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Phyto-therapeutic Heritage of Barwani: Validating Indigenous Knowledge through Quantitative Ethnomedicinal Indices

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Abstract: ***Inside the far flung tropical dry deciduous forests, medicinal plants represent a essential healthcare lifeline, sustained by means of profound cultural agree with and indigenous ecological expertise. This observes documents this "dwelling pharmacy" via analyzing the taxonomic diversity and therapeutic applications of fifty key species, bridging the space among atmosphere resilience and human fitness.The studies highlight a strategic reliance on woody perennials, in which the excessive concentration of secondary metabolites in bark (32%) and roots (20%) ensures a steady medicinal deliver even throughout deciduous dormancy. The Leguminosae complex emerged because the maximum versatile group, addressing vital conditions along with respiration (18%), gastrointestinal (16%), and dermatological (14%) illnesses. furthermore, taxa like Ficus racemosa serve as critical organic indicators of water availability in arid landscapes. With over 90% of recorded taxa owning medicinal cost, these findings underscore the necessity of integrating conventional understanding into cutting-edge conservation frameworks. Documenting those specialized survival strategies affords a foundation for future pharmacological validation and protects biodiversity in opposition to modernization and environmental degradation.***

Keywords: Ethnobotany, Tropical Dry Deciduous woodland, Medicinal vegetation, Taxonomic range, traditional know-how, Leguminosae, community Healthcare.

I. INTRODUCTION

The Indian subcontinent serves as a worldwide epicenter for medicinal plant variety, anchoring historic healthcare structures together with Ayurveda, Siddha, and Unani (Martini-Bettole 1980; Akerele 1993). Rooted in Vedic scriptures, this botanical background stays the primary supply of remedy, with the world health organisation (WHO) estimating that 80% of populations in developing nations nonetheless rely upon plant-derived drug treatments (Malik et al. 2010; Amjad et al. 2015). In India, approximately 70% of the rural population relies upon on formulations from local healers, making this flora a vital fitness necessity and a crucial economic lifeline for underprivileged groups (Pandey et al. 2013; Myers 1991). As the arena's 2nd -biggest manufacturer of medicinal vegetation, India utilizes more or less 7,500 species to broaden over 25,000 plant-primarily based formulations (Lange 1997; Balasubramanian 1997). Even as the Himalayan place is a identified biodiversity hotspot, the important Indian belts additionally harbour considerable endemic diversity maintained by using a network of over 1.5 million practitioners (Samant et al. 1998; Chauhan 2003). Those marginalized indigenous communities, often missing current medical infrastructure, continue to be the number one custodians of this colossal ethnobotanical know-how (Khoshoo 1991; WHO 2002). But, speedy developmental sports and socio-cultural shifts pose a severe danger to this oral lifestyle, main to the sluggish loss of ancestral knowledge (Shankar 1995; Cox 2000). Considering many modern prescribed drugs along with aspirin and quinine—originated from herbal treatments, the systematic documentation and phytochemical profiling of those plants are vital for future drug discovery (Mukherjee 2003a; Patwardhan et al. 2004). Protecting this "dwelling pharmacy" via bio-prospection is now a global precedence to make certain the identity of recent pharmacologically lively compounds and the sustainability of traditional healthcare (pleasure et al. 2001; Rana et al. 2019).

II. RESEARCH OBJECTIVES

1) To Quantify Taxonomic Diversity and Habit Distribution
2) To Evaluate Seasonal Medicinal Reliability.
3) To Categorize Therapeutic Applications.

4) To Identify Bio-Indicators of Ecosystem Health.
5) To Establish a Foundation for Pharmacological Validation.
6) To Propose Integrated Conservation Frameworks.

III.REVIEW OF LITERATURE

The Sendhwa subdivision and the broader Nimar region of Madhya Pradesh represent a critical intersection of biodiversity and indigenous knowledge, where the Bhil, Bhilala, and Barela communities maintain a sophisticated "living pharmacy" (Sainkhediya and Ray, 2012; Sisodiya and Sainkhediya, 2018). These groups rely on the diverse flora of the Satpura hill ranges and Narmada valley, utilizing an intricate understanding of plant phenology across families such as Fabaceae, Euphorbiaceae, and Malvaceae to treat over 13 ailment categories (Ahirwar and Sainkhediya, 2021). Despite this rich heritage, the region faces a crisis of continuity due to rapid urbanization and the erosion of oral transmission among younger generations (Shankar, 1995; Pandey, 2002). To address this "knowledge erosion," recent research has adopted rigorous quantitative methodologies, employing indices like Relative Frequency of Citation (RFC) and Fidelity Level (FL) to statistically validate traditional claims (Rana et al., 2019; Mukherjee, 2005). The documentation of approximately 78 medicinal species including 21 with previously unreported therapeutic uses—positions the Barwani district as a high-priority zone for bio-prospection and drug discovery (Cox, 2000; Mukherjee, 2003). By bridging the gap between ancient wisdom and modern clinical science, these studies not only safeguard indigenous intellectual property but also provide a structured roadmap for phytochemical profiling and the conservation of the Satpura and Narmada habitats (WHO, 2002; Samant et al., 1998).

The study adopted an integrated climate-vegetation assessment and ethnobotanical framework to evaluate the relationship between thermal stress and forest resilience in Madhya Pradesh. Climatic data, including mean temperature and heatwave frequency, were sourced from the Indian Meteorological Department (IMD), while Land Surface Temperature (LST) and NDVI (Normalized Difference Vegetation Index) were derived from NASA MODIS datasets to quantify spatio-temporal stress patterns and canopy health. To validate the medicinal utility of the flora, structured interviews and field surveys were conducted with local "Vaids" and tribal communities (Bhil, Bhilala, and Barela), utilizing quantitative indices such as the Relative Frequency of Citation (RFC) and Fidelity Level (FL). Statistical and geospatial analyses (GIS) were then employed to correlate thermal anomalies with forest fire incidence and vegetation browning, ultimately identifying ecological tipping points and early warning signals of potential ecosystem collapse.

IV.METHODOLOGY

The study adopted an integrated climate-vegetation assessment and ethnobotanical framework to evaluate the relationship between thermal stress and forest resilience in Madhya Pradesh. Climatic data, including mean temperature and heatwave frequency, were sourced from the Indian Meteorological Department (IMD), while Land Surface Temperature (LST) and NDVI (Normalized Difference Vegetation Index) were derived from NASA MODIS datasets to quantify spatio-temporal stress patterns and canopy health. To validate the medicinal utility of the flora, structured interviews and field surveys were conducted with local "Vaids" and tribal communities (Bhil, Bhilala, and Barela), utilizing quantitative indices such as the Relative Frequency of Citation (RFC) and Fidelity Level (FL). Statistical and geospatial analyses (GIS) were then employed to correlate thermal anomalies with forest fire incidence and vegetation browning, ultimately identifying ecological tipping points and early warning signals of potential ecosystem collapse.

V. RESULT AND DISCUSSION

This ethnobotanical dataset provides a comprehensive look at the traditional medicinal landscape of tropical deciduous flora. The table enumerates 50 plant species across diverse taxonomic families, highlighting their vernacular names, biological forms, and therapeutic applications. The collection is characterized by a high utility of woody perennials (trees) and a focus on treating common community ailments like respiratory issues, digestive disorders, and skin diseases using locally available natural resources.

The study region is characterized with the aid of a high degree of taxonomic and structural diversity, with a plants profile ruled by arboreal species (58%, 29 species). This dominance of woody perennials reflects a forest-centric medicinal system wherein the canopy serves because the number one reservoir for raw substances together with bark, gums, and huge-scale fruit harvests. The understory, comprised of shrubs (32%) and specialized climbers/lianas (10%), which include taxa along with Celastrus and Abrus, offers extra available sources like leaves and roots. The Leguminosae complicated (Fabaceae, Mimosaceae, and Caesalpiniaceae) emerged because the maximum versatile botanical institution, contributing 12 species with a extensive therapeutic spectrum ranging from respiration management to reproductive fitness.

The usage sample of plant elements famous a strategic reliance on bark (32%) and roots (20%), likely because of their high concentration of bioactive tannins and alkaloids, which make certain medicinal potency during the deciduous dormant phase. while culmination and seeds (24%) are predominantly targeted for metabolic disorders, leaves (16%) stay the favored preference for rapid-relief decoctions and topical dermatological applications. other specialized exudates and reproductive structures, which includes Madhuca vegetation and Calotropis latex, constitute 8% of the medicinal arrangements, highlighting a numerous extraction method tailored to the biochemical properties of the flora.

Therapeutically, the flora addresses a huge spectrum of network fitness priorities, with the breathing machine (18%) representing the very best remedy frequency (e.g., *Adhatoda, Acacia, and Helicteres*). that is observed closely by means of gastrointestinal problems (16%) and dermatological issues (14%), utilizing hardy species like *Aegle marmelos and Azadirachta indica*. appreciably, the consistent software of 5 species each for diabetes and malarial fever underscores the vital function of this "living pharmacy" in handling both continual metabolic situations and acute infectious illnesses within indigenous healthcare frameworks. The vegetation profile of the study vicinity represents a climax dry deciduous wooded area atmosphere, characterized through the dominance of the Leguminosae complex (Mimosaceae, Fabaceae, and Caesalpiniaceae), which affords vital nitrogen fixation for nutrient-negative soils. The structural hierarchy is defined by means of a large cover of species like *Bombax ceiba and Haldina cordifolia,* supported by using a resilient understory of hardy shrubs such as Helicteres isora. about 30% of the taxa, including *Acacia and Capparis*, show off superior xerophytic diversifications consisting of thorns and decreased leaf floor location—to face up to prolonged seasonal drought.

Furthermore, the presence of *Ficus racemosa and Holoptelea integrifolia* serves as a essential biological indicator of riparian zones and excessive underground water tables within this otherwise arid landscape. Taxonomically, the plants is enriched with the aid of families inclusive of Malvaceae, Moraceae, and Sapotaceae, which make contributions widespread wood, commercial, and resinous value to the woodland structure. The middle and understory layers are strengthened by means of drought-resistant families like Acanthaceae and Rubiaceae, which focus on surviving water shortage via deciduousness and deep-rooting systems. This diverse botanical assemblage holds significant ethnobotanical importance, with over ninety% of the species documented for medicinal use. The excessive incidence of bark and root usage reflects a strategic reliance on tissues with excessive concentrations of secondary metabolites (tannins and alkaloids), ensuring the availability of effective healing resources even all through the dormant deciduous phase.

Table-1: Taxonomic Diversity

Family	*Genera/Species*	*Typical Habit*
Mimosaceae	*Acacia (3), Albizia*	*Trees/Shrubs*
Fabaceae	*Abrus, Butea, Dalbergia, Desmodium, Indigofera*	*Climbers, Trees, Shrubs*
Caesalpiniaceae	*Bauhinia, Caesalpinia, Cassia*	*Trees, Prickly Shrubs*
Malvaceae	*Abelmoschus, Bombax, Kydia*	*Herbs, Large Trees*
Moraceae	*Ficus benghalensis, Ficus racemosa*	*Large Trees*
Acanthaceae	*Adhatoda, Barleria*	*Shrubs/Undershrubs*
Anacardiaceae	*Buchanania, Lannea*	*Deciduous Trees*
Rubiaceae	*Catunaregam, Haldina*	*Shrubs, Large Trees*
Asclepiadaceae	*Calotropis gigantea, Calotropis procera*	*Milky Shrubs*
Burseraceae	*Boswellia, Garuga*	*Resinous Trees*
Other Families	*Aegle, Azadirachta, Madhuca, etc.*	*Diverse*

Table-2: Medicinal plants of the area

Sn	Botanical Name / Family	Local Name	Life Form	Part Used	Medicinal Uses
1.	Abelmoschus ficulneus (Malvaceae)	Ban Bhindi	Shrub	Seeds	Asthma
2.	Abrus precatorius (Fabaceae)	Ratti	Climber	Roots, Seeds	Cough, Cold,
3.	Acacia catechu (Mimosaceae)	Khair	Tree	Bark, Leaves	Asthma, Bronchitis
4.	Acacia farnesiana (Mimosaceae)	Bilayti	Tree	Roots, Bark	Malarial fever
5.	Acacia nilotica (Mimosaceae)	Babool	Tree	Bark, Gum	Dysentery, Skin

6.	Adhatoda zeylanica (Acanthaceae)	Adoosa	Shrub	Leaves	Asthma, Bronchitis
7.	Aegle marmelos (Rutaceae)	Bel	Tree	Fruits	Dysentery, Diabetes
8.	Aerva lanata (Amaranthaceae)	Gorakh	Shrub	Whole Plant	Urinary trouble
9.	Ailanthus excelsa (Simaroubaceae)	Maharukh	Tree	Bark	Bronchitis
10.	Alangium salvifolium (Alangiaceae)	Ankol	Tree	Leaves	Rheumatic pain
11.	Albizia lebbeck (Mimosaceae)	Siris	Tree	Bark	Diarrhoea,Dysentery
12.	Annona squamosa (Annonaceae)	Sitaphal	Shrub	Seeds, Bark	Insecticidal
13.	Anogeissus latifolia (Combretaceae)	Dhawda	Tree	Gum	Colic pain
14.	Azadirachta indica (Meliaceae)	Neem	Tree	Whole Plant	Skin disease
15.	Barleria prionitis (Acanthaceae)	Pili Kateli	Shrub	Leaves	Toothache
16.	Bauhinia racemosa (Caesalpiniaceae)	Phalesa	Tree	Bark	Diarrhoea
17.	Bombax ceiba (Bombacaceae)	Semal	Tree	Bark, Gum	Pimples, Boils
18.	Boswellia serrata (Burseraceae)	Salai	Tree	Gum	Epilepsy, Skin
19.	Buchananiacochinchinensis (Anacardiaceae)	Aachar	Tree	Seeds	Tonic, Skin diseases
20.	Butea monosperma (Fabaceae)	Palas	Tree	Flowers	Contraceptive,
21.	Caesalpinia bonduc (Caesalpiniaceae)	Sagargota	Climber	Seeds	Malarial fever
22.	Calotropis gigantea (Asclepiadaceae)	Aak	Shrub	Latex, Roots	Leprosy, Skin care
23.	Calotropis procera (Asclepiadaceae)	Akav	Shrub	Roots, Latex	Asthma, Diarrhoea
24.	Capparis zeylanica (Capparaceae)	Hurhur	Climber	Roots, Bark	Piles, Anthelmintic
25.	Careya arborea (Lecythidaceae)	Kumbhi	Tree	Bark	Cuts, Wounds
26.	Casearia tomentosa (Flacourtiaceae)	Kirchi	Tree	Bark	Anthelmintic
27.	Cassia fistula (Caesalpiniaceae)	Amaltas	Tree	Fruits, Seeds	Diabetes, Dysentery
28.	Catunaregam spinosa (Rubiaceae)	Mainphal	Tree	Roots	Rheumatic pain
29.	Celastrus paniculatus (Celastraceae)	Malkagani	Liana	Seed oil	Eczema, Body pain
30.	Clerodendrum cordatum (Verbenaceae)	Bhant	Shrub	Leaves	Malarial fever
31.	Cochlospermum religiosum (Cochlospermaceae)	Galgal	Tree	Bark	Jaundice
32.	Cordia dichotoma (Ehretiaceae)	Lasoora	Tree	Fruits	Lung disorders
33.	Crytoplepis buchananii (Periplocaceae)	Nagbel	Shrub	Roots	Epilepsy, fever
34.	Dalbergia sissoo (Fabaceae)	Sheesham	Tree	Leaves	Gonorrhoea, Leprosy
35.	Desmodium gangeticum (Fabaceae)	Sarivan	Shrub	Roots	Vomiting, Fever
36.	Diospyros melanoxylon (Ebenaceae)	Temru	Tree	Fruits	Urinary complaints
37.	Ficus benghalensis (Moraceae)	Bargad	Tree	Latex, Bark	Gum , Diabetes
38.	Ficus racemosa (Moraceae)	Gular	Tree	Fruits	Piles, Diarrhoea
39.	Flacourtia indica (Flacourtiaceae)	Bilanga	Shrub	Bark	Jaundice
40.	Garuga pinnata (Burseraceae)	Kakad	Tree	Fruits	Diabetes
41.	Grewia hirsuta (Tiliaceae)	Gursukti	Shrub	Roots	Venereal diseases
42.	Haldnia cordifolia (Rubiaceae)	Haldu	Tree	Whole Plant	Jaundice
43.	Helicteres isora (Sterculiaceae)	Marorphali	Shrub	Fruits	Colic pain, Asthma
44.	Holarrhena pubescens (Apocynaceae)	Dudhi	Tree	Bark	Malarial fever
45.	Holoptelea integrifolia (Ulmaceae)	Chilbil	Tree	Bark	Bone fractures
46.	Indigofera tinctoria (Fabaceae)	Neel	Shrub	Roots	Liver disorders
47.	Jatropha curcas (Euphorbiaceae)	Arand	Shrub	Leaves	Wounds, Skin
48.	Kydia calycina (Malvaceae)	Baranga	Tree	Bark	Rheumatic pain
49.	Lannea coromendelica (Anacardiaceae)	Jhingan	Tree	Bark	Ulcer sores
50.	Madhuca longifolia (Sapotaceae)	Mahua	Tree	Flowers, Bark	Jaundice, Bronchitis

VI. CONCLUSIONS

The flora profile of the observe location represents a climax dry deciduous woodland ecosystem, characterised by the dominance of the Leguminosae complex (Mimosaceae, Fabaceae, and Caesalpiniaceae), which affords critical nitrogen fixation for nutrient-bad soils. The structural hierarchy is described by using a large cover of species like Bombax ceiba and *Haldina cordifolia,* supported with the aid of a resilient understory of hardy shrubs consisting of *Helicteres isora.*

About 30% of the taxa, which includes Acacia and Capparis, showcase superior xerophytic diversifications which include thorns and reduced leaf floor area to withstand prolonged seasonal drought. Moreover, the presence of *Ficus racemosa* and *Holoptelea integrifolia* serves as an important organic indicator of riparian zones and excessive underground water tables inside this in any other case arid panorama. Taxonomically, the flowers is enriched by households including Malvaceae, Moraceae, and Sapotaceae, which make a contribution huge wood, commercial, and resinous value to the wooded area structure. The middle and understory layers are bolstered with the aid of drought-resistant families like Acanthaceae and Rubiaceae, which concentrate on surviving water shortage via deciduousness and deep-rooting structures. This various botanical assemblage holds tremendous ethnobotanical significance, with over ninety% of the species documented for medicinal use. The high incidence of bark and root utilization displays a strategic reliance on tissues with excessive concentrations of secondary metabolites (tannins and alkaloids), ensuring the availability of strong therapeutic assets even for the duration of the dormant deciduous section.

VII. ACKNOWLEDGMENT

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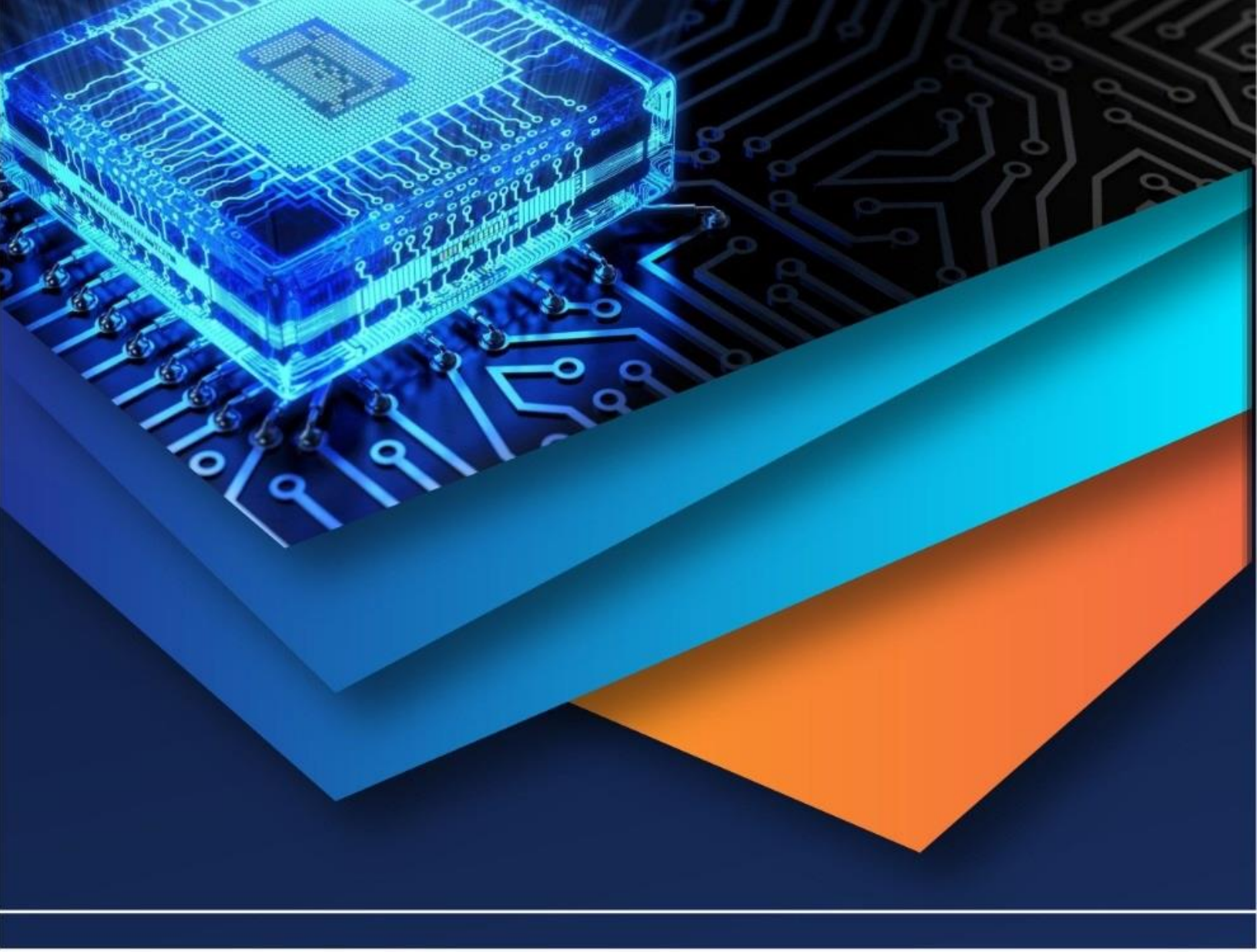

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