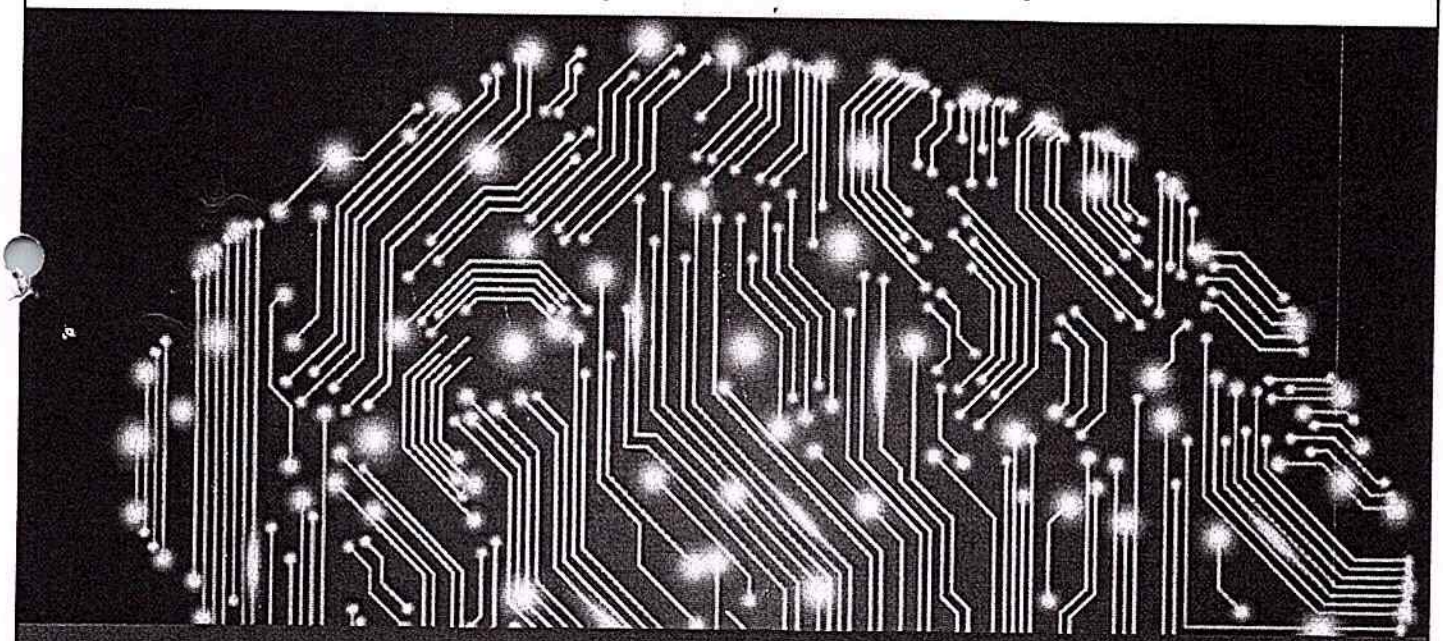

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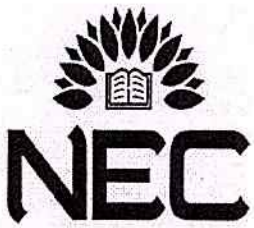

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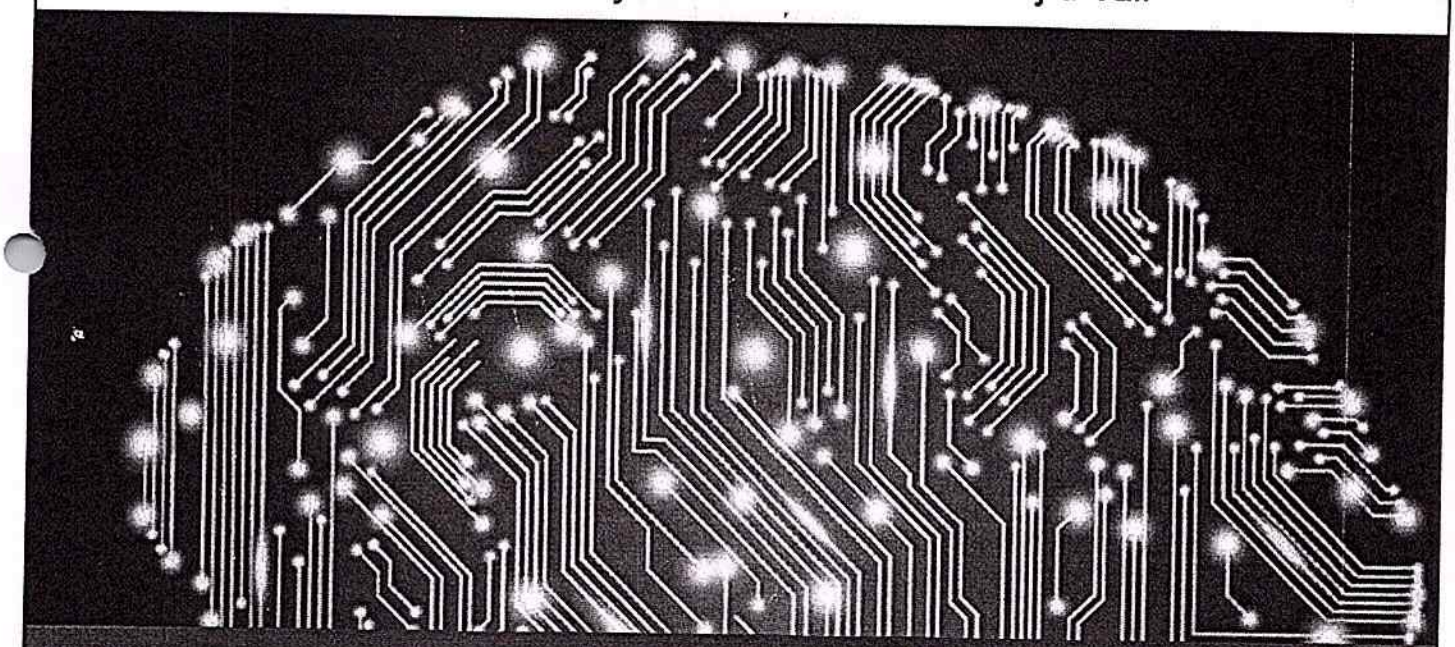

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(NEC-ICASPC–2K21)

23rd & 24th JULY, 2021

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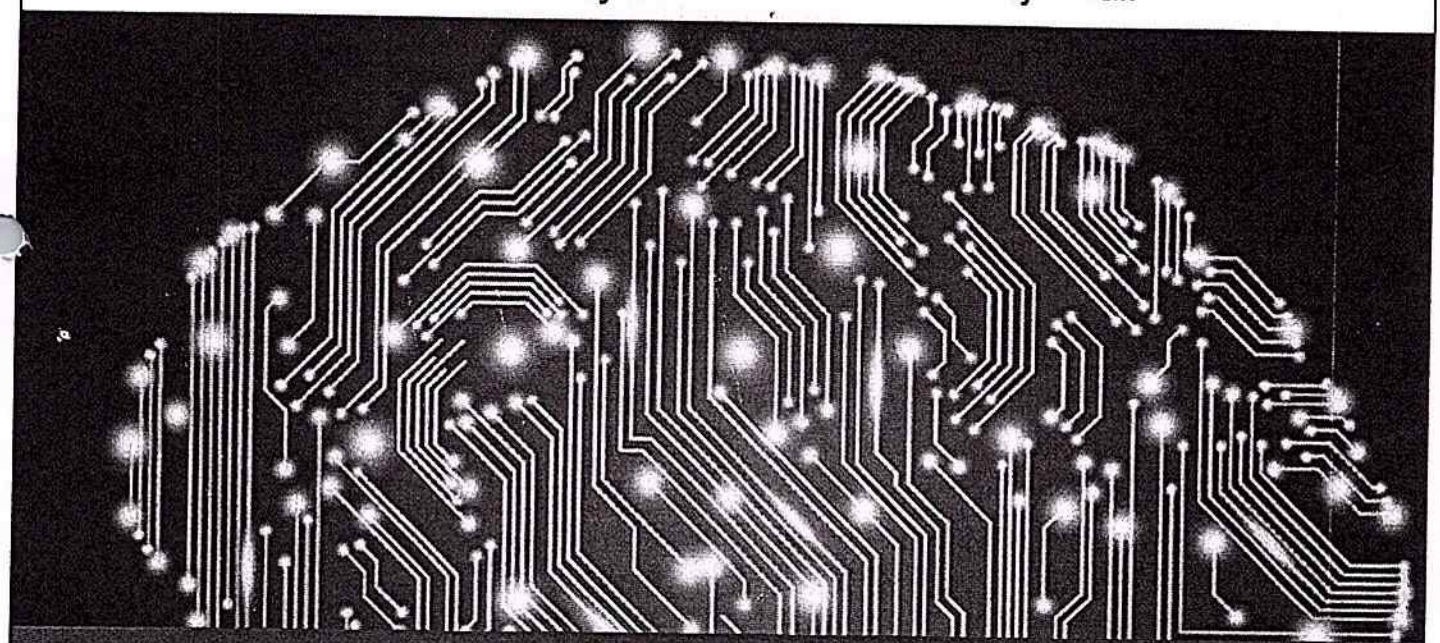

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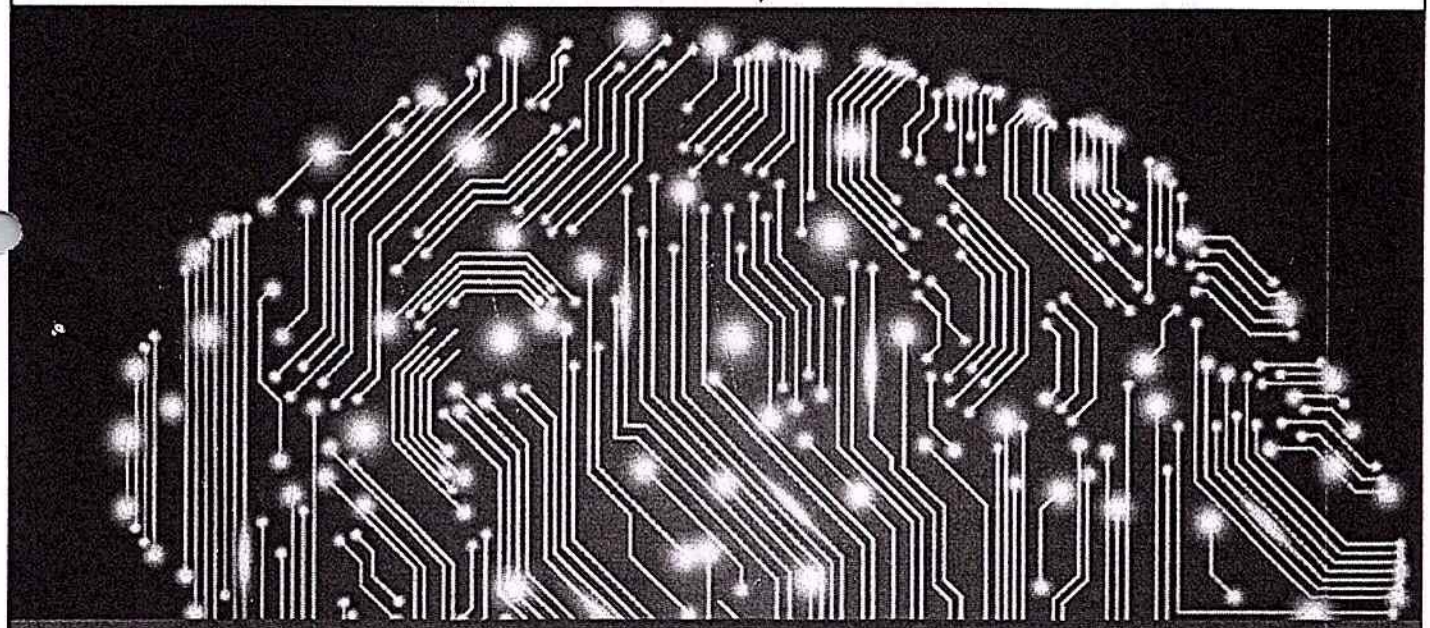

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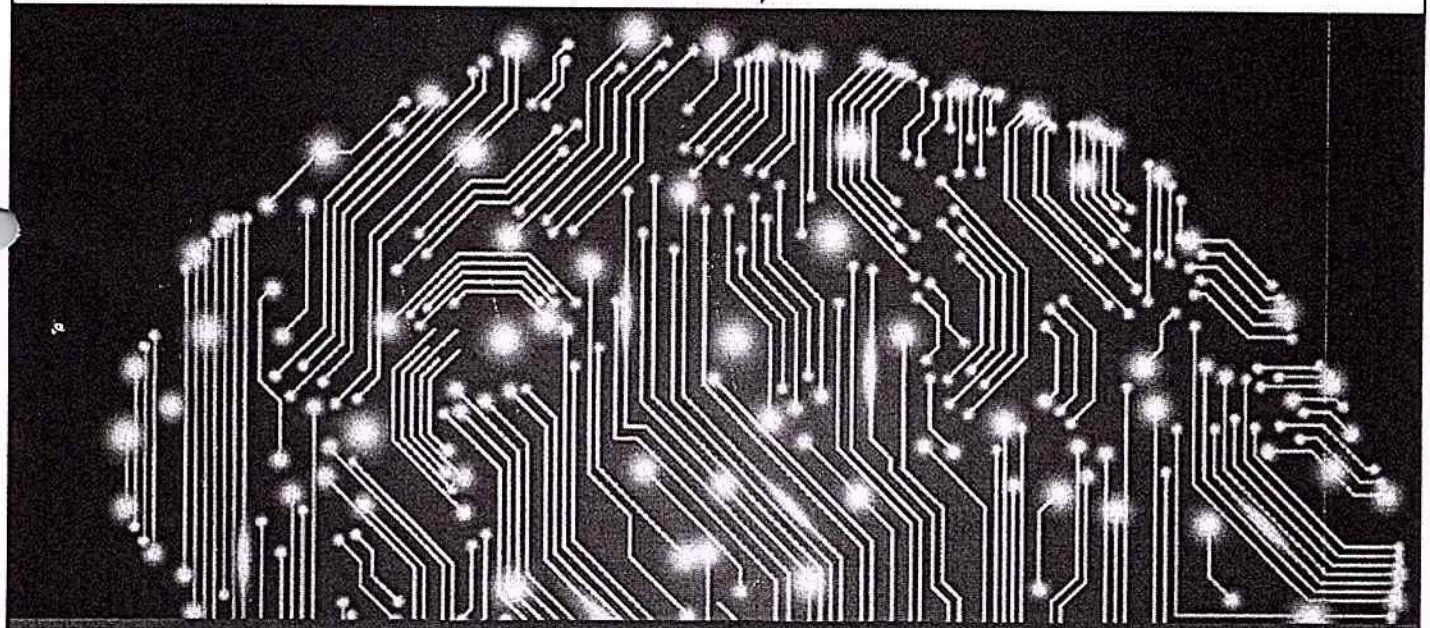

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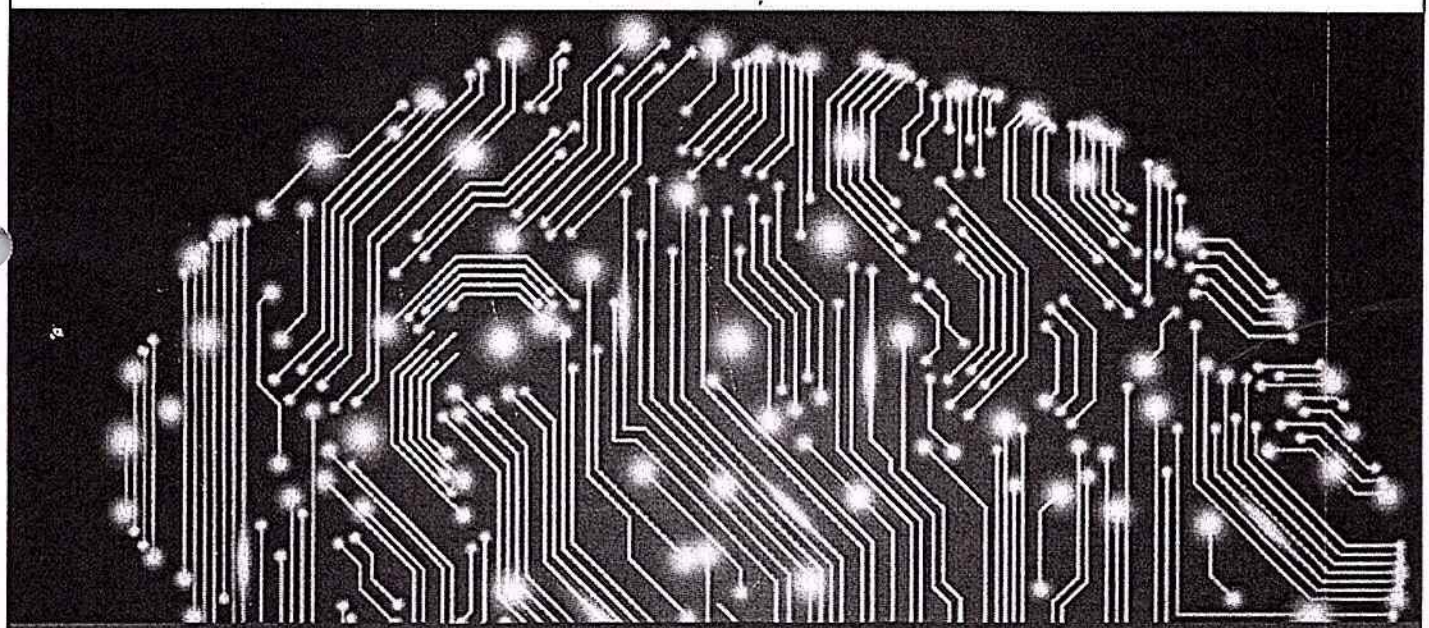

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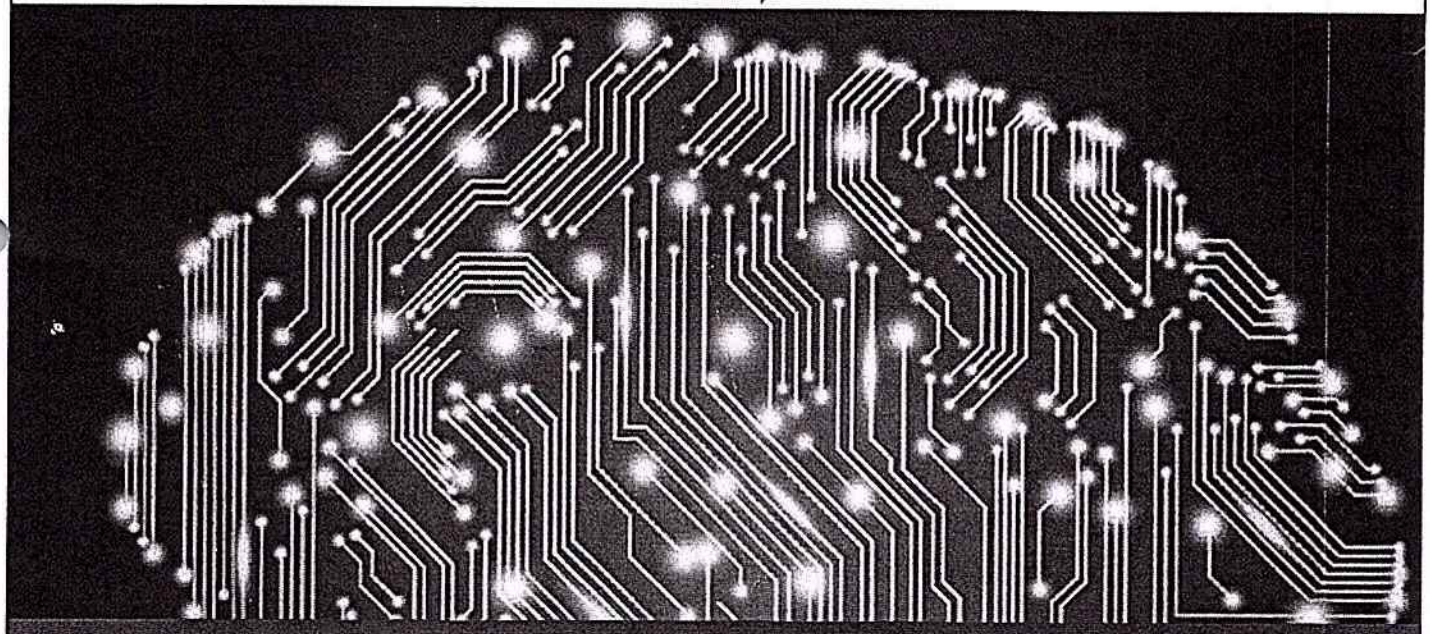

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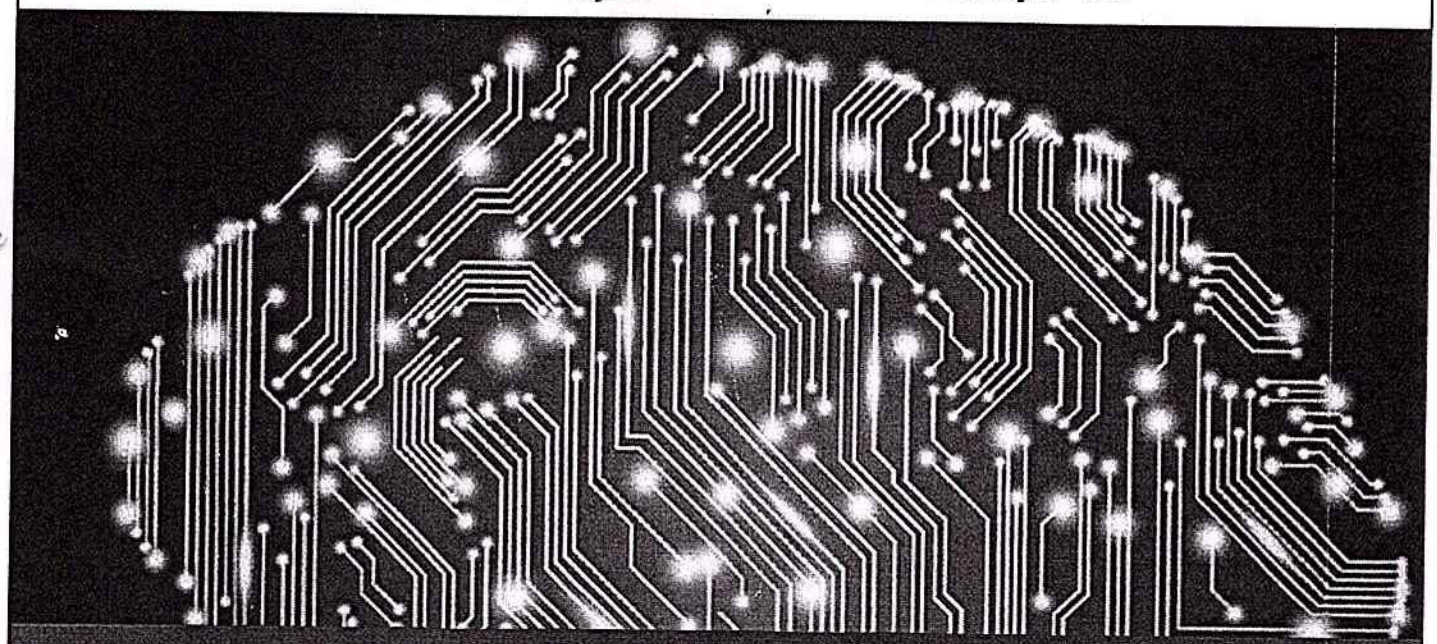

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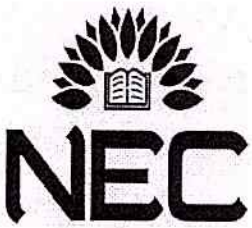

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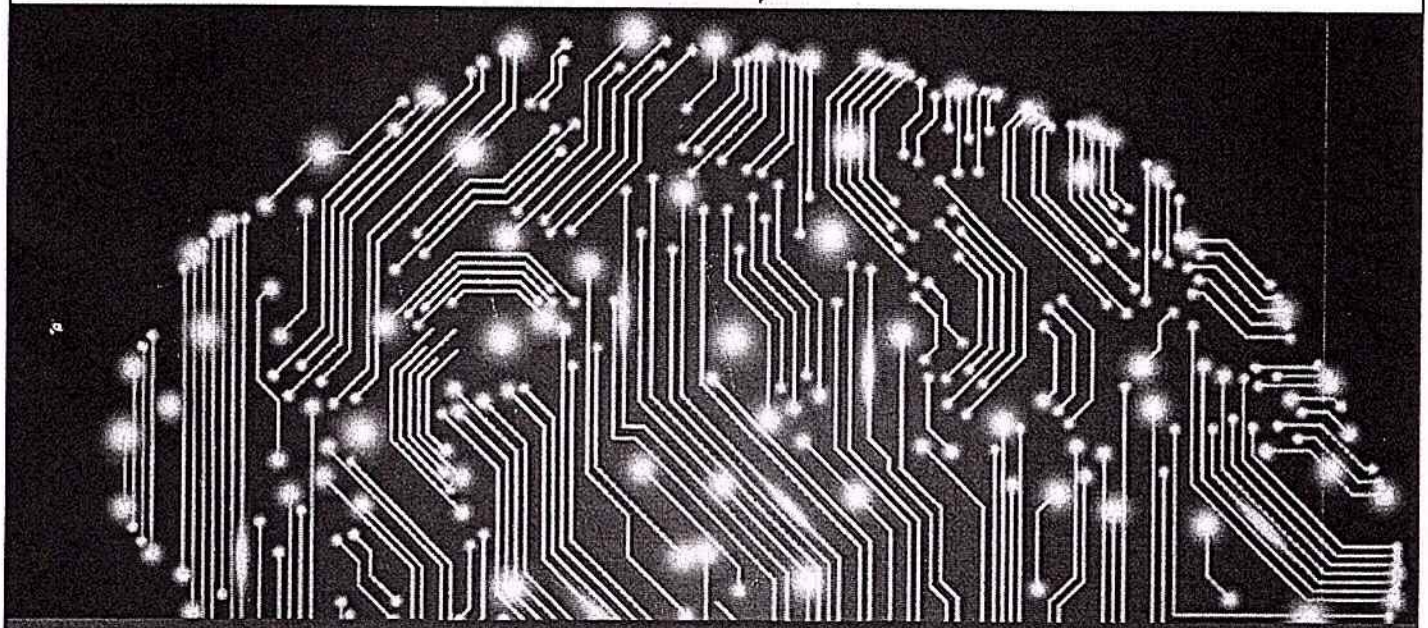

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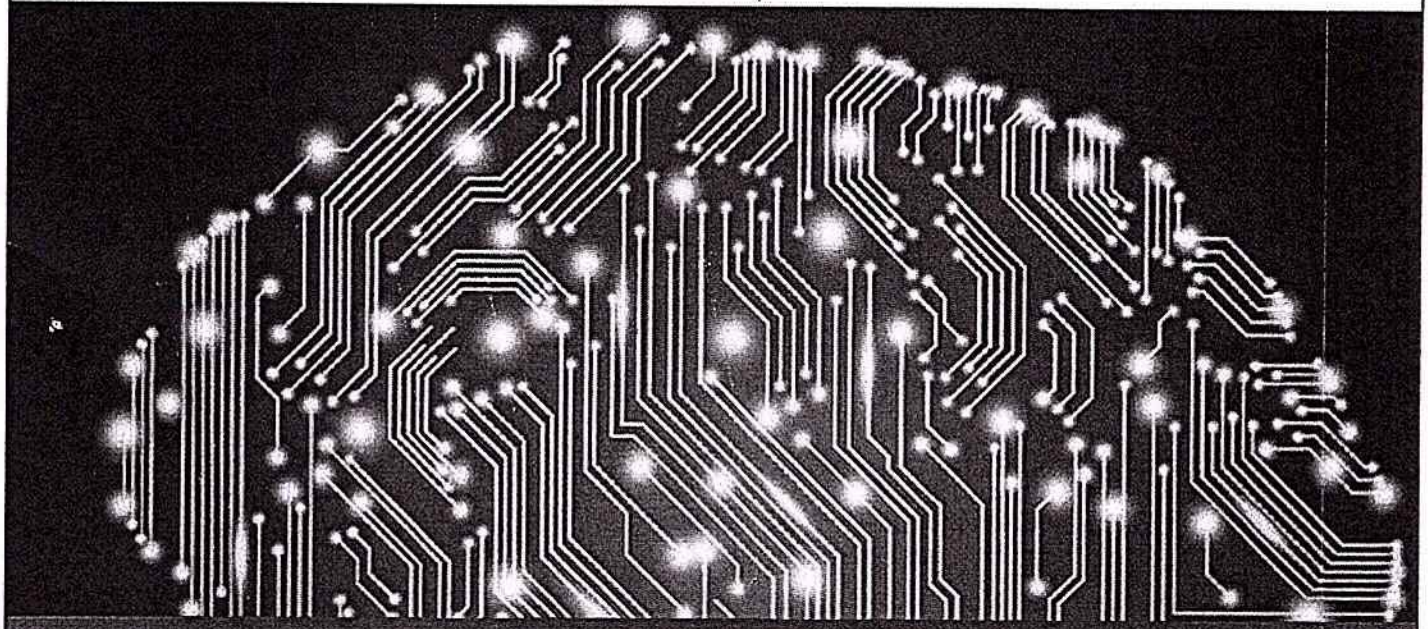

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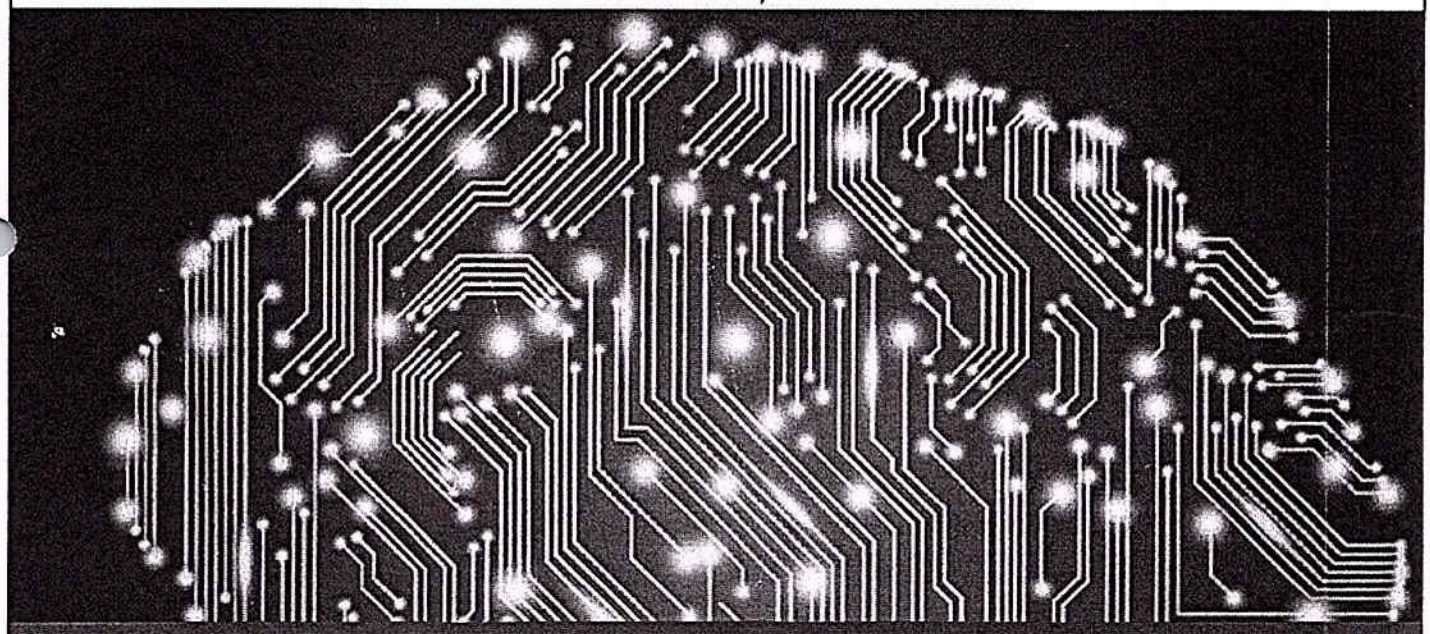

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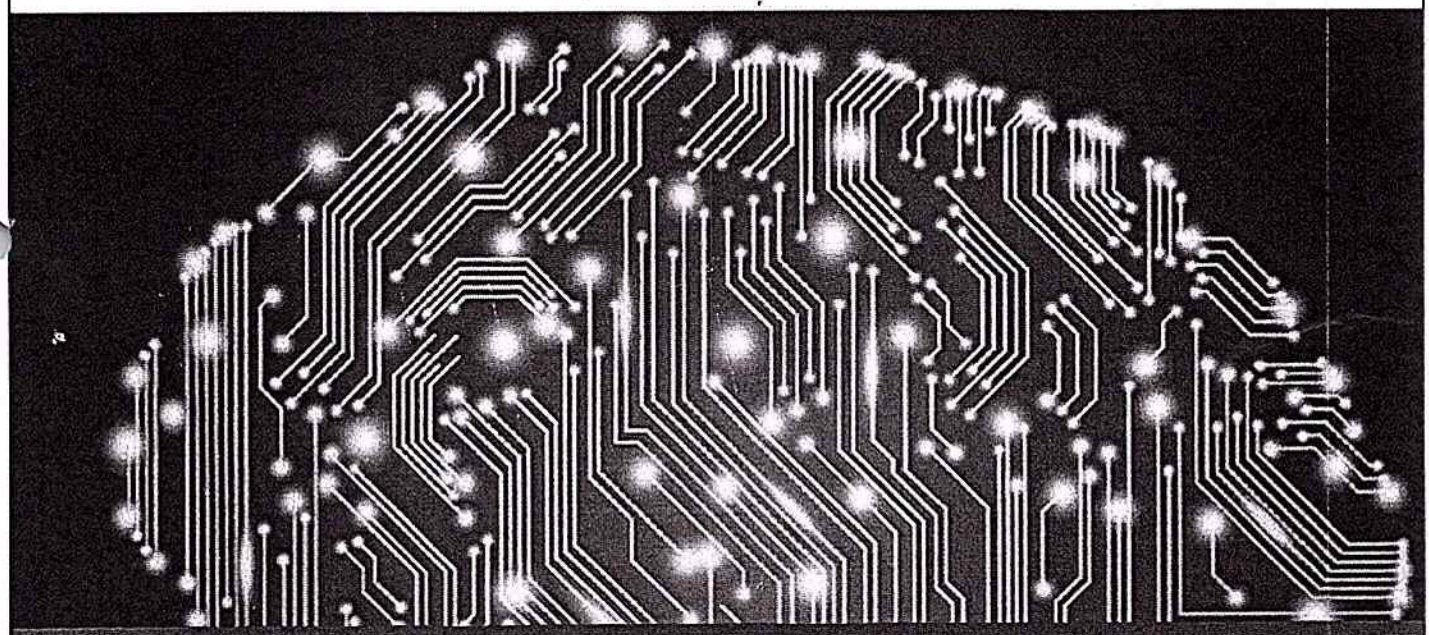

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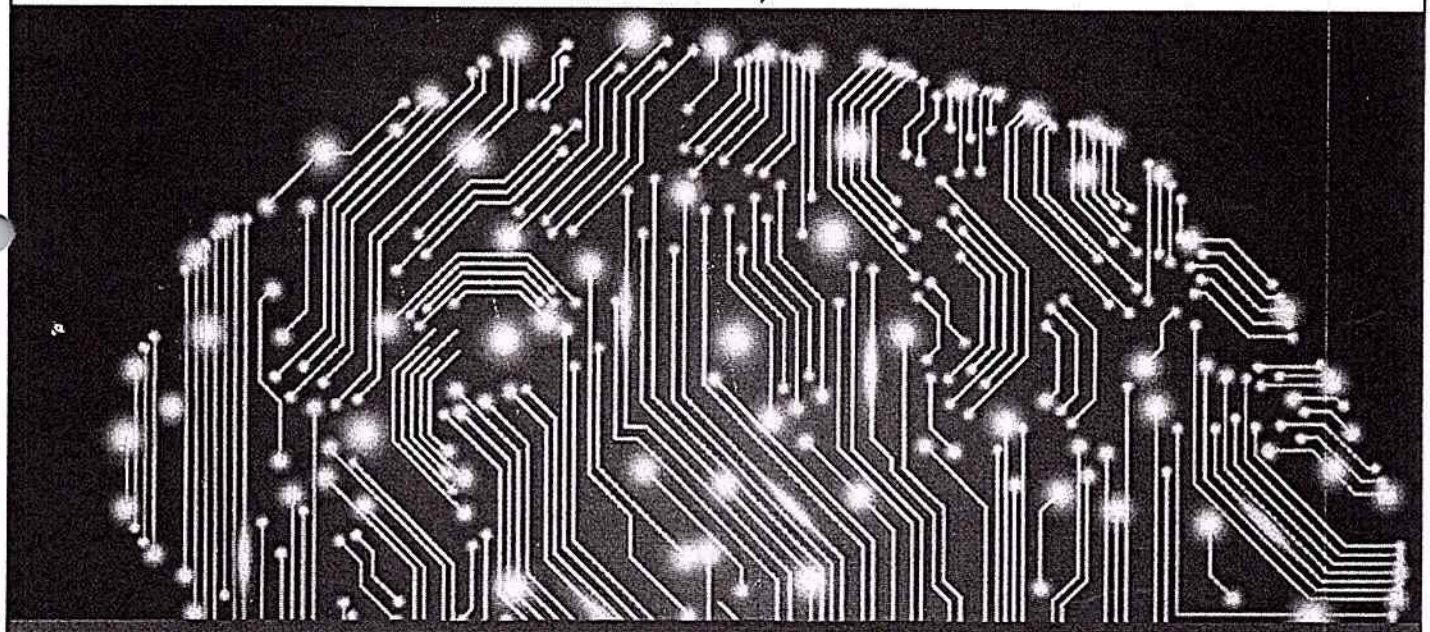

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23rd & 24th JULY, 2021

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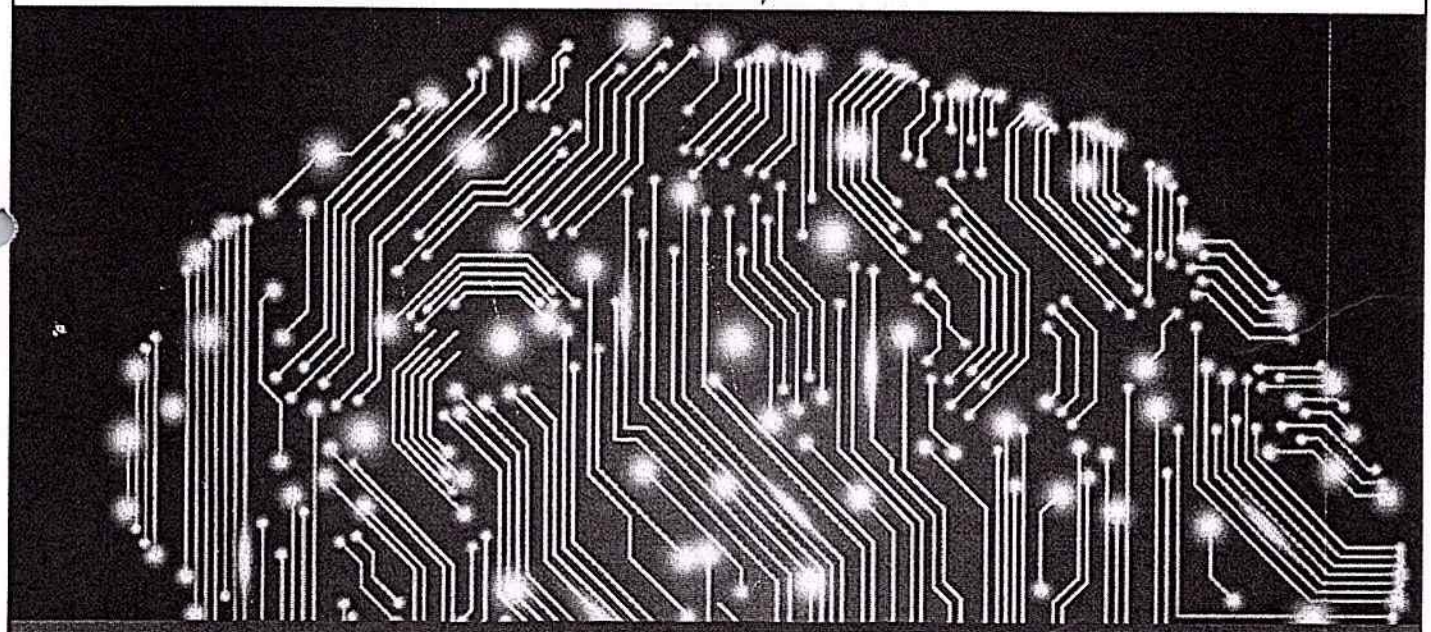

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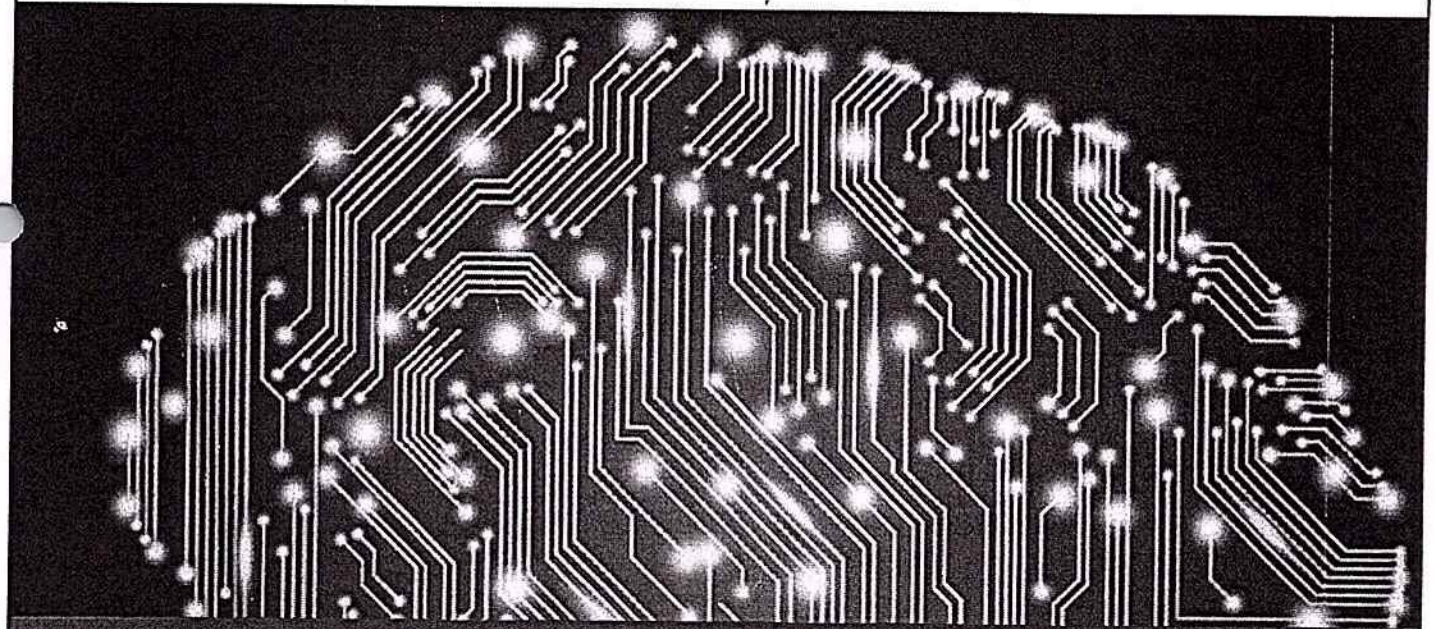

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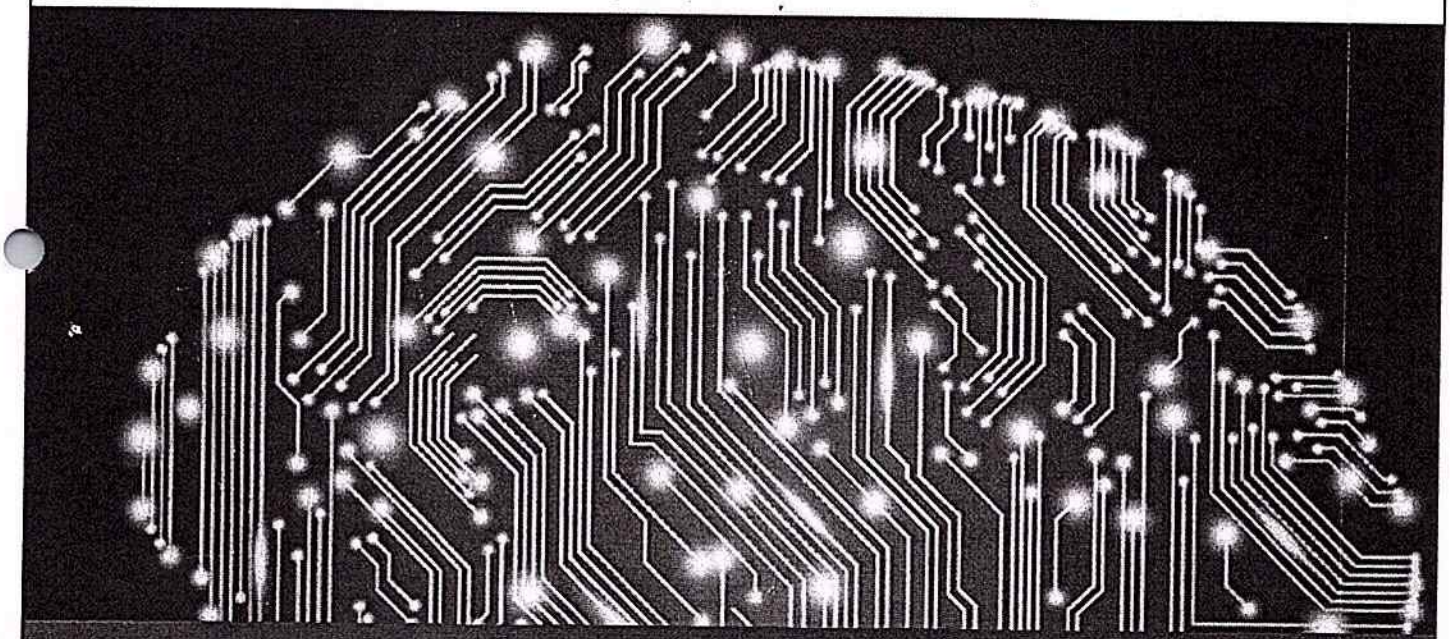

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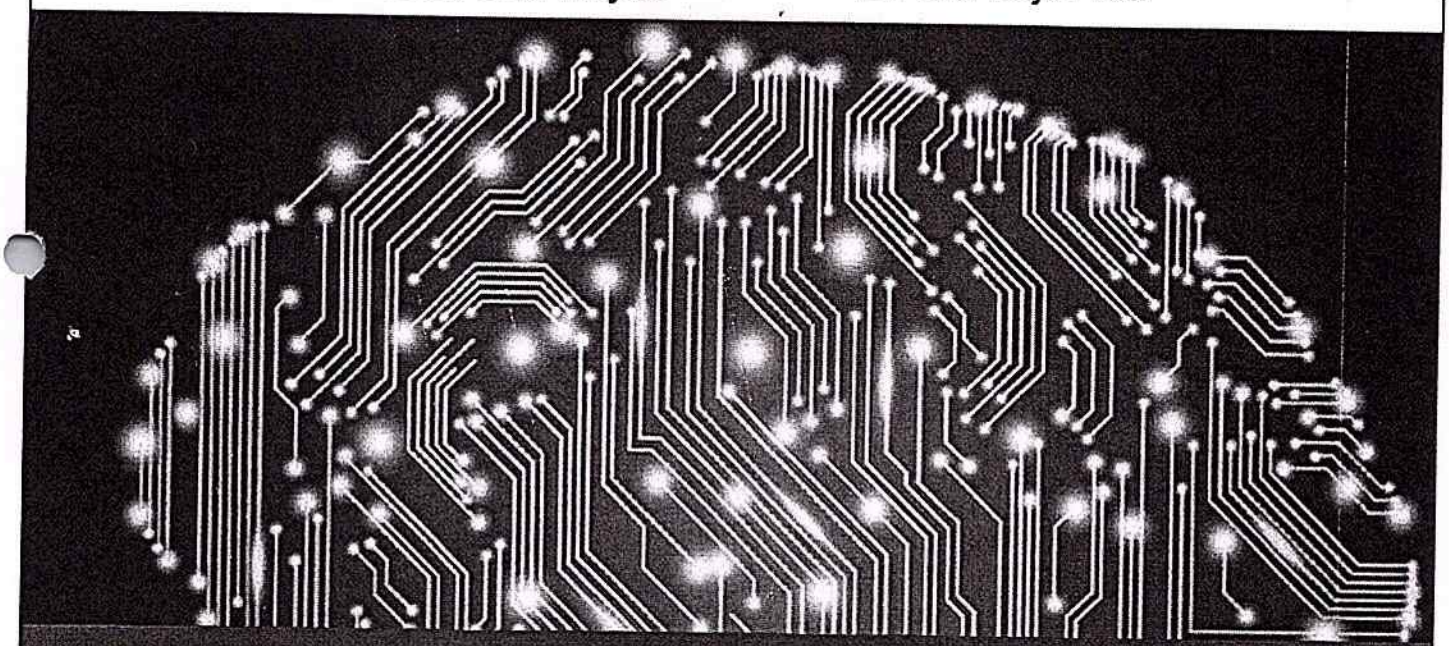

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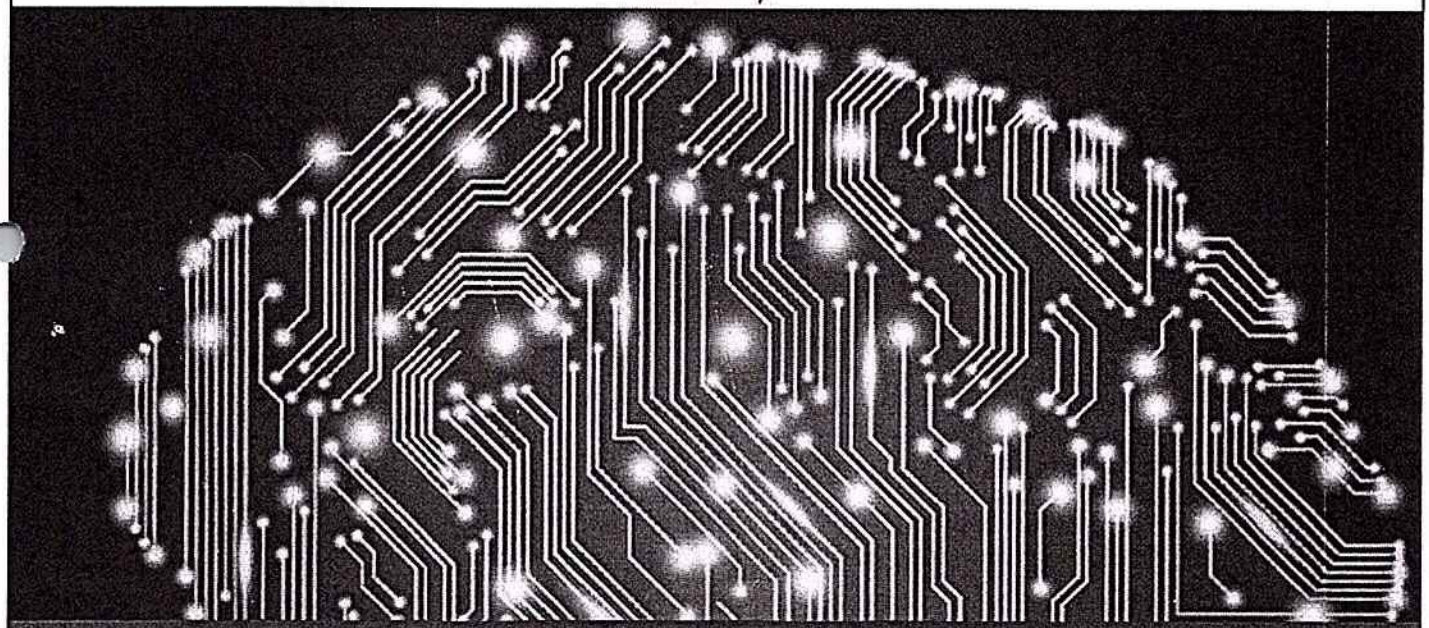

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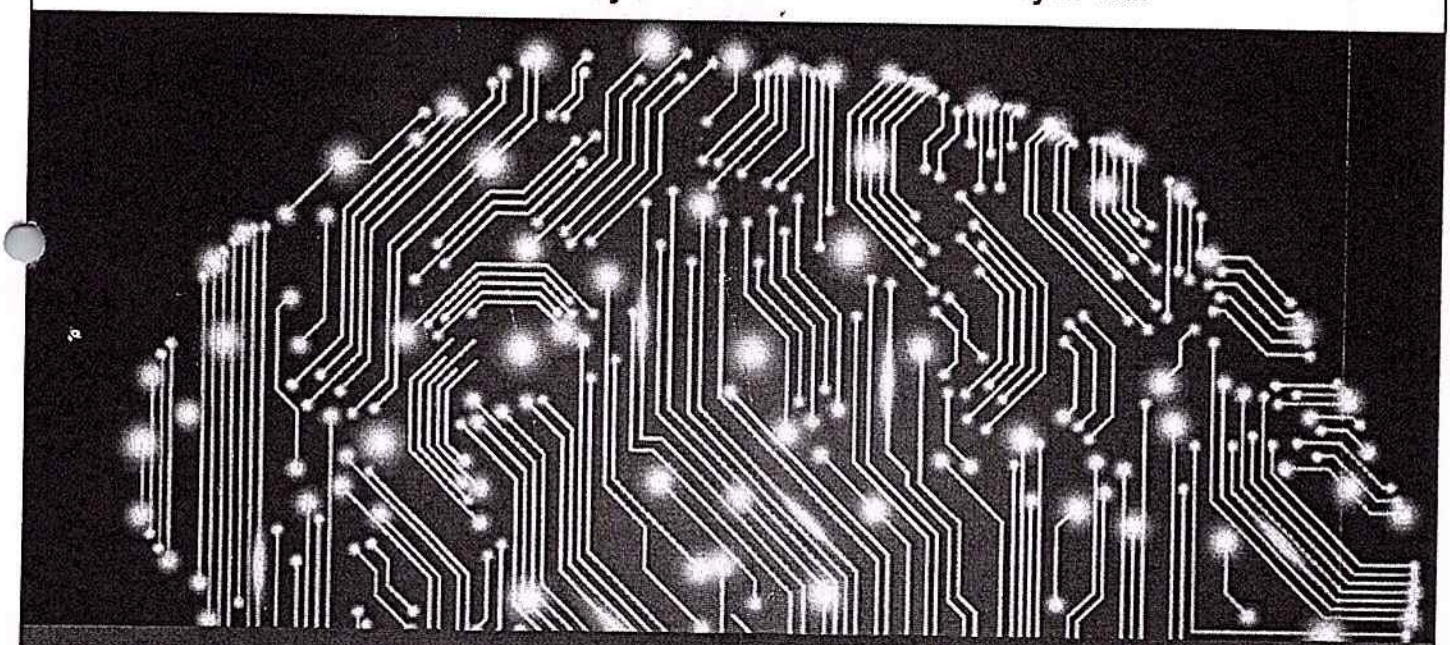

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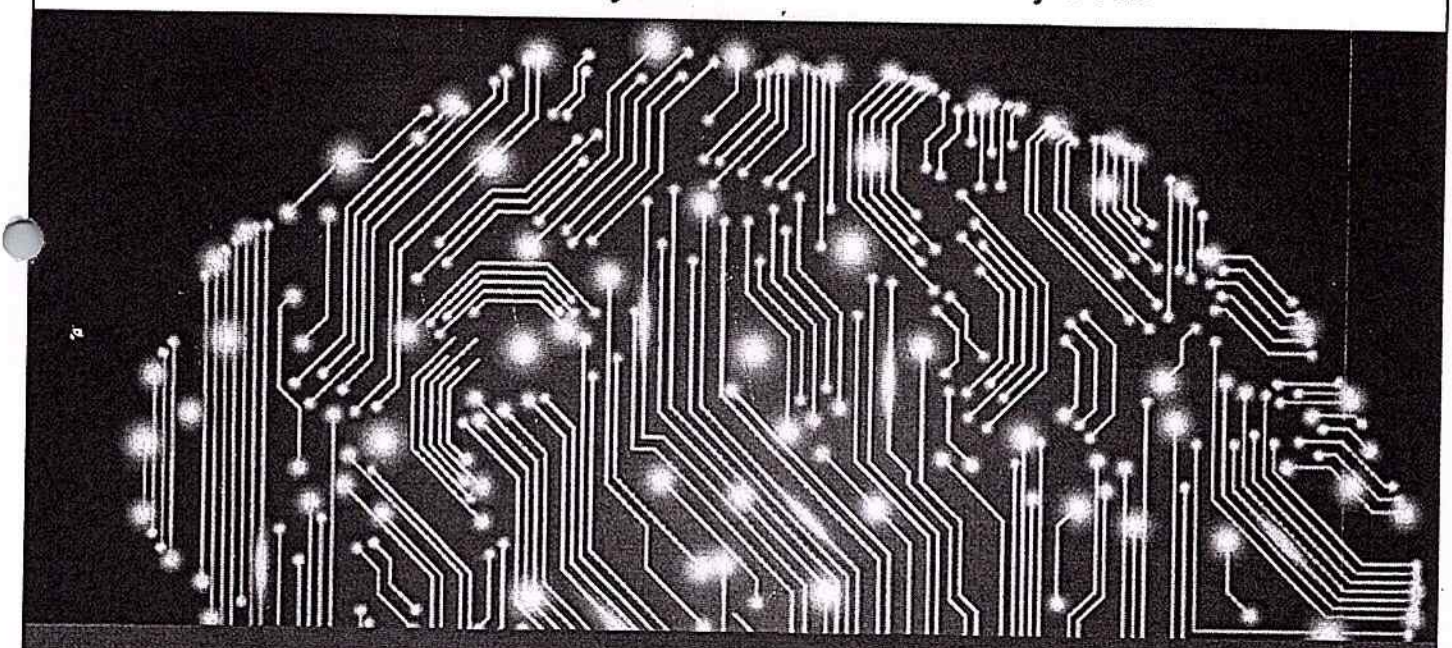

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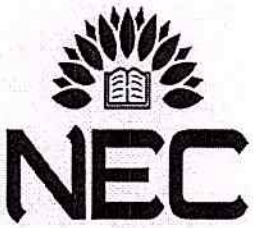

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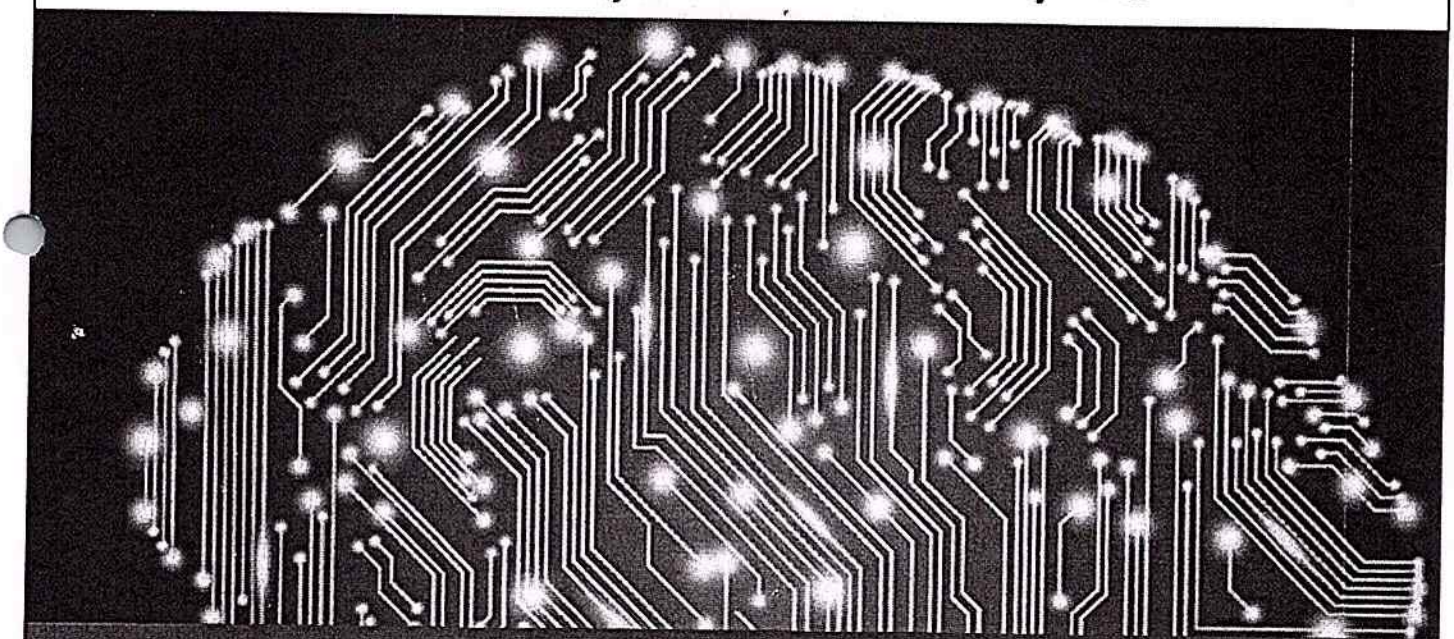

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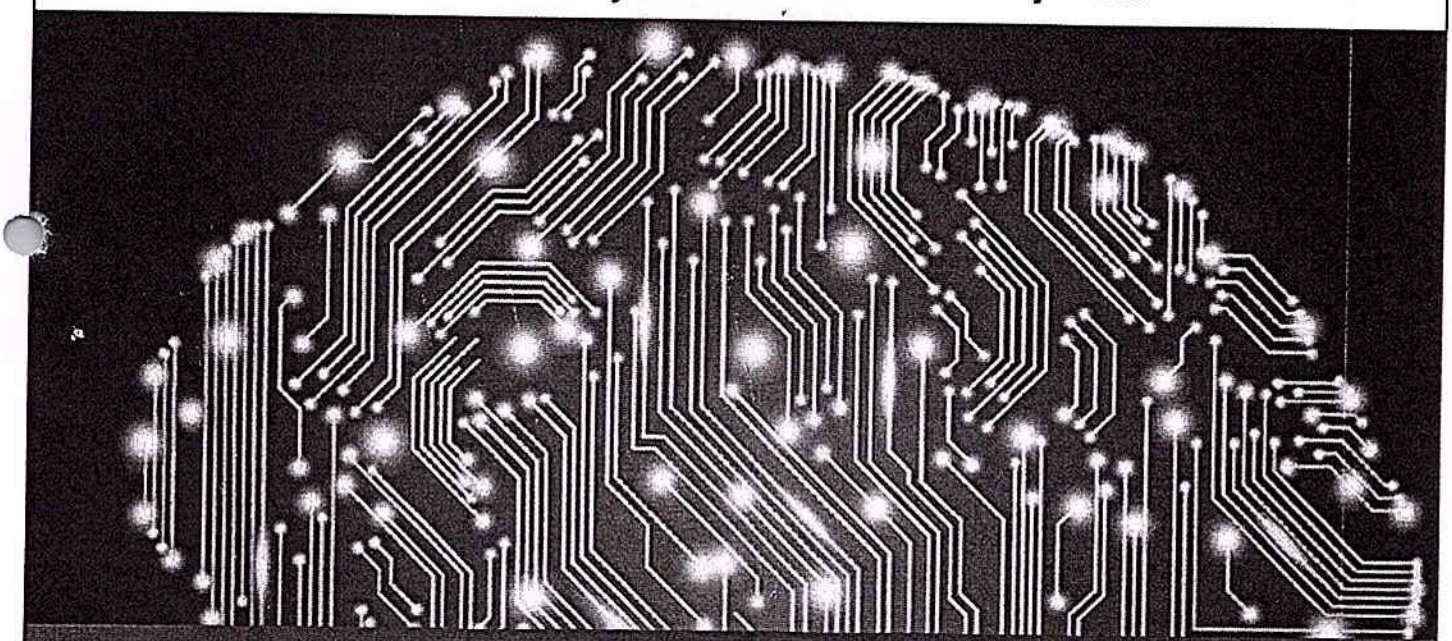

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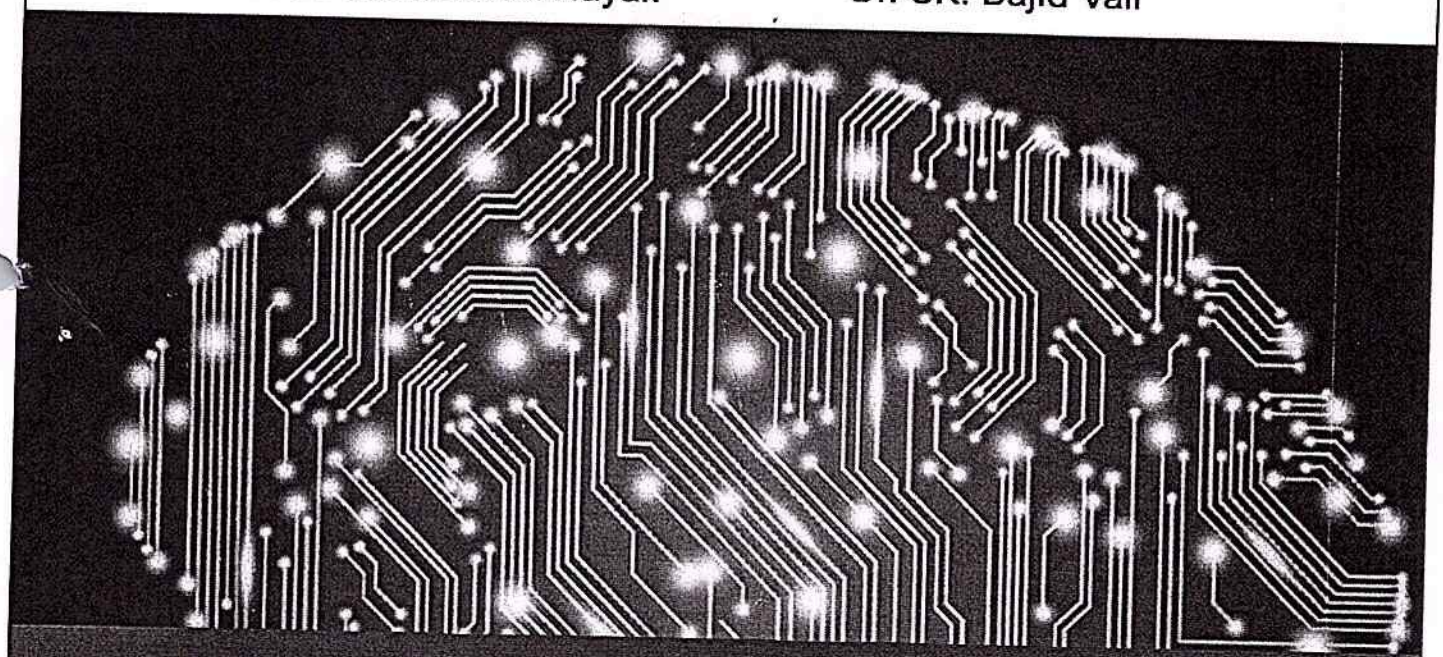

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Participated/ Presented a paper entitled with Advanced coal mine gas detection robot in the Virtual - International Conference on Advances in Signal Processing and Communications– 2K21 (NEC ICASPC-2K21) held at Department of Electronics and Communication Engineering, Narasaraopeta Engineering College, Narasaraopet during 23rd & 24th July, 2021

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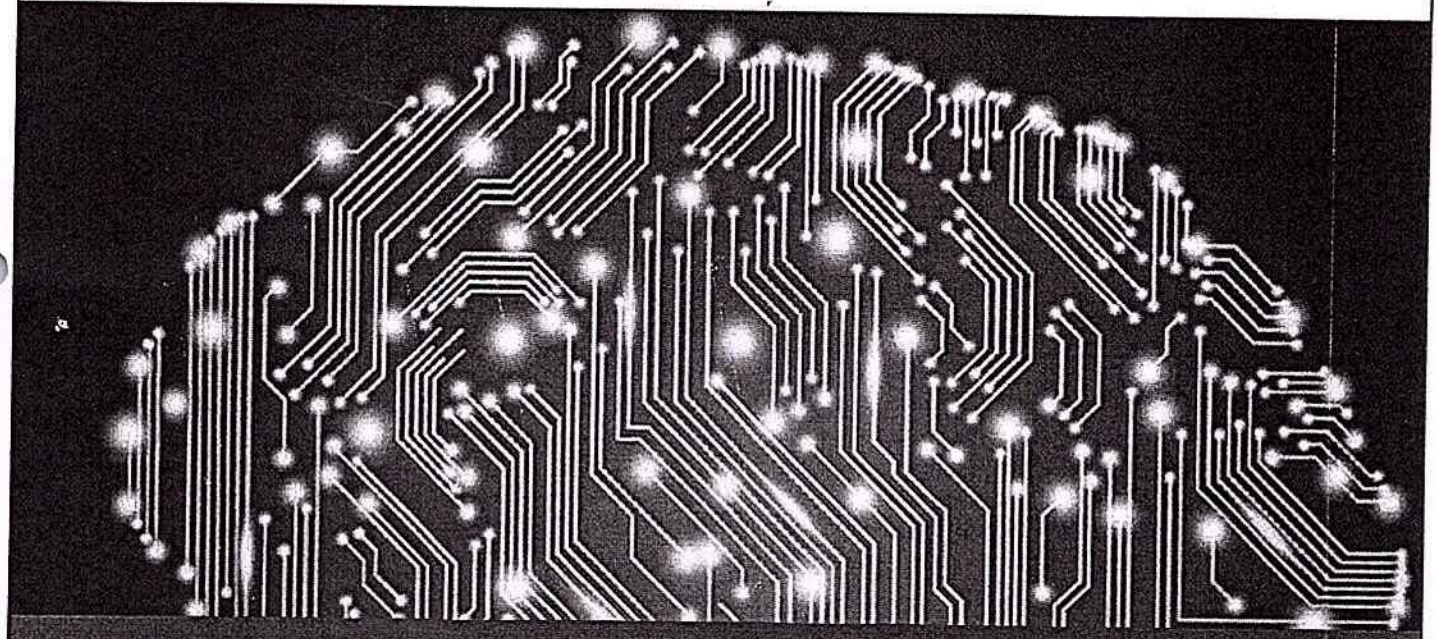

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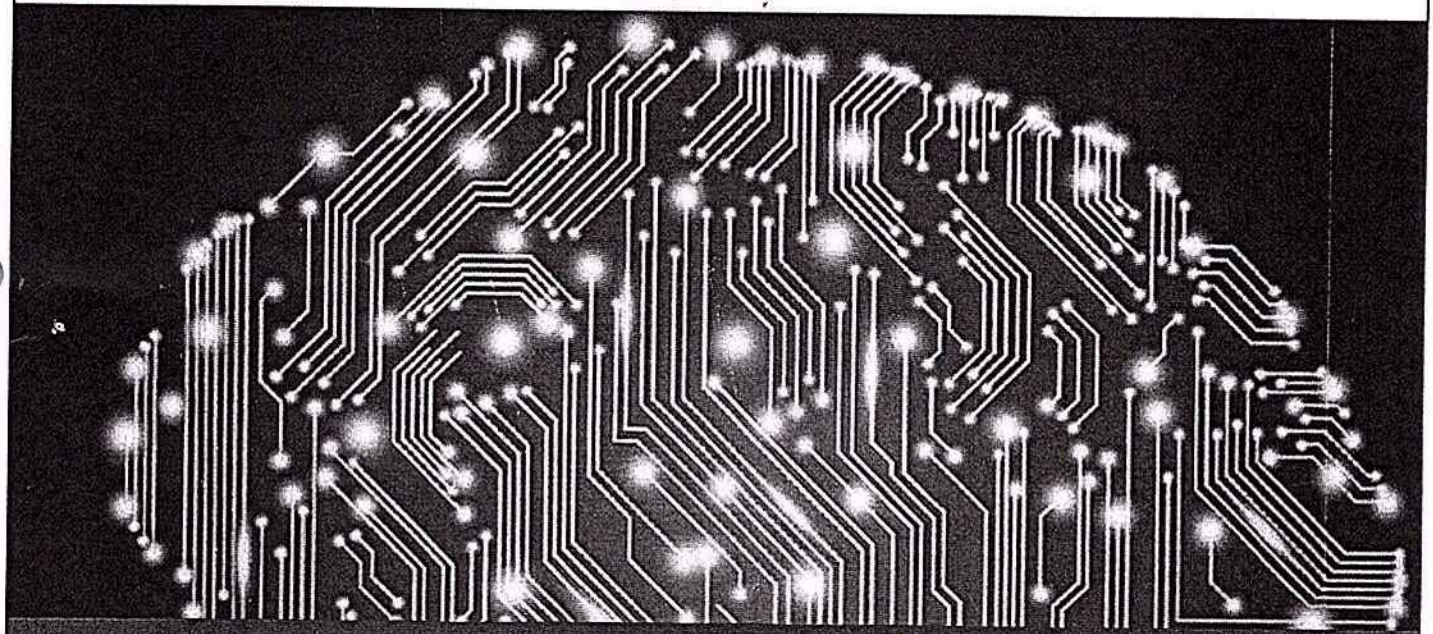

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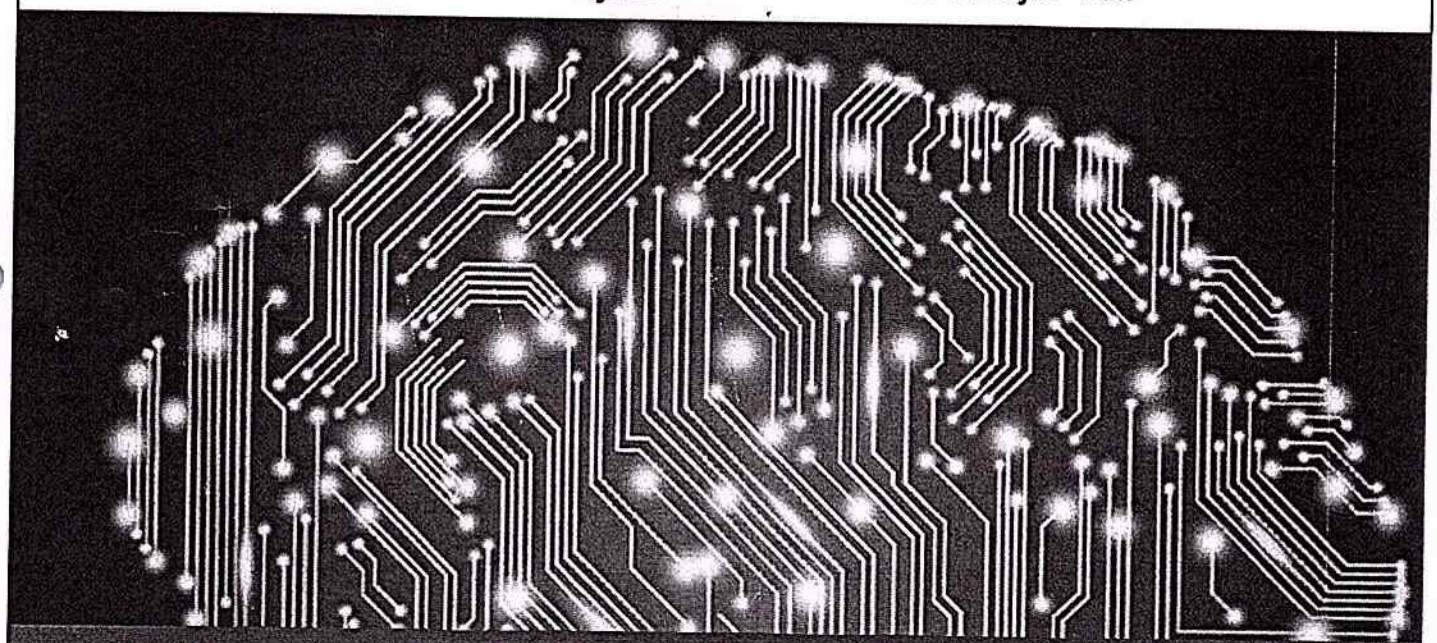

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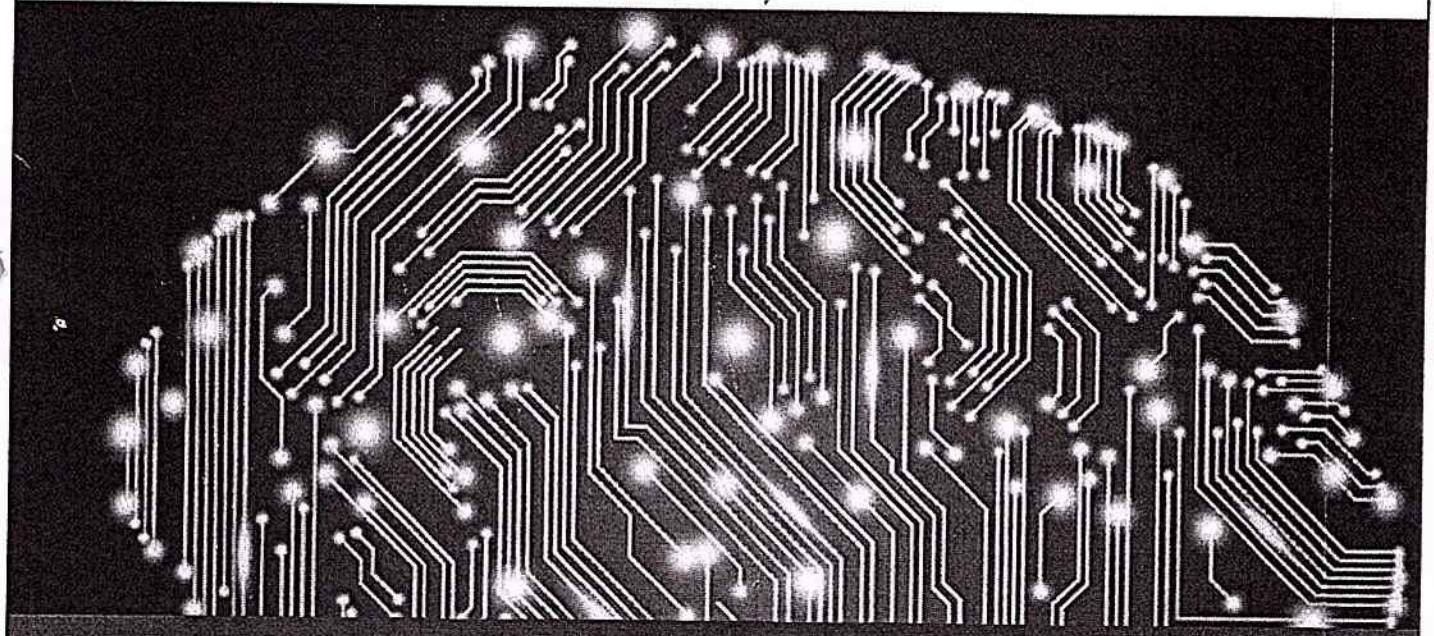

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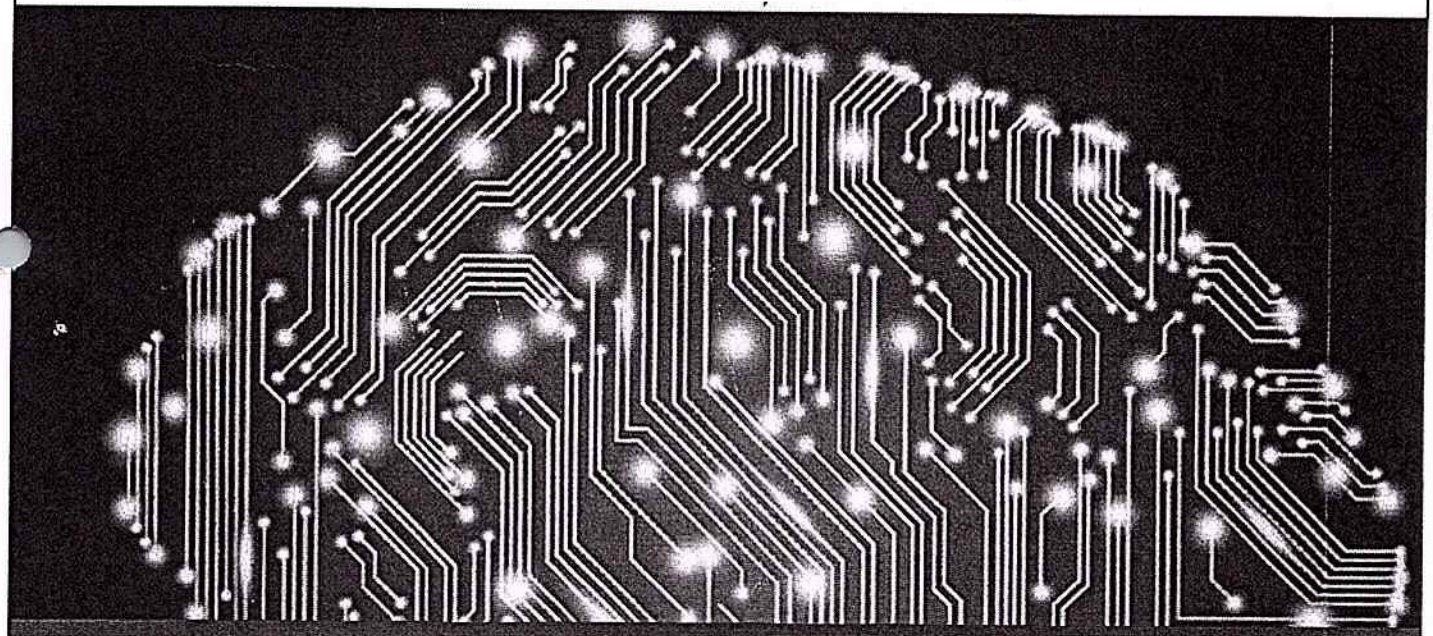

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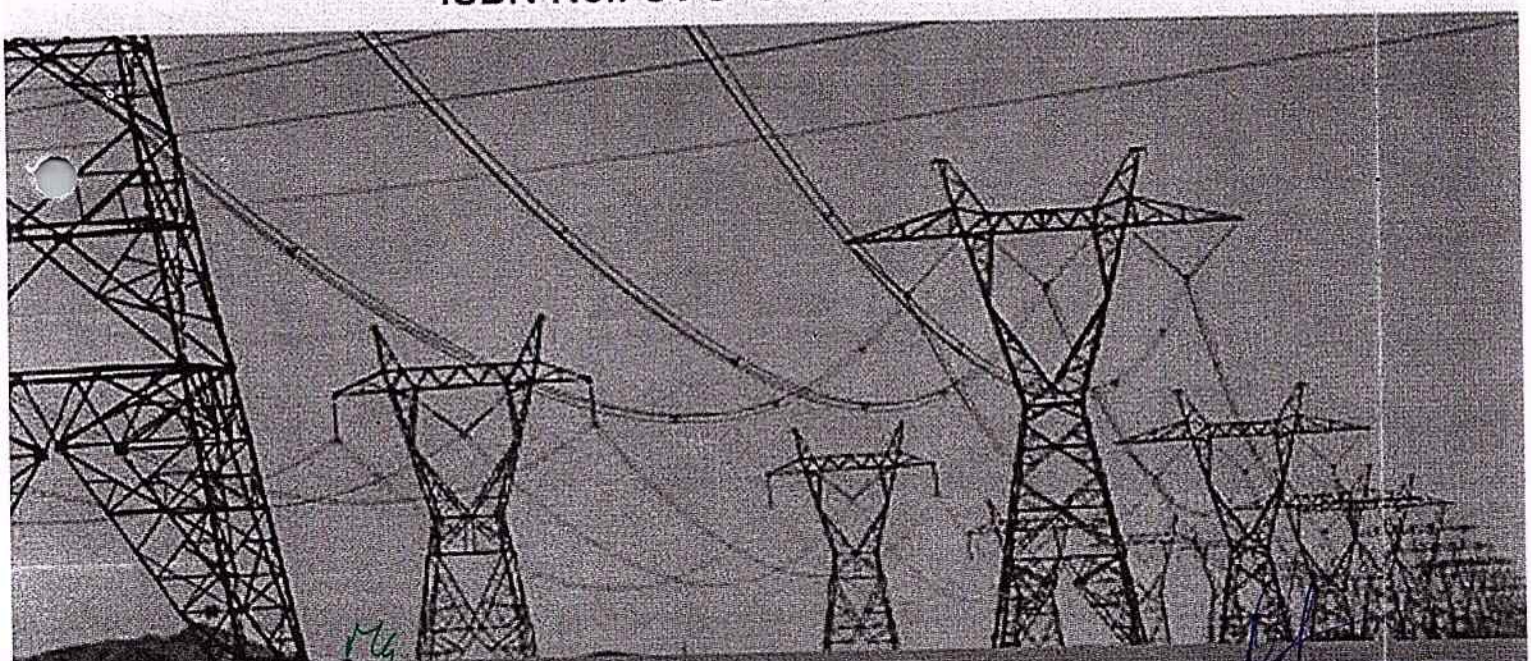

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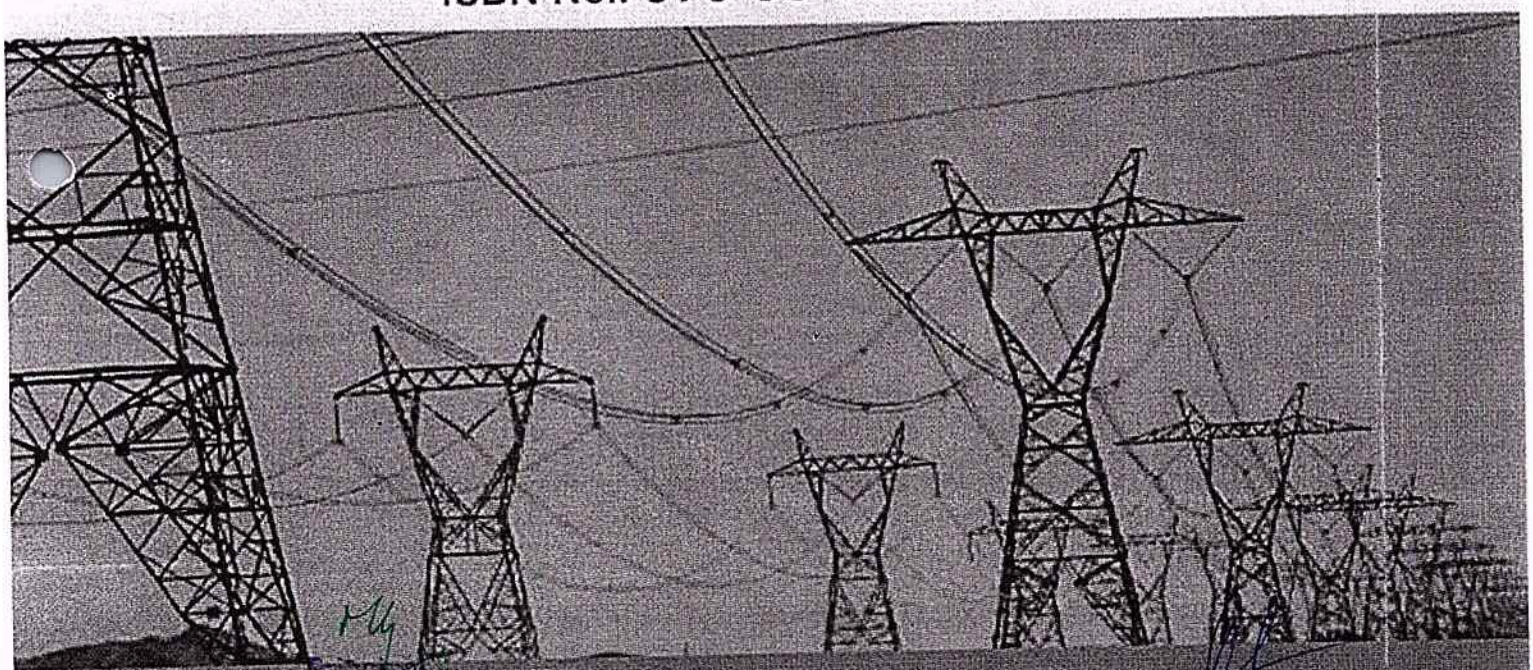

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NEC-VICPSPE-2K2

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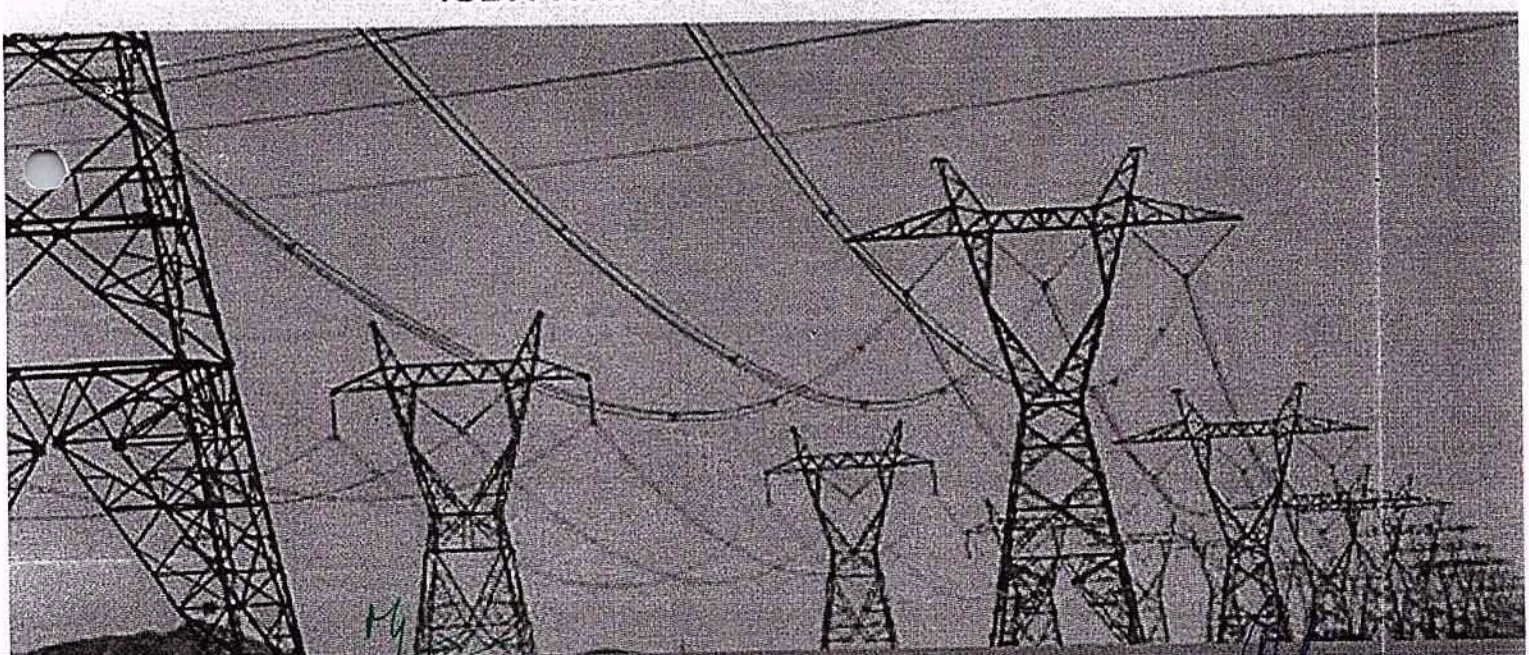

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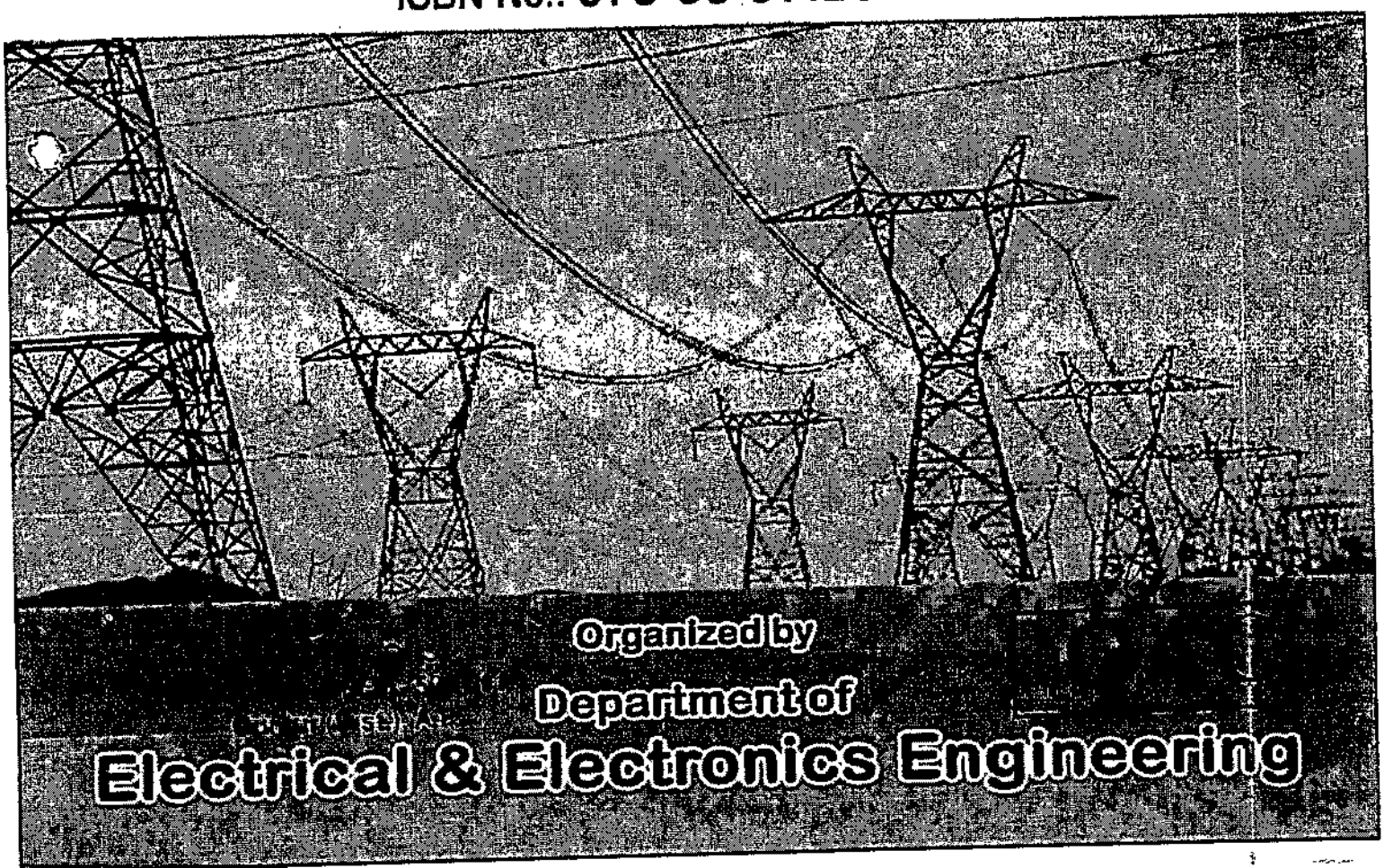

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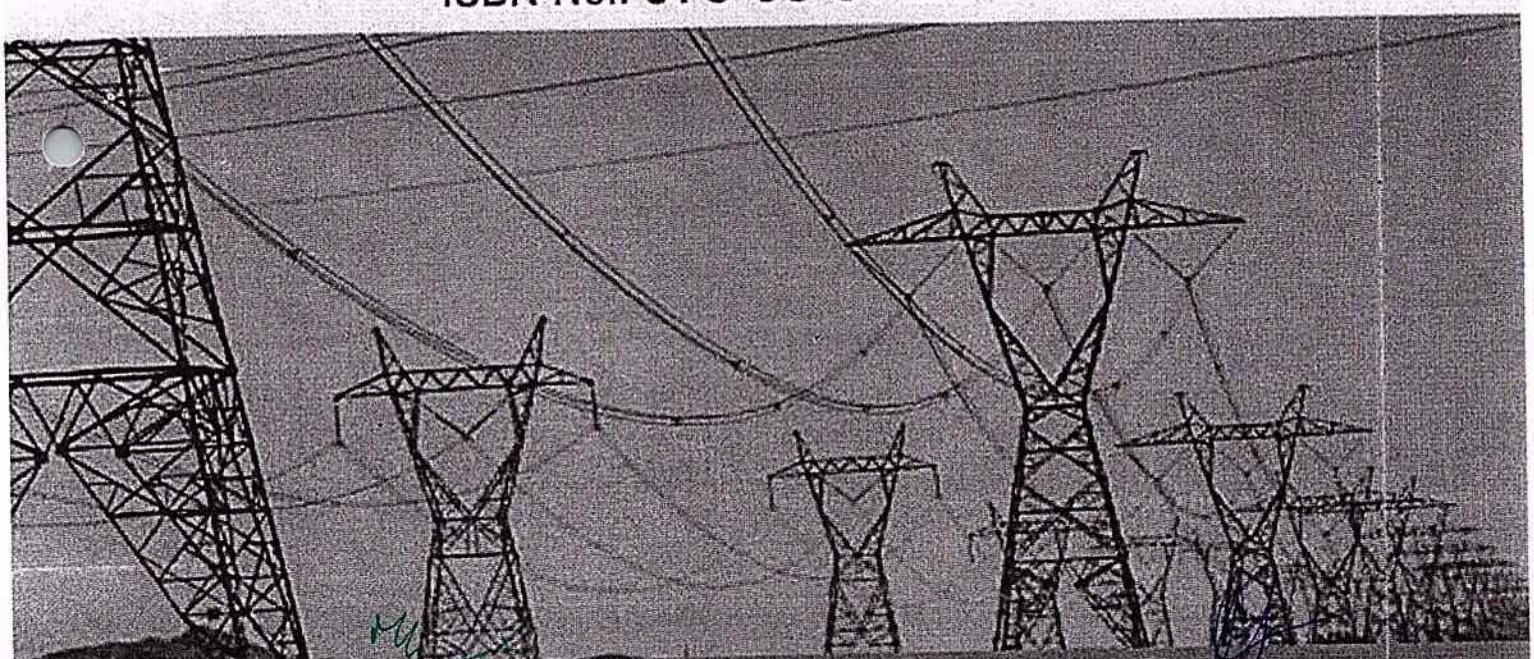

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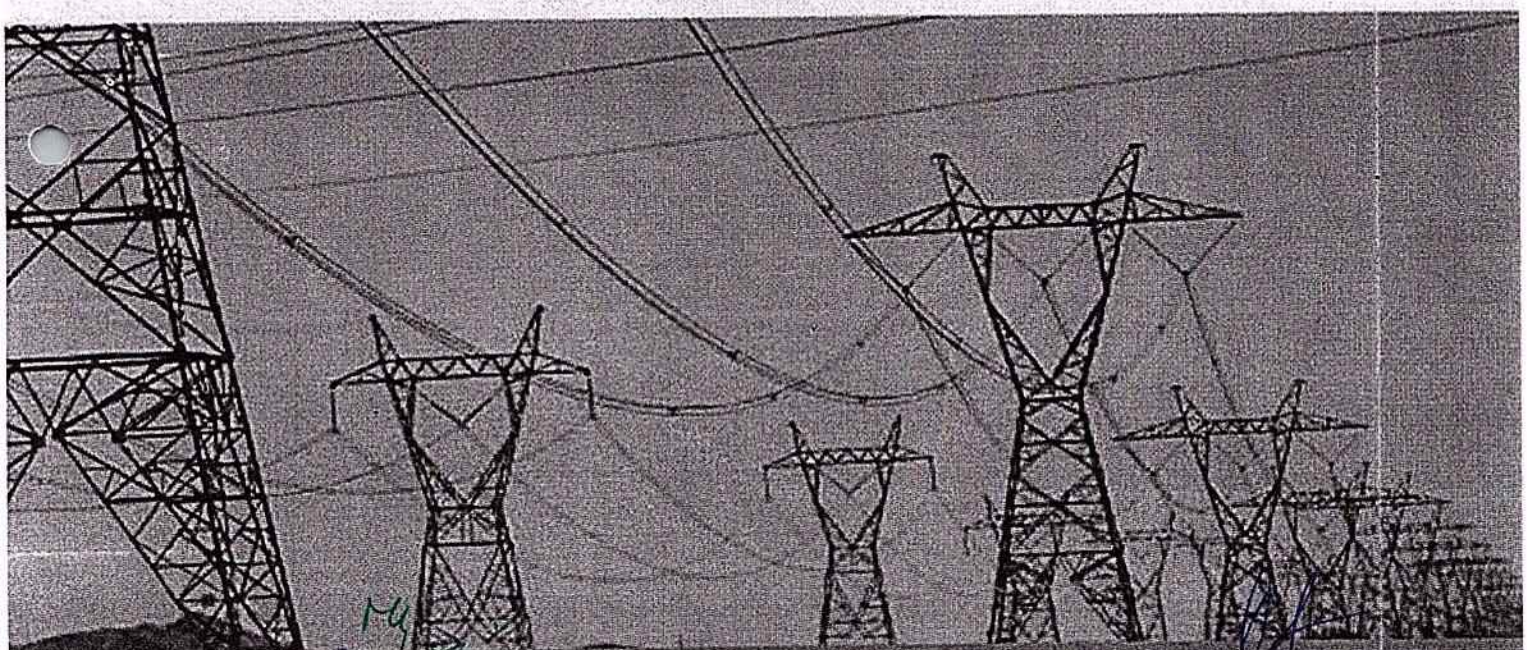

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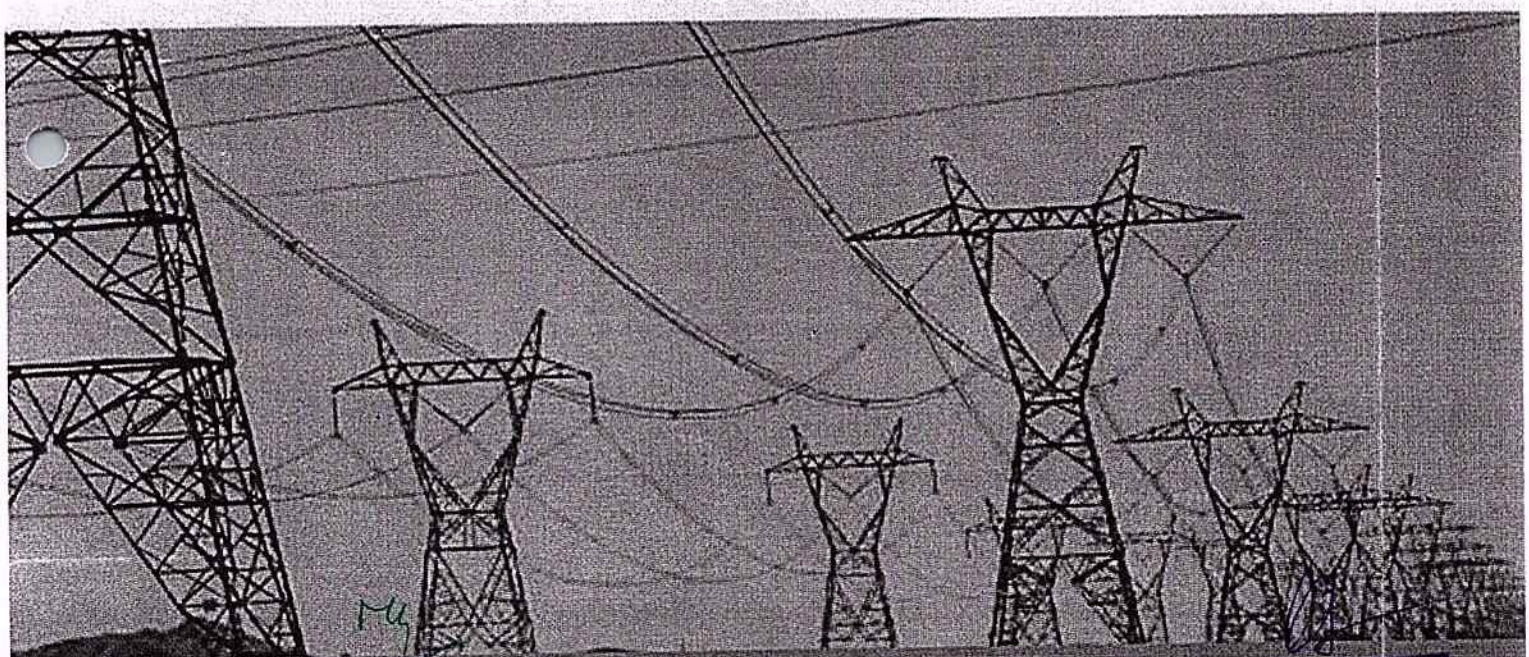

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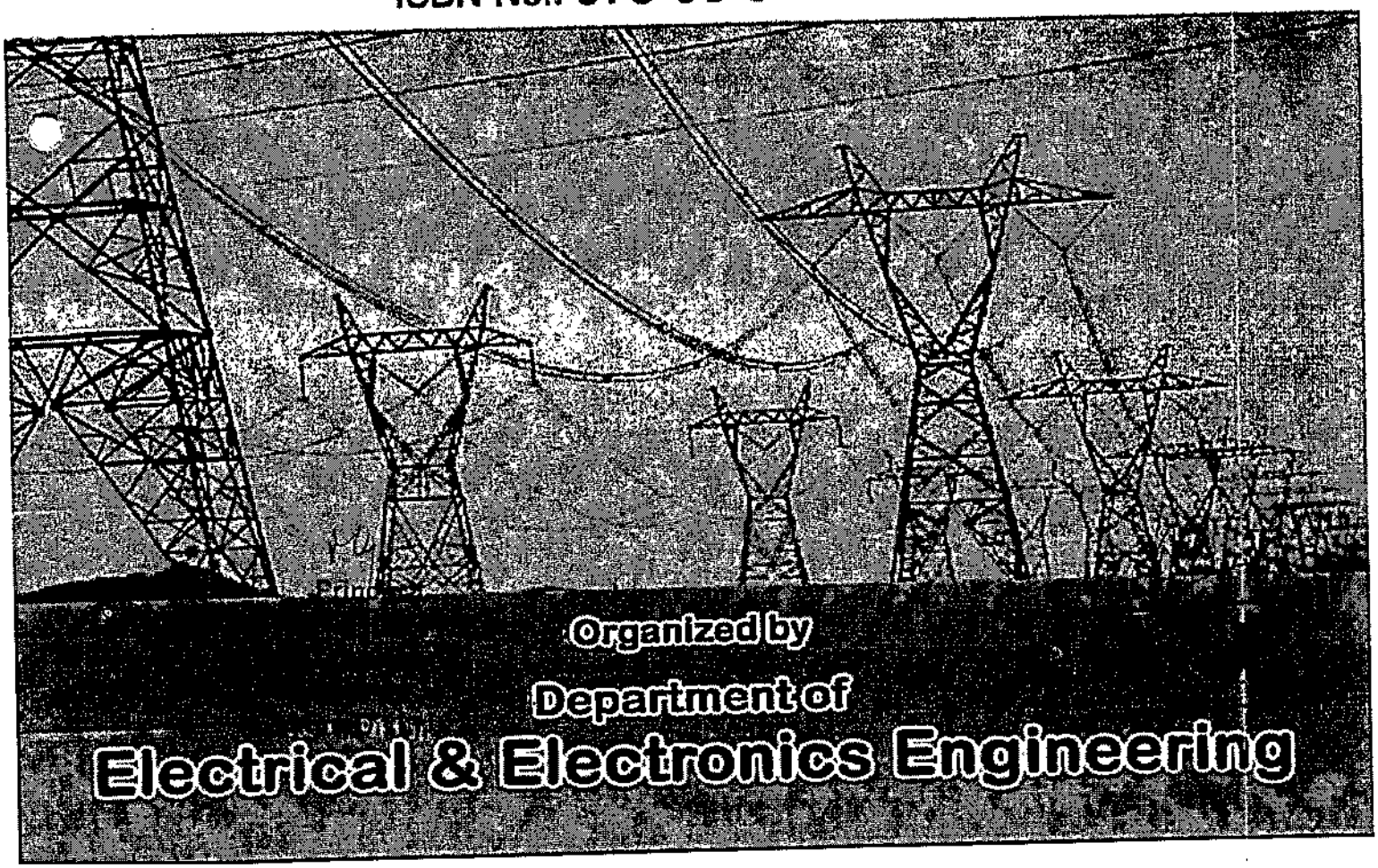

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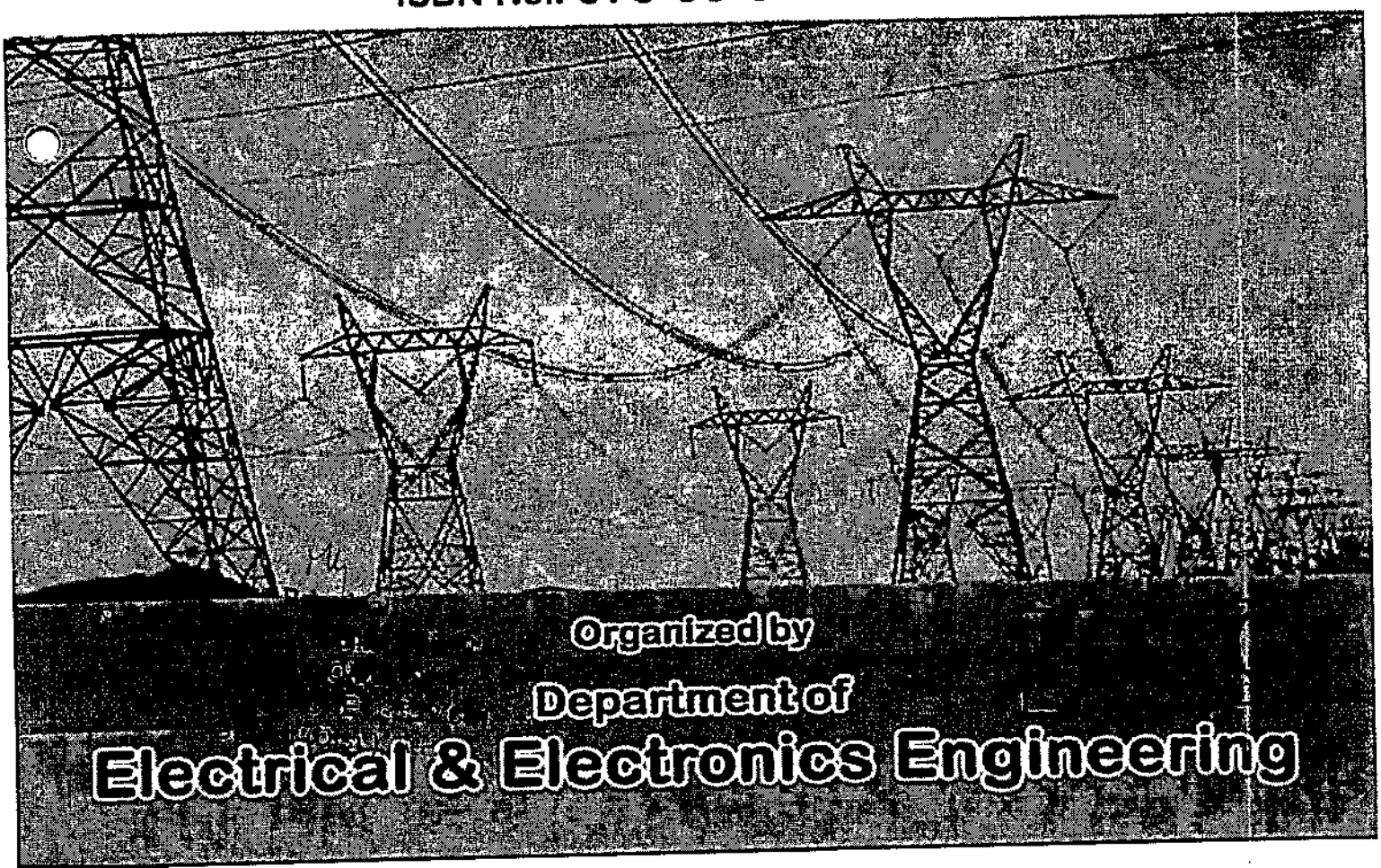

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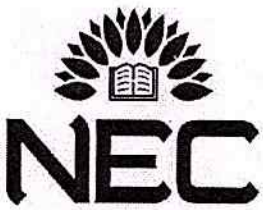

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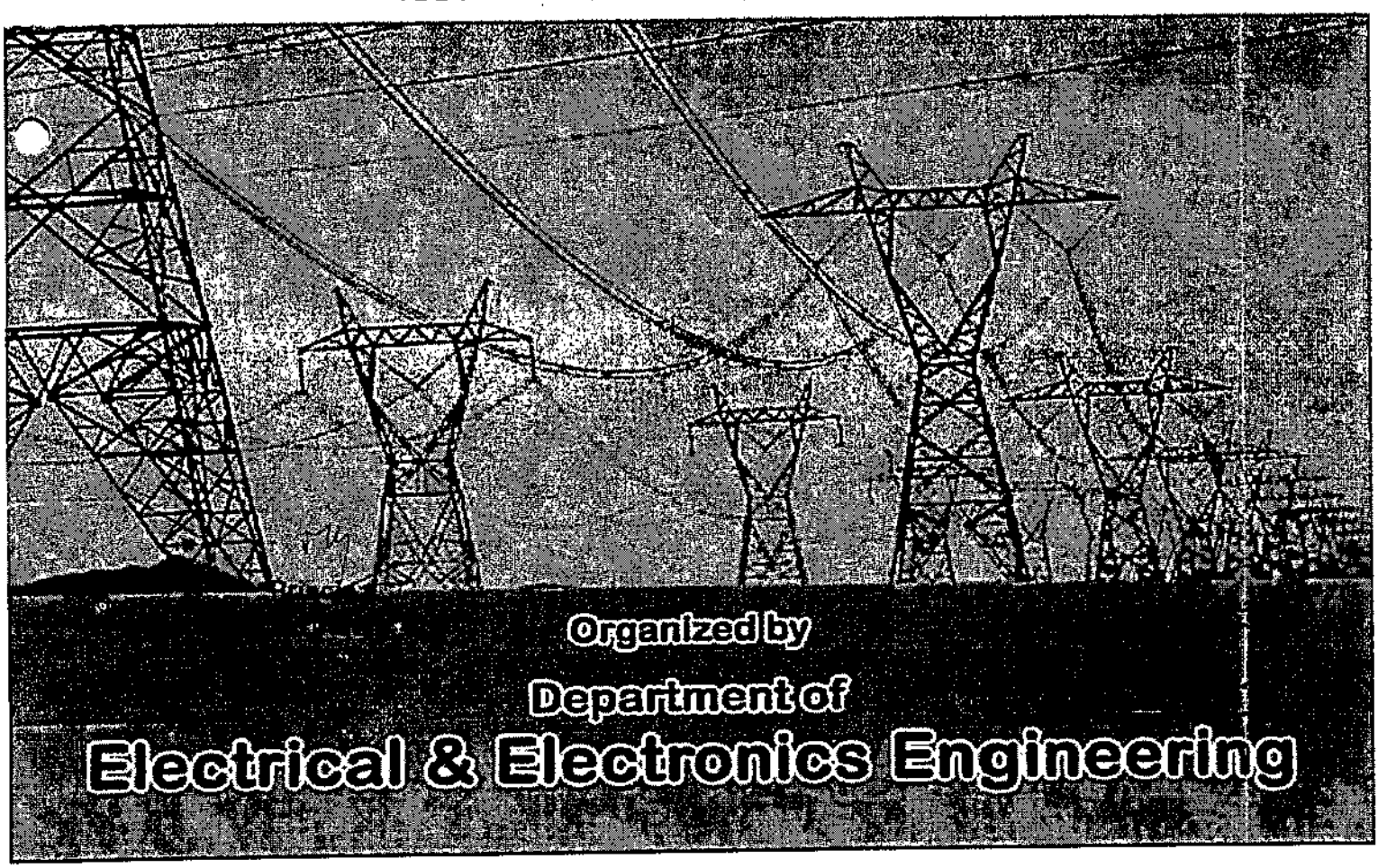

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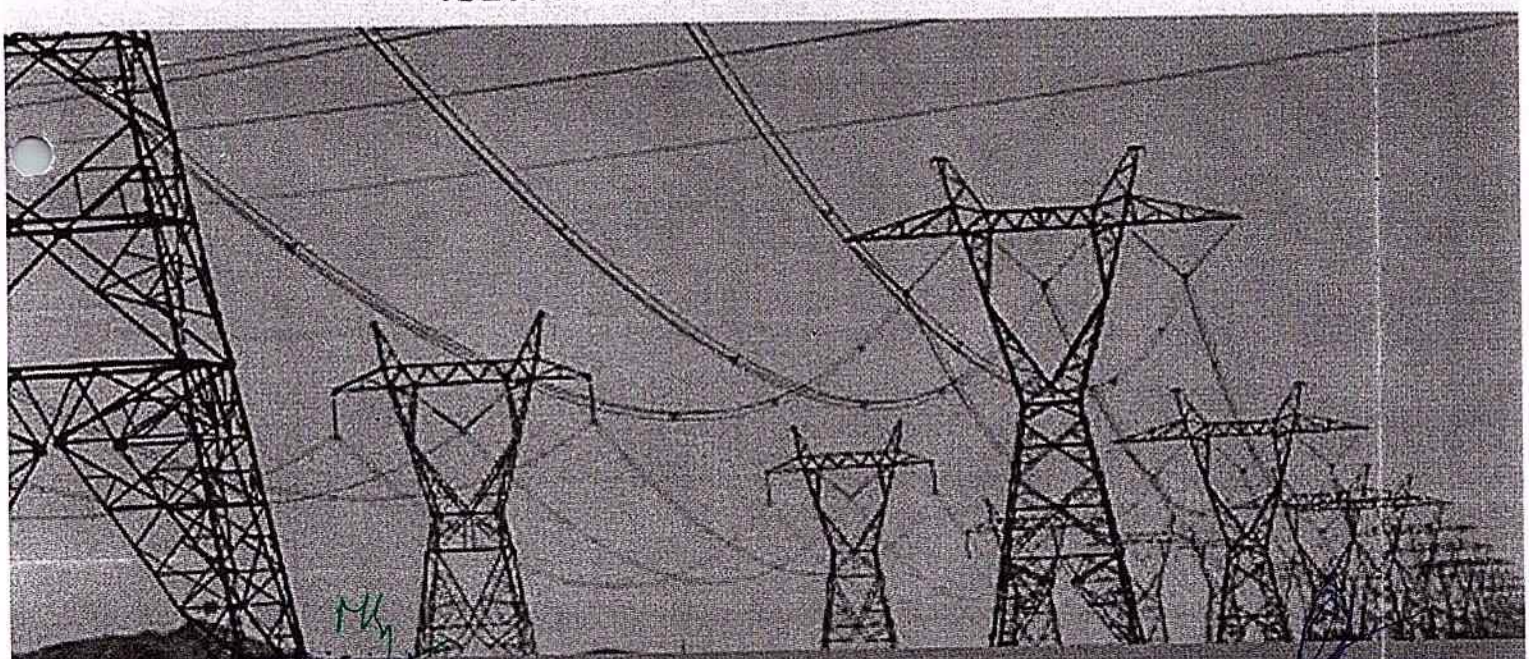

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Perceptions of Users of UDAN Scheme in Indian Civil Aviation Sector

D. Sateesh Kumar[1,a)], Mohiddin Shaw Shaik[2], B. Narayana [3], B.V. Appa Rao[1]

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Abstract. Government of India Ministry of Civil Aviation released the National Civil Aviation Policy 2016 (NCAP-16), that focuses on making flying affordable to the masses and strengthening the regional air connectivity. One of the objectives of NCAP is to enhance physical support and infrastructure development. To achieve this objective, it is required to establish and integrated ecosystem which will lead to significant growth of the civil aviation sector. In this contest Government of India released a Scheme UDAN (Ude Desh ka Aam Nagarik), which is a regional airport development and regional connectivity scheme (RCS) this scheme is aimed at making air travel affordable and wide spread, there by leading to economic development and employment in all regions of the India. Initially out of the 486 Indian airports 406 were participating in UDAN. The performance of UDAN during last two years needs to be evaluated so as to assesses whether its intended objectives are meet and suggestions for future strategies need to be given. In this contest the present study intended to ascertain the passenger perception about UDAN scheme and ascertain its roll in regional connectivity in India. To achieve this a Random sample of 555, UDAN users were taken and a structured questioner were used to obtain their opinions regarding UDAN implementation. Based on the responses the success and changes faced by UDAN scheme was assessed using descriptive data analytical tools and inferential statistical tools.
Key words: *UDAN, NCAP, RCS, Shapiro-Wilk, Levene's, Mann-Whitney U test, Likert's scale, Descriptive data tools, Inferential data tools*

INTRODUCTION

By 2004, human's beings have been travelling by air since 100 years. According to aviation analysts, the total number of aircraft currently in service including both passenger and cargo are approximately 23,600. Another estimate on aviation enthusiast website airliners.net includes all commercial and military planes excluding light aircraft claims that there are some 39,000 planes in the world and that over the course of history, there have been more than 150,000.

There are 5 major manufacturers of civil transport aircraft. Those are:

- Airbus, based in Toulouse, France
- Boeing, based in Seattle, United States of America
- Bombardier, based in Montreal, Canada
- Embraer, based in Sao Paulo in Brazil
- Tupolev, based Moscow in Russia

Objective of the paper is to analyze the impact of UDAN scheme in developing the air transport in INDIA. Government of India Ministry of Civil Aviation released the National Civil Aviation Policy 2016 (NCAP-16), that focuses on making flying affordable to the masses and strengthening the regional air connectivity. One of the objectives of NCAP is to enhance physical support and infrastructure development. To achieve this objective, it is

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Reduction of CO2 Emissions to Decelerate and Reverse Global Warming Using Mathematical Analysis

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Abstract: Understanding the problem of Future Global Carbon dioxide Emissions and arranging for the mitigation of these emissions through the regulation of human activities and the development of greenery in surroundings. This is to provide climate policy makers with smooth patterns of global carbon dioxide (CO2) emissions consistent with the UN climate targets . It needs an accessible mathematical approach to understand the problem. Global Warming is expressed in time to determine when the climate targets will be hit in case of no climate change mitigation. Based on secondary data using mathematical knowledge, this is an exponential model for the rapid reduction and long-term stabilization of Co2 emissions slightly above zero. Then, suitable interpolations are performed to ensure a smooth and flexible transition to the exponential decline, further projecting the future CO_2 emissions status and take necessary remedial measures to control climate hence making the world a better Place.

Keywords: *Reduction, Co_2, Emission, Environment*

INTRODUCTION

Carbon dioxide (CO_2), an important trace gas in Earth's atmosphere is an integral part of the carbon cycle, a biogeochemical cycle in which carbon is exchanged between the Earth's oceans, soil, rocks, and the biosphere. Solar energy is used by Plants and other photoautotrophs to produce carbohydrates from atmospheric carbon dioxide and water by photosynthesis. Carbohydrates derived from photosynthesis are the primary source of energy and carbon compounds for all other organisms.

Over the past three decades, due to the rising temperatures and the consequential spread of devastating floods, severe droughts, and ravaging wildfires, the climate change has been declared as an urgent global threat. Addressing this threat, the UN parties adopted the 2015 Paris Agreement on Climate Change along with its implementation by 2020. It was aimed that "the increase in global annual average temperature above the pre-industrial level well below 2°C and pursuing efforts to limit it further to 1.5°C". It also aimed at the reduction of greenhouse gases emissions as soon as possible. The increased anthropogenic CO2 emissions as a consequence of growing global demand for fossil fuel-based products, resulted in the atmospheric carbon dioxide (CO2) emission largely dominating the other greenhouse gases for the last 100 years. Subsequently, a need for relocation in climate policies, arranging for the reduction of these emissions by shifting to no-carbon energy and introducing cleaner technologies has become mandatory. Climate Mathematical Modelling has so far focused on the physics behind the

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Design and Modelling of Nano Particle-Based Alcohol Gas Sensors

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Abstract. This paper discusses about nano particle-based gas sensors to study the different parameters like power consumption, temperature uniformity, change in resistance, sensitivity, and selectivity. These all are estimated by measuring resistance changes as gas is spread over the surface layer. The instant response of gas detection uses in different applications like vehicle breath analyser and food quality control. The sensor is made up of with poly silicon hot plate structure and it is coated with titanium file, which detects various gases touching on it.The temperature of hot plate changes the film conductance and amount of gas absorbed on its surface. The gas sensor is configured with 3V supply voltage and micro heater temperature around 619 K. The gas is sensed by the sensor is analysed for different materials coating like ZnO, TiO2 and SnO.

Key words: Micro Heater, Gas Sensor, Nano Particles, Stress, Chemical Sensor

INTRODUCTION

A gas sensor is a tool that often as part of a safety system detects the presence of gases in an environment. Gas sensors are typically chemical sensors of vital importance. A chemical sensor is composed of an active layer and a transducer. It transforms chemical information into a different type of electronic signal such as current, frequency or voltage. Since the air around us includes various concentrations of pollutants that may be detrimental to human health, atmospheric pollutants are essential to an industrial or medical method. Therefore it is very crucial to identify the existence of such gasses. Since the world in which we live is made up of humans , plants and animals as its key inhabitants, the protection of their lives is of the highest importance. This also includes various gasses such as catalytic, thermoelectric, thermal conductivity, electrochemical, amperometry, potentiometric, optical gas sensors, infrared, semiconductor, acoustic wave, SAW-based, gas-based capacitance and metal oxide sensor. Metal oxide-based sensor is chosen among all these types of gas sensors to measure the sensitivity and selectivity needed.

The theory is based on the resistance change of a thin film when the gas molecules are adsorbed on a semiconductor surface. Gas sensor is used to detect harmful gasses, gasoline, oxygen depletion and radioactive gases and to locate possible hazardous gas leaks These sensors generally use an alarm message to warn people when a dangerous gas is detected. Gas sensing is very important for controlling pollution and for industry. The center of a gas sensing system is the heater configuration.

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Analysis of MIMO Detector Using Artificial Neural Network and Deep Neural Network

Swapna Tangelapalli[1], Pardha Saradhi P[1,a)], D. Sateesh Kumar[2], Nagaraju Dasari[3], Mohiddin Shaw Shaik[4]

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Abstract: Next generation cellular wireless communication network should be effective, ultra reliable, low latency and an intelligent Network. By using Artificial Neural Network based algorithms can be preferred to solve current wireless network problems. The most complicated problems in current wireless network possibly effectively formulated and efficiently solved using Artificial Neural Network and powerful Deep Neural Networks. The DNN approach proved to be less complex with better BER performance over traditional MIMO detectors. This paper proposes the Conventional Neural network and Deep Neural Network proceeds for implementation of MIMO detectors. The proposed method exhibits better robustness and better BER performance.

Key words: *MIMO,CNN, wireless network, SNR layers.*

INTRODUCTION

Most signal processing algorithms in communications are implemented using the mathematical models, but the deep learning don't require any mathematical traceable models for better optimization[1]. Machine Learning enhances the beauty of traditional wireless communication system. The Neural networks architecture otherwise known as universal function approximation network [3] which has magnificent capacity of learning. In multi user wireless communication network, due to large number of access points and small cell size, the network is flooded with huge data to transmit and receive. The bottleneck of wireless cellular network is management of intercell and intra cell interference. The machine learning could be applied for various concepts, for instance, modulation recognition [4], channel modeling and identification [3,4], encoding and decoding [8, 9] channel estimation etc. The branch of machine learning called as Deep Neural Network has novel architectures and might be used to learn parameters automatically and adjusts the model structures via parameter training. The traditional methods of interference cancellation techniques are with using effective MIMO receivers such as Zero Forcing (ZF) receivers, Minimum Mean square Error (MMSE) receivers, Zero forcing receiver with successive interference cancellation (ZF-SIC), MSE-SIC etc. As the wireless cellular network is loaded with huge amount of data, the complexity and computation cost is high for existing techniques. The paper is further organizes as section 2 explains the benefits of using Deep Learning for wireless cellular communication network. Section 3 gives several applications and challenges of Deep learning for wireless communications. System model for MIMO network is explained in Section 4 followed by system parameters, simulation results, discussions in Section5. Section 6 reviews the conclusions from the simulation results.

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Metallic Nano Particle Effect on Unsteady Convective MHD Flow of Radiation with Rotating Frame of Reference : A Theoretical Study

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Abstract. In this article we investigate an influence of thermal radiation on unsteady convective heat transfer flow of a TiO_2-H_2O nanofluid past a vertical plate which is semi-infinite, in the presence of constant heat source. Analytical closed form solutions are obtained for both the momentum and the energy equations using the small perturbation method. The influence of different governing physical characteristics like as magnetic field parameter, Prandtl number, heat source parameter, suction parameter, rotational parameter and Nano particle volume fraction, on velocity and temperature profiles along with the skin-friction factor and local Nusselt are presented and discussed. The influence of radiation parameter F on the nanofluid both velocity and temperature profiles for various values of TiO_2 nanoparticles are increasing across the momentum boundary layer with an increasing in F.

Keywords: *TiO_2-H_2O nanofluid, heat source, small perturbation, heat transfer.*

INTRODUCTION

Nanoparticles, which were named as ultra-fine particles during the 1970s and 1980s, have size usually less than 100 nm. When a bulk material is considered then its physical properties remain nearly constant, but in case of nanoparticles it is not true. Nanoparticles are being used in many consumer goods such as paints, cosmetics and textiles. Nanoparticles are mixed with base fluid such as water, ethylene glycol and oil, to improve its properties. This mixture of nanoparticles and base fluid which is known as nanofluid can be used in different heat transfer applications. Since the heat transfer capacity of liquids is generally far below that of solid metals or metal compounds, it is expected that the heat transport of liquid can be enhanced by suspending solid particles into it. However, some drawbacks appeared in suspensions with millimetre or micrometer particles, such as the poor dispersibility, aggregation, and sedimentation as well as adhering to inner surface of the system, which could easily lead to degradation of heat transfer performance, increases in pumping power, and even pipe block. A new opportunity to overcome these drawbacks was found when a new generation of suspension viz. nanofluid was proposed by Choi in 1995 [1]. Nanofluid is a new kind of dilute suspension containing nanoparticles whose at least one-dimensional size is below 100 nm. When the particle sizes in

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Unsteady Titanium Alloy Water-Based Nano Fluid Past an Oscillatory Moving Vertical Permeable Semi-Infinite Flat Plate with Thermophoresis Effect

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Abstract: We investigated the effect of thermo diffusion an unsteady flow of a titanium alloy water based nano fluid. Analytical solution was performed using perturbation scheme. The effects of various non-dimensional governing parameters on temperature, concentration and velocity are negotiated and reported via graphs. Moreover, we observed that an enhance in thermo diffusion causes to rise the velocity and concentration and velocity the thick ness of boundary.

Keywords: *Thermophoresis, Hall current, inclined surface, Rotation, Chemical Reaction.*

INTRODUCTION

Nanometer particles sized are collided using the heat convectional a transfer fluid to improve the thermal conductivity of the fluid is known as Nanofluid. The Nano fluids usage has been increased to reduce the drawbacks of conventional fluids. Using the low thermal fluids in industries effects losing the energy, cost, and time. But these fluids can be utilized by increasing thermal properties. These new fluids represented as nanofluids. Due to the properties of nanofluid, it has increased the usages in the era of technology [1-4]. The term angular velocity can be used in relation either to a particle that is rotating about an axis or to a set of axes that is rotating relative to another set of axes. Several authors examined in the literature about rotating frames [5-8]. Nano fluids along with the applied magnetic field has important effects and also has considerable applications in science and engineering. These include cooling of incessant filaments, in the process of drawing, hardening and thinning of copper wire. Drawing the strips through an electrically conducting fluid which is subject to a magnetic field can regulate the rate of cooling and stretching, there by expanding the desired characteristics of the final item for consumption. Lately, the researchers [9-24] distributed their precious work on the flow of assorted fluids through manifold channels.

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