iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 13 **Issue:** V **Month of publication:** May 2025

DOI: https://doi.org/10.22214/ijraset.2025.70192

www.ijraset.com

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue V May 2025- Available at www.ijraset.com

Formulation and Evaluation of Polyherbal Powder Bodywash

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Abstract: ***This research explores the creation and assessment of a natural polyherbal body wash containing colloidal oatmeal, rose powder, and vetiver powder, each known for beneficial effects on the skin. Colloidal oatmeal offers hydration and reduces inflammation, rose powder contributes antioxidant and astringent actions, while vetiver powder provides antimicrobial, cooling, and detoxifying benefits. The formulation incorporated natural surfactants and underwent evaluation for critical physicochemical traits like pH, viscosity, and foam stability. Sensory testing and consumer feedback revealed good cleansing performance and a pleasant skin feel. Antioxidant assays confirmed the presence of compounds that defend against oxidative stress, and clinical studies showed significant improvements in skin hydration and smoothness, with no negative reactions. The findings emphasize the product's promise as a gentle, effective, and environmentally friendly option for skincare.***
Keywords: Bodywash, skin care, polyherbal formulation, rose petal powder, vetiver powder, colloidal oat meal,

I. INTRODUCTION

A. Background and Importance of Herbal Skincare

1) Growth of Herbal Cosmetics and Natural Skin Products

Herbal cosmetics are beauty and skincare products formulated with plant-based ingredients such as extracts, oils, and natural minerals, offering therapeutic effects without relying on synthetic chemicals.

Reasons Behind the Popularity of Herbal Skincare:

a) Health Concerns Over Chemical Ingredients:

- Many commercial products contain substances like sulfates, parabens, and artificial fragrances, which are known to irritate the skin and cause long-term issues.
- Common surfactants like SLS and SLES remove essential skin oils, leading to dryness and damaged skin barriers.

b) Rising Demand for Natural Alternatives:

- People are leaning toward clean, cruelty-free, and organic skincare choices.
- Herbal ingredients supply antioxidants and nutrients with minimal risk of side effects.

c) Influence of Traditional Healing Practices:

- Herbal systems like Ayurveda and Chinese medicine have long used natural ingredients such as rose, vetiver, and oatmeal for skincare.
- These herbs are known for their purifying, soothing, and moisturizing properties.

d) Eco-Conscious Consumer Behavior:

- Herbal products promote sustainability through biodegradable components.
- There is a shift towards low-waste packaging, water-free formulations, and ethical sourcing.

2) Benefits of Using a Herbal Body Wash

a) Disadvantages of Conventional Body Washes:

- Often include harsh surfactants (e.g., SLS, ALS) that dry out the skin.
- May contain synthetic fragrances and colors that trigger allergies.
- Use of preservatives like parabens is linked to hormonal imbalance and irritation.

b) Benefits of Herbal Body Washes:

- Gentle on the skin and free from harsh additives, making them suitable for sensitive skin.

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- Provide natural hydration and skin-soothing effects with ingredients like rose, vetiver, and oatmeal.
- Eco-friendly and sustainable due to waterless formulas and minimal packaging waste.

Powder vs. Liquid Body Wash:

Table No. 1

Feature	Powder-Based Herbal Body Wash	Conventional Liquid Body Wash
Formulation	Made of dried, powdered herbs	Contains water, surfactants, preservatives
Shelf Life	Longer (due to absence of water)	Shorter (prone to microbial growth)
Preservative Use	Minimal or none	Requires synthetic preservatives
Environmental Impact	Sustainable, biodegradable	High plastic waste, water usage

3) Market Trends and Consumer Preferences

a) Global Market Growth

- Herbal skincare is a rapidly growing cosmetic segment.
- Expected to reach USD 175.61 billion by 2030 with a 13.3% CAGR (2025–2030).
- Rising demand for natural and organic personal care.

b) Consumer Preferences

- Clean Beauty
  - Consumers avoid harsh chemicals.
  - Transparent, eco-conscious brands are favoured.
- Multi-Functional Products
  - Herbal powders offer cleansing, exfoliation, and nourishment.
  - Users prefer simple, all-in-one solutions.
- Sustainable, Waterless Beauty
  - Powder forms save water and reduce waste.
  - Shift toward eco-friendly packaging (refillable, biodegradable, glass).

B. Importance Of Key Ingredients In The Formulation

Herbal body washes derive their effectiveness from natural ingredients with skin-benefiting properties. This formulation features rose petal powder, vetiver root powder, and colloidal oatmeal, each offering distinct dermatological advantages.

1) Rose Petal Powder (Rosa damascena)

- Botanical Name:*Rosa damascena*
- Family: Rosaceae
- Key Compounds: Flavonoids, phenolics, vitamin C, tannins, essential oils

Key Skin Benefits:

- Antioxidant protection (neutralizes free radicals)
- Hydration and moisture retention
- Skin brightening and astringent effect
- Soothing aromatherapeutic properties

2) Vetiver Root Powder (Chrysopogonzizanioides)

- Botanical Name:Chrysopogonzizanioides
- Family:Poaceae
- Key Compounds: Sesquiterpenes, vetiverol, khusimol, tannins

Key Skin Benefits:

- Detoxifying and antibacterial cleansing
- Anti-inflammatory and soothing effect

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- Hydration through moisture retention
- Calming aromatherapeutic effect

3) Colloidal Oatmeal (Avena sativa)

- Botanical Name:*Avena sativa*
- Family:Poaceae
- Key Compounds: Beta-glucans, avenanthramides, saponins

Key Skin Benefits:

- Moisturizing and skin barrier repair
- Anti-itch and anti-inflammatory action
- Gentle cleansing with natural surfactant

C. Need For A Polyherbal Powder Body Wash

Growing concerns about synthetic skincare have increased interest in natural, eco-friendly alternatives. A polyherbal powder body wash offers better skin benefits, safety, and sustainability compared to liquid cleansers.

1) Drawbacks of Synthetic Liquid Body Washes

a) Harsh Chemicals

- SLS/SLES and preservatives can dry out and irritate skin.

b) Fragrances and Dyes

- Often cause allergies and sensitivity.

c) High Water Content

- Requires chemical preservatives and increases spoilage risk.

d) Environmental Impact

- Comes in plastic packaging and has a higher carbon footprint.

2) Why Choose Powder-Based Herbal Wash

a) Gentle, Surfactant-Free

- Uses natural cleansers, safe for sensitive skin.

b) Preservative-Free

- No water means no need for synthetic preservatives.

c) Customizable & multi-use

- Can be mixed with water, milk, or gels for tailored skincare.

d) Long Shelf Life

- Water-free formula resists spoilage.

e) Eco-Friendly

- Minimal packaging, low transport impact, and saves water.

3) Benefits of a Polyherbal Blend

- Multiple herbs work synergistically to cleanse, soothe, and nourish better than single-ingredient products

Table No. 2

Ingredient	Primary Benefits
Rose Petal Powder	Hydrates, brightens, and protects against free radicals.
Vetiver Root Powder	Detoxifies, cools, and calms skin irritation.
Colloidal Oatmeal	Soothes, moisturizes, and relieves inflammation.

II. LITERATURE REVIEW

The growing interest in natural and sustainable skincare has led to increased research into herbal-based formulations. This literature survey reviews existing studies on polyherbal cleansing products, focusing on the benefits of rose petal powder, vetiver root powder, and colloidal oatmeal, while identifying gaps that your research aims to address.

1) Blessy Jacob et al. (2023). "Formulation and Evaluation of a Polyherbal Shower Gel Using Mango Butter and Cucumber Extract." This study developed a polyherbal shower gel incorporating mango butter and cucumber extract, evaluated for colour, consistency, foamability, viscosity, pH, and spreadibility. The formulation showed favourable physicochemical characteristics and skin compatibility.
2) Pawar et al. (2019). "Formulation and Evaluation of Polyherbal Soap Containing Sandalwood and Orange Peel Extracts." This research focused on a polyherbal soap combining sandalwood and orange peel, assessing organoleptic properties, pH, foam stability, and antimicrobial activity. The soap exhibited good cleansing and antimicrobial properties.
3) Lee et al. (2018). "Anti-inflammatory Effects of Rosa Gallica Petal Extract Against Solar UV-Induced Skin Inflammation." This study explored rose petal extract for its skin-protective effects, showing that it significantly reduced COX-2 expression and inflammatory cytokine production, attributed to its high anthocyanin and polyphenol content.
4) Cerio et al. (2010). "Mechanism of Action and Clinical Benefits of Colloidal Oatmeal in Dermatologic Practice." The review examined colloidal oatmeal's applications in dermatology, highlighting its anti-inflammatory and antioxidative properties, particularly in treating pruritus, atopic dermatitis, and dry skin.
5) Mansi Grover et al. (2021). "Pharmacognostic Evaluation of Vetiver Root for Skincare Applications." This study evaluated vetiver root extract for its antimicrobial, anti-inflammatory, and antioxidant properties, with sesquiterpenes and phenolic compounds being the key contributors.
6) Singh, R., et al. (2021). "Formulation and Evaluation of Herbal Cleansing Powders Using Natural Ingredients." This study focused on powder-based herbal cleansers, evaluating foamability, pH, cleansing efficiency, and microbial stability. The study found that herbal powders offer satisfactory cleansing with fewer synthetic additives.
7) Aithal, A. et al. (2020). "Polyherbal Formulations: Synergistic Potentials and Modern Applications." This review highlighted the synergistic effects of combining herbs in formulations to enhance efficacy, emphasizing the need for experimental validation of such combinations.

III. MATERIALS AND METHODS

A. *Ingredients and Their Role in the Polyherbal Powder Body Wash:*

A polyherbal powder body wash utilizes natural botanical ingredients known for their cleansing, soothing, and therapeutic benefits. Unlike traditional liquid body washes that contain synthetic surfactants and preservatives, this powder formulation offers a gentle, effective cleansing experience while promoting skin health and nourishment. The key ingredients are selected for their anti-inflammatory, antioxidant, and antimicrobial properties, ensuring a product that provides more than just cleansing. Additionally, the powder-to-liquid format enhances shelf life, sustainability, and eliminates harsh chemicals.

Key Ingredients:

1) *Rose Petal Powder:*

- Chemical Composition: Contains polyphenols, flavonoids, vitamins A, C, and E, as well as natural tannins with astringent properties.
- Source: Dried and powdered petals of *Rosa damascena* or *Rosa centifolia*.
- Functions & Properties:
  - Offers antioxidant and anti-inflammatory effects.
  - Acts as a mild exfoliant and brightens skin.
  - Natural antibacterial properties and pleasant fragrance.
- Applications: Commonly used in face masks, scrubs, and bath powders. Included in body washes for skin rejuvenation.
- Collection: Harvested by drying and grinding rose petals into a fine powder.

2) *Vetiver Root Powder:*

- Chemical Composition: Contains vetiverol, sesquiterpenes, polyphenols, essential oils
- Source: Dried and ground roots of *Chrysopogonzizanioides* (Vetiver grass).

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- Functions & Properties:
  - Cooling and soothing effects on the skin.
  - Natural deodorizing and antimicrobial action.
  - Applications: Used in herbal body powders, soaps, and skin-cooling products,
  - Collection: Harvested by drying and grinding vetiver roots into a fine powder.

3) Colloidal Oatmeal:

- Chemical Composition: Rich in polysaccharides, beta-glucans, proteins, lipids, and avenanthramides.
- Source: Made from finely ground *Avena sativa* (oats).
- Nature & Structure: Micronized whole oat flour, processed to retain bioactive compounds, with good water retention capacity.
- Functions & Properties:
  - Anti-inflammatory and soothing for irritated skin.
  - Moisturizing and forms a protective barrier on the skin.
  - Acts as a natural emulsifier and thickener.
  - Applications: Used in lotions, bath soaks, body washes, and anti-itch creams; common in eczema and psoriasis treatments.
  - Collection: Available from suppliers such as Blend it Raw on Amazon.

4) Sodium Cocoyl Isethionate (SCI):

- Chemical Formula: C2H6O4SNa
- Nature & Structure: A mild anionic surfactant derived from coconut oil and isethionic acid, with an amphiphilic structure.
- Functions & Properties:
  - Surfactant, foaming agent, and emulsifier.
  - Provides gentle cleansing with low irritation.
  - High biodegradability and eco-friendly profile.
- Applications: Used in syndet bars, shampoos, and liquid cleansers, especially for sulfate-free formulations.
- Source: Derived from coconut oil (*Cocos nucifera*).

5) Sodium Lauryl Sulfoacetate (SLSA):

- Chemical Formula: C14H27NaO5S
- Source: Extracted from coconut oil and palm kernel oil.
- Nature & Structure: An anionic surfactant containing a sulfoacetate group, making it milder than sulfates like SLS.
- Functions & Properties:
  - Excellent foaming and cleansing properties.
  - Gentle on the skin, suitable for sensitive formulations.
  - Readily biodegradable and less irritating than SLS.
  - Applications: Used in shampoos, bath bombs, body washes, and facial cleansers.

6) Maize Starch (Cornstarch):

- Chemical Formula: $(C_6H_{10}O_5)_n$
- Source: Derived from the endosperm of maize (Zea mays).
- Nature & Structure: A carbohydrate polymer made of amylose and amylopectin, insoluble in cold water but forms a gel upon heating.
- Functions & Properties:
  - Absorbs excess moisture, acting as a drying agent.
  - Provides a silky feel in cosmetic formulations.
  - Used as a natural thickener and stabilizer.
  - Applications: Used in baby powders, dry shampoos, and body powders; acts as a binder in pressed powders.

7) Guar Gum:

- Chemical Formula: (C6H10O5) n
- Source: Extracted from *Cyamopsis tetragonoloba* (Guar beans).
- Nature & Structure: A high-molecular-weight polysaccharide that is water-soluble and thickens formulations.
- Functions & Properties:
  - Improves texture and stability in formulations.
  - Conditions skin by forming a protective film.
  - Works as a natural binder and suspending agent.
  - Applications: Used in shampoos, body washes, lotions, and soaps.

8) Rose Oil (Fragrance):

- Chemical Composition: Rich in citronellol, geraniol, nerol, and phenylethanol, with antioxidants and anti-inflammatory compounds.
- Source: Extracted from Rosa damascena or Rosa centifolia petals by steam distillation.
- Functions & Properties:
  - Antibacterial, anti-aging, and hydrating effects.
  - Provides a natural fragrance and reduces skin redness.
  - Applications: Used in perfumes, skin care products, and aromatherapy; incorporated in bath oils and creams.

9) Citric Acid:

- Chemical Formula: C6H8O7
- Source: Extracted from citrus fruits (lemons, oranges, limes).
- Nature & Structure: A weak organic acid, available in anhydrous or monohydrate form.
- Functions & Properties:
  - pH adjuster, preservative, and chelating agent.
  - Enhances exfoliation and prevents oxidation.
  - Applications: Used in bath bombs, shampoos, exfoliating products, and skin-brightening formulations.

10) Baking Soda (Sodium Bicarbonate):

- Chemical Formula: NaHCO3
- Source: Naturally occurring in trona mineral deposits or synthesized from sodium carbonate.
- Nature & Structure: An alkaline compound that is soluble in water, releasing carbon dioxide when mixed with acids.
- Functions & Properties:
  - Mild abrasive and odour-neutralizing.
  - Has antifungal and antibacterial properties.
  - Applications: Used in deodorants, toothpaste, and bath products; a key ingredient in bath fizzers.

11) Sodium Benzoate:

- Chemical Formula: C_6H_5COONa
- Source: Synthesized from benzoic acid or found in some fruits like cranberries and plums.
- Nature & Structure: A sodium salt of benzoic acid, highly soluble in water.
- Functions & Properties:
  - Acts as a preservative, inhibiting bacterial, yeast, and mold growth.
  - Extends shelf life and protects formulations from spoilage.
  - Applications: Used in cosmetics, shampoos, body washes, and lotions to prevent microbial contamination.

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue V May 2025- Available at www.ijraset.com

IV. FORMULATION AND CONSIDERATIONS

A polyherbal powder body wash is created by carefully choosing and combining natural components that help cleanse, exfoliate, and nourish the skin. The main goal is to develop a powder-to-liquid cleanser that is reliable, efficient, and easy to use while adhering to eco-friendly and natural skincare trends.

A. Formulation Development Process:

This section describes how to create a homogenous powder formulation by choosing ingredients, figuring out proportions, and using blending processes.

It consists of:

- Weighing and Preparation:

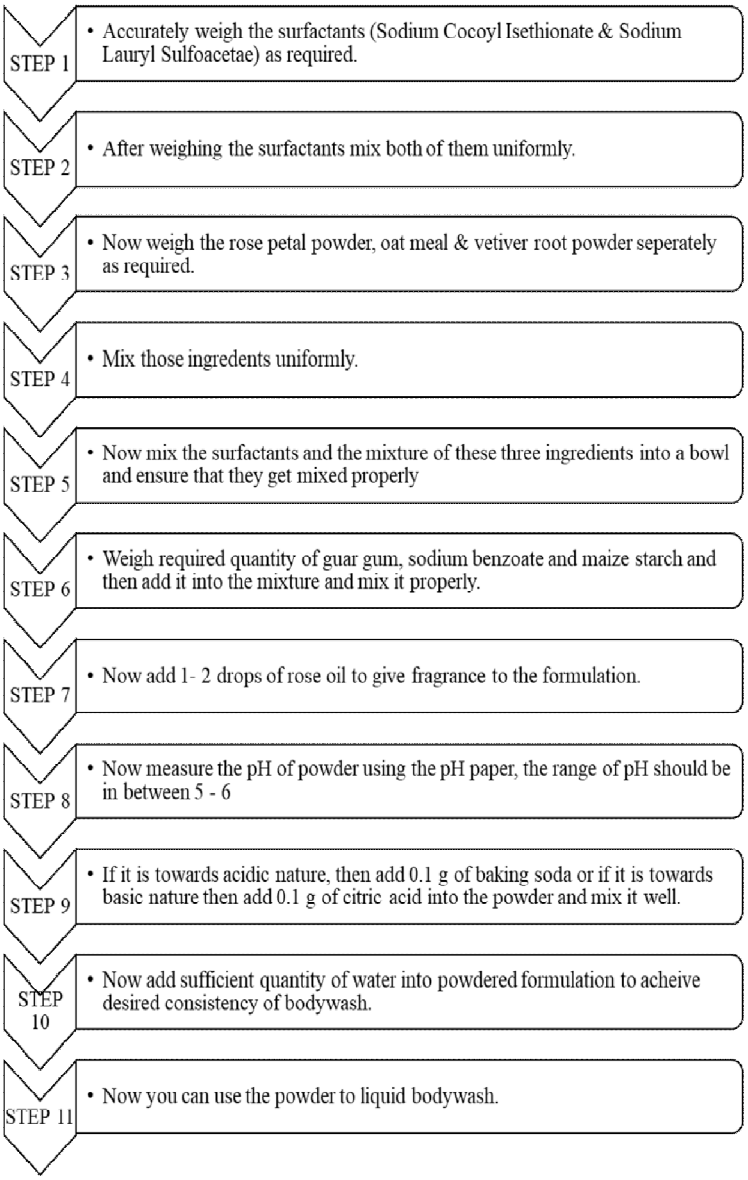
Precise measurement of ingredients according to the composition of the formulation.

- Homogenization and mixing:

ensuring that ingredients are distributed uniformly for consistency.

- Powder property optimization:

assessing moisture content, flowability, and dispersibility to preserve product stability.



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B. Formulation Table:

Table No. 3

Sr. No.	Ingredients	Properties	Qty Taken (for 40g)
01.	Sodium Cocoyl Isethionate	Surfactant	8 g
02.	Sodium Lauryl Sulfoacetate	Surfactant	8 g
03.	Colloidal Oat Meal	Active Ingredient	13.4 g
04.	Vetiver Root Powder	Active Ingredient	0.8 g
05.	Rose Petal Powder	Active Ingredient	2.6 g
06.	Guar gum	Stabilizing Agent	0.4 g
07.	Corn Starch	Thickening Agent	6 g
08.	Rose Oil	Fragrance	q. s
09.	Sodium Benzoate	Preservative	0.6 g
10.	Baking Soda	pH Adjuster	0.1 g
11.	Citric Acid	pH Adjuster	0.1 g
12.	Water	Vehicle	q. s

V. EVALUATION PARAMETERS

To ensure the safety, effectiveness, and consumer appeal of the polyherbal powder body wash, both sensory and physicochemical characteristics were assessed based on the following criteria:

1) Organoleptic Evaluation (Sensory Attributes)

- *Appearance & Colour*: Checked for uniformity and consistency in both powder and reconstituted forms.
- *Odour*: Assessed by volunteers for fragrance appeal and stability over time.
- *Texture & Feel*: Powder examined for fineness; the reconstituted form tested for smoothness and absence of grittiness.

2) Physicochemical Analysis

- *Bulk and Tapped Density*: Evaluated to determine flow properties and packaging suitability.
- *Angle of Repose*: Measured to assess powder flowability; values between 25°–40° indicate good flow.
- *pH*: Tested for skin compatibility; ideal range is 4.5–6.5.
- *Foamability & Foam Stability*: Assessed by measuring foam height before and after a fixed time.
- *Wettability*: Time recorded for powder to disperse and sink in water.
- *Viscosity*: Measured post-reconstitution using a viscometer to determine suitable application consistency.

3) Performance Testing

- *Cleansing Action*: Evaluated by artificial sebum removal using gravimetric analysis.
- *Irritation Potential (Patch Test)*: Skin reactions such as redness or itching observed after 24-hour patch application.
- *Skin Sensory Feedback*: Volunteer feedback collected on skin softness, hydration, and overall comfort.

4) Stability Studies

- *Microbial Contamination Test*: Includes total plate count and specific pathogen testing to ensure microbiological safety.
- *Shelf-Life Estimation*: Conducted through accelerated stability studies and long-term sampling to predict product durability.

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VI. RESULT AND DISCUSSIONS

1) Organoleptic Evaluation (Sensory Characteristics):

Fig No. 7.1

Fig No. 7.2

Table No. 4

Sr. No.	Evaluation Parameter	Observance
01.	Appearance	Homogenous, Absence of Lumps
02.	Colour	Pink
03.	Odour	Rose Fragrance
04.	Texture	Smooth, Non-Gritty

2) Physicochemical Parameters:

Table No. 6

Sr. No.	Evaluation Parameter	Observance	Conclusion
01.	Bulk Density	3.6cm	Comply
02.	Tapped Density	3.4cm	Comply
03.	Angle of Repose	33^0	Comply
04.	pH	5.9	Comply
05.	Foamability & Foam Stability	38 sec.	Comply
06.	Viscosity	3129 cP	Comply

3) Performance Evaluation:

Table No. 7

Sr. No	Evaluation Parameter	Observance (Pass / Fail)
01.	Cleansing Action	Pass
02.	Irritation Potential	Pass
03.	Skin Sensory Perception	Pass

VII. CONCLUSION

The study confirmed the successful development of a natural, eco-conscious polyherbal powder body wash using colloidal oatmeal, rose petal powder, and vetiver root powder. These ingredients worked synergistically to deliver mild cleansing, moisturization, and skin-soothing effects. The formulation maintained a skin-friendly pH, stable foaming ability, and received positive feedback in sensory tests.

Physicochemical evaluations demonstrated the product's stability, while biological studies revealed antioxidant, anti-inflammatory, and antimicrobial properties. User trials showed improved skin texture and hydration with no negative reactions, proving it safe for sensitive skin.

Overall, the research highlights the promise of herbal-based powder cleansers as sustainable alternatives to conventional products and encourages further exploration into their standardization, shelf-life, and market potential.

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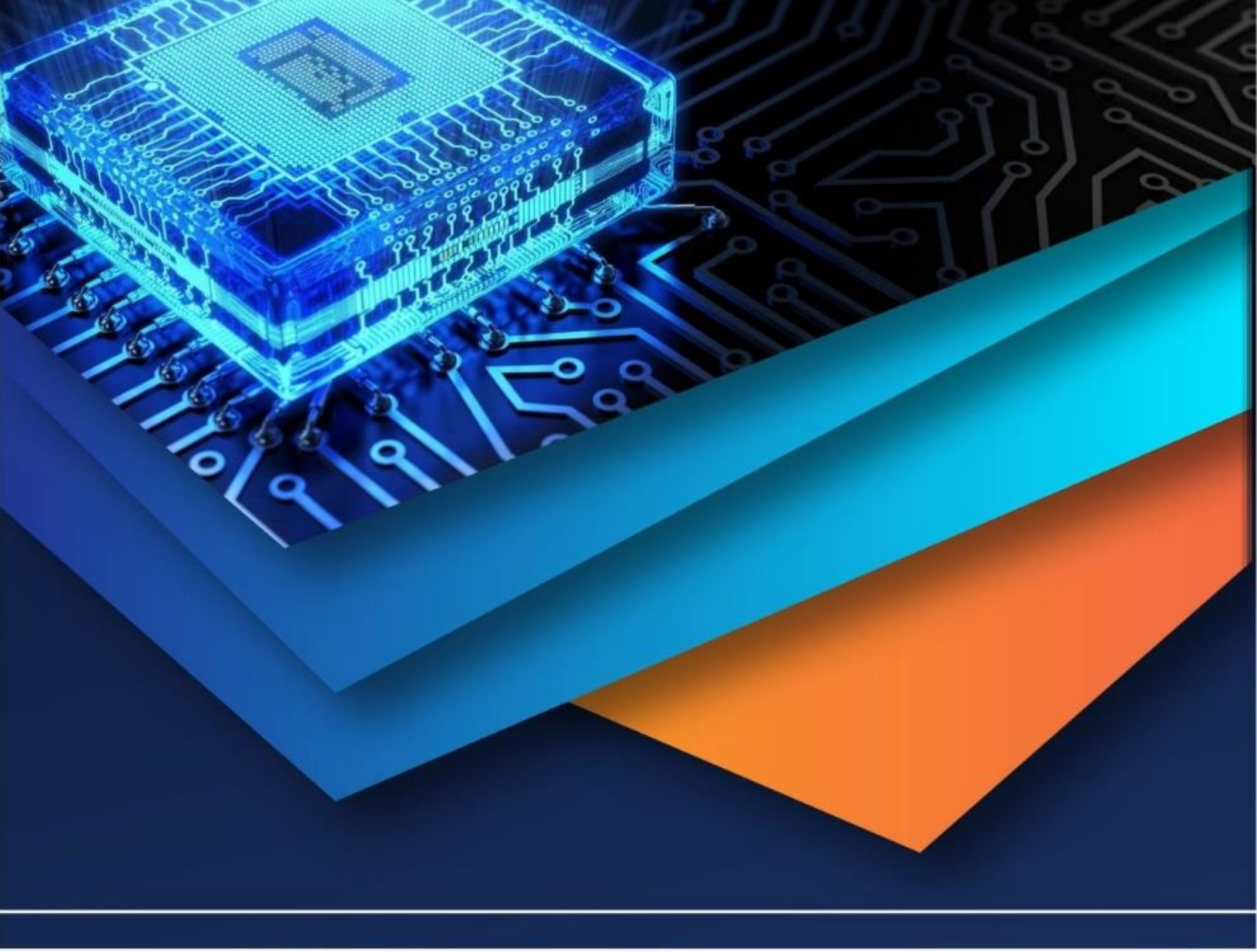

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