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Resins Covering Medicinally Activated Plants and Their Significance in Medicinal cum Pharmaceutical Areas: An Overview

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Abstract: ***Resins are important chemical constituents over other components in medicinal plants. They have maintained the different functions of plants as well as used for treatment of different diseases. Different variations of resins like oleoresins, oleo-gum-resins, glycoresins, balsams, acid resins, ester resins, alcoholic resins are precursor components among resins. Various plant show the resins as rich sources like Capsicum, Ginger, Jalap, Guggul, Myrrh, Cannabis, Asafoetida, Haridra, Colocynth, Kaladana etc. Those plants are grown and cultivated in all over the World. Those plants are belonging from various families like Umbelliferae, Solanaceae, Zingiberaceae, Cannabinaceae, etc. The resins are basically extracted out from different parts of the plants. Some resins are used for the treatment of ulcer, wounds, rheumatism, cancer, constipation, inflammation, arthritis, motion sickness worms in body. Besides, they are also used as astringent, antiseptic, diuretic, purgative, carminative, expectorant, antipruritic, hypolipidemic, cathartic, stomachic, appetizer, sedative, spice, condiment, flavoring agent, etc. The review article highlighted that definition, importance, various classification systems and distribution of resins among different plants from various families in all over the World.***

Keywords: Resins, Oleoresins, Glycoresins, Oleo-gum-resins, Capsicum, Ginger, Jalap, Guggul, Myrrh, Cannabis, Asafoetida, Haridra, Colocynth, Kaladana.

I. INTRODUCTION

Resins are chemically amorphous complex compounds. Generally resins are obtained from the extraction of different plant parts or from trunk, bark, root, rhizomes, herbs, seeds, twigs etc. Sometimes resins are mixed with acids whereas sometimes resins are mixed with esters or alcohols. Various types of resins are obtained like oleoresins in where resins are mixed with oils as well as glycoresins in where resins are mixed with sugars and oleo-gum-resins in where resins are mixed with gum and volatile oils. Different plants like Asafoetida, Ginger, Capsicum, Myrrh, Jalap, Guggul, etc., are the rich cum potent sources of resins. Those resins containing medicinal plants are cultivated in different parts of World. Many resins are very heavy in compared to water. They are basically translucent or transparent substances. They are having large carbon atoms. These are solid or semi solid products. These are generally soluble in alcohol, ether, benzene, chloral hydrate, fixed oils, volatile oils but insoluble in water. The resins are basically end product of plant metabolite. The resins are non conductive. At first the resins are hard but after that they are soft when these are heated or melted. The resins protect the injury of the plants from different types of wounds in plants like cutting, incision, etc. The resins also protect the plant from insects, worms, pathogens, etc. Resins are maintaining different medicinal roles like treatment of ulcer, diabetes, hypertension, fever, cancer, arthritis, constipation, motion sickness, eczema, etc. Some resins are also used as spice as well as condiment. Besides, these are also used as antiseptic, carminative, cathartic, purgatives, flavoring agent, sedatives, stomachic, appetizer, diuretic, expectorant, etc [1-3].

II. RESINS CLASSIFICATION

The classification of resins is mentioned in the following table 1.

Table 1: Resins Descriptions and Their Types [1, 3-5].

Sl. No.	Resin Types	Description	Constituents	Example
1	Acid Resins	Resins and their acids mixture	Abietic acid	Colophony
2	Ester Resins	Resins and their esters mixture	Cinnamyl cinnamate	Storax
3	Resin Alcohols	Resins and complex alcohols mixture	Peruresinotannol	Balsam of Peru

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III. ACTIVE CONSTITUENTS OF RESINS

The active constituent of resins is mentioned in the following table 2.

Table 2: Resins Descriptions and Their Types [1, 3-6].

Sl. No.	Resin Constituents	Description	Example
1	Oleo-gum-resins	Resins and homogenous mixture of volatile oil, gum	Asafoetida
2	Oleoresins	Resins and homogenous mixture of oil	Capsicum
3	Glycoresins	Resins and sugars mixture	Jalap
4	Balsam	Resins and benzoic acid or cinnamic acid mixture	Storax

IV. SIGNIFICANCE OF RESINS IN MEDICINAL & PHARMACEUTICAL AREAS

Resins are maintaining different roles in medical and pharmaceutical area. The significance of resins in those areas is mentioned in the following table 3.

Table 3: Significance of Resins in Medical and Pharmaceutical Areas [1, 6-10].

Sl. No.	Resins	Significance in Medical and Pharmaceutical Areas
1	Oleo-gum-resins	Carminative, Anti-inflammatory, Antiseptic, Stimulant, Hypolipidemic, Protective, Astringent
2	Oleoresins	Stomachic, Appetizer, Anti-rheumatic agent, Carminative, Expectorant, Flavoring agents, Wounds healing agent, Antiseptic
3	Glycoresins	Cathartic, Hydragogue
4	Acid Resins	Antiseptic, Stimulant, Diuretic
5	Ester Resins	Carminative, Expectorant, Aantiseptic, Stimulant
6	Resin Alcohols	Flavoring agents, Wounds healing agent
7	Balsam	Expectorant, Flavoring agents, Wounds healing agent, Stimulant antiseptic, Anti-ulcer agent

V. RESINS ISOLATION

Various types of isolation process of resins are mentioned in the following table 4.

Table 4: Isolation Process of Resins [1, 10-14]

Sl. No.	Method	Example
1	Plants parts are heated	Guaiacum
2	The oil is separated by distillation	Colophony
3	Incisions of plant exudates	Myrrh
4	The extraction is done by using alcohol and further precipitated by using water	Ipomoea
5	The fossil resins are collected	Kauri
6	The encrustations is processed	Shellac

VI. RESINS CONTAINING & COVERING MEDICINAL PLANTS SOURCES IN DIFFERENT PARTS OF WORLD

Different types of medicinal plants containing resins are present various parts of World. The following table 5 shows medicinal plants grown and cultivated in whole World.

Table 5: Medicinal Plants of Resins in Whole World

Sl. No.	Drug's Name	Geographical Descriptions	References
1	Capsicum	India, East and West Africa	[1, 15-17]
2	Jalap	India, Jamaica, South America	[1-2, 18]
3	Ginger	India, Africa, Australia, Caribbean Islands, Jamaica, Mauritius, Taiwan	[1, 19-21]
4	Ipomoea	Mexico	[1-2, 22]
5	Haridra	India, Italy, China, Malaysia, Thailand	[1, 23]
6	Asafoetida	India, Iran, Afghanistan	[1-2, 24]
7	Cannabis	India, Mexico, Africa, Nepal	[1, 25-27]
8	Male Fern	India, Europe, South America, Nepal	[1, 28]

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9	Podophyllum	India, Tibet, Afghanistan	[1, 29]
10	Guggul	India, Somalia, Ethiopia, Kenya, Zimbabwe	[1, 30]
11	Tar	India, USA, Canada, North Europe	[1, 31-32]
12	Storax	Turkey, South West Asia	[1, 33]
13	Myrrh	South Arabia, North East Africa	[1-2, 34]
14	Colophony	India, North Europe, North America	[1-2, 35-36]
15	Boswellia	India, Africa	[1, 37]
16	Shellac	Sri Lanka, Vietnam, Indonesia, Malaysia, Philippines, Thailand	[1, 38]
17	Benzoin	South East Asia, Vietnam, Thailand	[1, 39]
18	Colocynth	India, Syria, Spain, Morocco, Egypt	[1, 40]
19	Kaladana	India, America	[1, 41]
20	Balsam of Peru	Central America, Honduras, Sri Lanka, Florida	[1, 42-43]
21	Tolu Balsam	Caribbean Islands, Columbia	[1, 44]
22	Copaiba	Brazil	[1-2, 45]
23	Sandrac	Spain, Morocco, Algeria, Tunisia, Asia,	[1-2, 46-47]

		North America, North West AFrica	
24	Guaiacum	India, Tropical America, Florida, Columbia, Venezuela	[1-2, 48-49]
25	Kauri	New Zealand	[1, 50-52]
26	Copal	Asia, Africa, Central America, Mexico	[1, 53-56]
27	Gamboge	South East Asia	[2, 57]
28	Eriodictyon	California, Mexico	[2, 58-59]
29	Grindelia	USA	[2, 60-61]
30	Damiana	Bolivia, Mexico	[2, 62-63]
31	Mastic	India, Portugal, Morocco, Syria, Spain	[2, 64-65]
32	Olibanum	North East Africa, Arab	[2, 66-68]

VII. MEDICINAL PLANT OF RESINS FROM DIFFERENT FAMILY MEMBERS

Lots of family represents the medicinal plants as sources of resins are mentioned in the following table 6.

Table 6: Resins Containing Medicinal Plants Fall under Various Family Members

Sl. No.	Drug's Name	Family Belongs to	References
1	Capsicum	Solanaceae	[1, 15-17]
2	Jalap	Convolvulaceae	[1-2, 18]
3	Ginger	Zingiberaceae	[1, 19-21]
4	Ipomoea	Convolvulaceae	[1-2, 22]
5	Haridra	Zingiberaceae	[1, 23]
6	Asafoetida	Umbelliferae	[1-2, 24]
7	Cannabis	Cannabinaceae	[1, 25-27]
8	Male Fern	Polypodiaceae	[1, 28]
9	Podophyllum	Berberidaceae	[1, 29]
10	Guggul	Burseraceae	[1, 30]
11	Tar	Pinaceae	[1, 31-32]
12	Storax	Hamamelidaceae	[1, 33]
13	Myrrh	Burseraceae	[1-2, 34]
14	Colophony	Pinaceae	[1-2, 35-36]
15	Boswellia	Burseraceae	[1, 37]
16	Shellac	Lacciferidae (Laccidae)	[1, 38]
17	Benzoin	Styraceae	[1, 39]

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18	Colocynth	Cucurbitaceae	[1, 40]
19	Kaladana	Convolvulaceae	[1, 41]
20	Balsam of Peru	Leguminosae	[1, 42-43]
21	Tolu Balsam	Leguminosae	[1, 44]
22	Copaiba	Leguminosae	[1-2, 45]
23	Sandrac	Cupressaceae	[1-2, 46-47]
24	Guaiacum	Zygophyllaceae	[1-2, 48-49]
25	Kauri	Araucariaceae	[1, 50-52]
26	Copal	Burseraceae	[1, 53-56]
27	Gamboge	Guttiferae	[2, 57]
28	Eriodictyon	Hydrophyllaceae	[2, 58-59]
29	Grindelia	Compositae	[2, 60-61]
30	Damiana	Turneraceae	[2, 62-63]
31	Mastic	Anacardiaceae	[2, 64-65]
32	Olibanum	Burseraceae	[2, 66-68]

VIII. DISTRIBUTION OF RESINS AMONG MEDICINAL PLANTS

Table 7: Resins Containing Medicinal Plants and Their Descriptions

Sl. No.	Drug's Name	Scientific Name	Synonym	Plant Parts Used	Active Chemical Constituents	Medicinal cum Pharmaceutical Uses	References
1	Capsicum	*Capsicum annum*	Cayenne pepper, Chillies	Dried ripe fruits	Oleo resin, Capsaicin, Capsanthin	Carminative, Stomachic, Appetizer, Spices, Counter irritant for treating rheumatism	[1, 15-17]
2	Jalap	*Ipomoea purga*	Jalap Radix	Dried tubercles	Glycoresin, Gum, Convolvulin, Jalapin, Exogenic cid, Ipurganol, Methyl aesculetin	Cathartic	[1-2, 18]
3	Ginger	*Zingiber officinale*	Sunthi	Dried full or half rhizomes	Oleo resin, Zingiberene, Gingerol, Gingediols, Curcumene, Zingerone, Paradols, Gingediols, Hexa-hydrocurcumin, Shagols	Carminative, Flavoring agent, Stimulant, Aromatic, Spices, For treatment of motion sickness	[1, 19-21]

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4	Ipomoea	*Ipomoea orizabensis*	Mexican scamony	Dried tuberous roots	Glycoresin, Convolvulin, Jalapin, Ipurganol, Scopoletin, Ipurganol	Cathartic, Hydragogue	[1-2, 22]
5	Haridra	*Curcuma longa*	Haldi	Dried and fresh rhizomes	Resin, Curcuminoids, Curcumin, Bis demethoxy curcumin, De methoxy curcumin, Camphene, Camphor, DL r termerone zingiberene α-phellandrene, α and β pinene	Antiseptic, Anti-inflammatory agent, Coloring agent, Spice, Antioxidant, Condiment	[1, 23]
6	Asafoetida	*Ferula foetida, Ferula rubricaulis*	Devil's dung	Dried rhizomes and roots	Oleo gum resin, Ferulic acid, Umbelliferone, Umbellic acid, Asaresinotannol	Nervine stimulant, Carminative, Flavoring agent, Using in veterinary medicines, Intestinal flatulence	[1-2, 24]
7	Cannabis	*Cannabis sativa*	Indian hemp	Dried flowering tops of female plants	Resin, Tetrahydro-Cannabinol, Cannabidiol, Canna-bichromene, Cannabidiolic acid, Cannabigerol	Narcotic analgesic, Sedative, Psychrotropic	[1, 25-27]
8	Male Fern	*Dryopteris filix-mas, Dryopteris odontoloma, Dryopteris marginata*	Aspidium	Rhizomes and frond bases	Oleo resin, Aspidinol, Albaspidin, Filicic acid, Aalbaspidin, Flavaspidic acid, Filicinic acid	Anthelmintic, Taeniafuge	[1, 28]
9	Podophyllum	*Podophyllum hexandrum, Podophyllum emodi, Podophyllum peltatum* (American Podophyllum)	Himalayan May-apple	Dried rhizomes and roots	Podophyllin (Resins), Podophyllotoxin, Podophyllotoxone, Demethyl-podophyllotoxin, Etoposide,	Purgative, Bbitter tonic, Cholagague, Anticancer agent	[1, 29]

					Desoxy-podophyllotoxin		
10	Guggul	*Commiphora wightii*	Commiphora	Basal part of stem bark	Oleo gum resin, Guggulosterol I II and III, Guggulsterone E and Z	Hypolipidemic agent, Anti-inflammatory agent, Anti-rheumatic agent, lowering density lipoproteins	[1, 30]
11	Tar	*Pinus sylvestris, Pinus palustris*	Pine tar, Chir tar	Wood of scots pine	Resins	Antipruritic, Expectorant, Antibacterial, Local irritant, For treating eczema	[1, 31-32]
12	Storax	*Liquidambar orientalis*	Purified Storax, Prepared Storax	Wounded trunk	Storesin (Ester resin), Cinnamic ester	Stimulant, Antiseptic, Flavoring agent	[1, 33]
13	Myrrh	*Commiphora molmol*	Myrrha	Herb	Oleo gum resin, Commiphoric acids (Acid resins)	Protective, Antiseptic, Stimulant, Astringent	[1-2, 34]
14	Colophony	*Pinus roxburghii*	Rosina, Rosin	Distilled residues of crude oleoresin	Abietic acid, (Acid resin), Pimaric acid, Sapinic acid	Stimulant, Diuretic, Used for the preparation of ointments	[1-2, 35-36]
15	Boswellia	*Boswellia serrata*	Kunduru	Oleo gum resin obtained from the twig of the plant	Oleo gum esin, Boswellic acid, Serratol, Volatile oil	Anti-rheumatic agent, Anti-arthritic agent	[1, 37]
16	Shellac	*Lacifer lacca*	Lac	Secretion of tiny lac insect	Resin, Shelloic acid, Aleuritic acid (Acid resin)	Used for the preparation of sustained release medicaments	[1, 38]
17	Benzoin	*Styrax tonkinensis* (Siam Benzoin), *Styrax benzoin and Styrax parallelloneurus* (Sumatra Benzoin)	Loban	Balsam resin obtained from the extraction of the herb of the plant	Ester resins (Benzoic acid, Cinnamic acids and their esters), Coniferyl acetate, Siaresinolic acid, Sumaresinolic acid, Coniferyl alcohol, Vanillin,	Carminative, Expectorant, Antiseptic, Diuretic, Flavoring agent, Used for the treatment of upper respiratory tract infection	[1, 39]

					Styrol, Phenyl propyl cinnamate		
18	Colocynth	*Citrullus colocynthis*	Bitter cucumber, Bitter apple	Dried pithy pulp of ripe fruits	Resin, Colocynthidin, Colocynthin, Phytosterols, Cucurbitacin E (α-elaterin), Fatty acids Alkaloids	Purgative, Carminative, Narcotic agent	[1, 40]
19	Kaladana	*Ipomoea hederacea*	Pharbitis Seeds	Dried seeds	Resin (Pharbiticin), Saponin	Cathartic	[1, 41]
20	Balsam of Peru	*Myroxylon balsamum*	Balsam of Tolu	Trunk of the tree	Balsam (Esters of cinnamic acid and benzoic acid like Cinnamyl cinnamate, Cinnamyl benzoate, Benzyl benzoate, Benzyl cinnamate), Volatile oil	Wounds healing agent, Flavoring agent, Anti-ulcer agent	[1, 42-43]
21	Tolu Balsam	*Myroxylon balsamum*	Peru Balsam	Trunk of the tree	Benzoic acid, Cinnamic acid, (Benzyl benzoate, Benzyl cinnamate), Vanillin, Styrol, Toluresinotannol, Volatile oil	Expectorant, Antiseptic, Flavoring agent, Used in the cough mixtures	[1, 44]
22	Copaiba	*Copaifera reticulata, Copaifera langsdorffii, Copaifera multijuga*	Copaiba Oil-resin	Trunk of the tree	Acid resins (Copaivic acid and Oxycopaivic acid)	Antibacterial agent, Antifungal agent, Anti-parasitic agent, Insecticidal agent, Anti-inflammatory agent, Gastro-protective agent, Anticancer agent, Urinary antiseptic	[1-2, 45]
23	Sandrac	*Tetraclinis articulata*	Sandarac, Azuka	Stem	Acid resin (Sandracolic acid), Phenolic	Carminative, Antiseptic, Anti-hypetensive agent,	[1-2, 46-47]

					compounds, Flavonoids, Di-terpenoids, Volatile oil, Fatty acid, Lipids, Phytosterols	Anti-diabetic agent, For treatment of digestive problems, migraine, fever, Anti-inflammatory agent, Anti-microbial agent, Antioxidant, Cytotoxic agent	
24	Guaiacum	*Guaiacum officinale*	Guaiacum	Heart-wood	Guaianin, Guaiacin	Hypocholesterolemic agent, Immunostimulant Agent, Blood purifier, Anti-dysentery agent, Anti-cancer agent, For treatment of urinary disorders and typhoid, Anti-diabetic agent	[1-2, 48-49]
25	Kauri	*Agathis Australis*	Dammara	Freshly fallen leaf, Woods, Seeds	Resins, Flavonoids	Used as fossil resins	[1, 50-52]
26	Copal	*Protium copal, Bursera copallifera*	Protium	Stems, Stem Bark, Leaves	Resins, Terpenoids, Volatile oils, Carvacrol, Sabinol, Camphene, Limonene, Verbenene, Verbenone	Anti-inflammatory agent, Antioxidant, Anti-arthritic agent, Anti-tumor agent, For treating tooth ache, bronchitis, dental pain, migraine, cough and cold	[1, 53-56]
27	Gamboge	*Garcinia hanburyi*	Gamboge Fruit	Fruit	Gum resin (Gambogic acid)	Purgative	[2, 57]
28	Eriodictyon	*Eriodictyon californicum*	Eriodictyon Leaf	Dried leaves	Resin, Volatile oil, Eriodictyol, Chrysoeriodictyol, Homoeriodictyol, Eriodonol, Eriodictyonic acid, Ericolin	Expectorant, for treating asthma, insect bites	[2, 58-59]

29	Grindelia	*Grindelia camporum*	Grindelia Herb	Dried leaves and flowering tops	Resin, Grindelans, Volatile oil, Bornyl acetate, α-pinene	for treating bronchitis, dermatitis, asthma	[2, 60-61]
30	Damiana	*Turnera diffusa*	Damiana Leaf	Dried leaves	Resin, Calamenene, σ-cadinene, α-copaene, Thymol, Volatile oil, Gum	Elixir	[2, 62-63]
31	Mastic	*Pistacia lentiscus*	Mastic Shrub	Leaves and Bark	Resin, Camphene, σ-pinene α-myrcene	Anti-ulcer agent	[2, 64-65]
32	Olibanum	*Boswellia carterii, Boswellia frereana*	Frankincense	Bark	Resin, Arabinose, Galactose, *p*-cymene, Galacturonic acid, Volatile oil	Anti-inflammatory agent	[2, 66-68]

IX. CONCLUSION

Resins are one of the promising targets for treating different types of medical cum pharmaceuticals problems. Glycoresins, Oleoresins and Oleo-gum-resins are important parts among resins. Besides, resins can protect the whole plants from different foreign pathogens. Different plants like Colophony, Myrrh, Asafoetida, Ginger, Capsicum, Haridra, etc represent the rich source of resins. Various plants are extracted for the collection of resins. These plants grew in whole World. Resins are used for treatment of various diseases like diabetes, hypertension, tumor, fever, arthritis, dental pain, ulcer, inflammation, wounds, constipation, motion sickness, etc. Resins are also used as astringent, carminative, cathartics, purgatives, flavoring agent, spice, condiment, sedative, antiseptic, expectorant, diuretic, hypolipidemic agent. Till then many plants from resins were discovered. Future research is going on resins. Scientists will try to find newer reports on resins. So, Resins may be hopeful sources for treatment and important chemical constituents to overcome various medicinal as well as pharmaceutical problems in upcoming decades.

Conflicts of Interest: Nil

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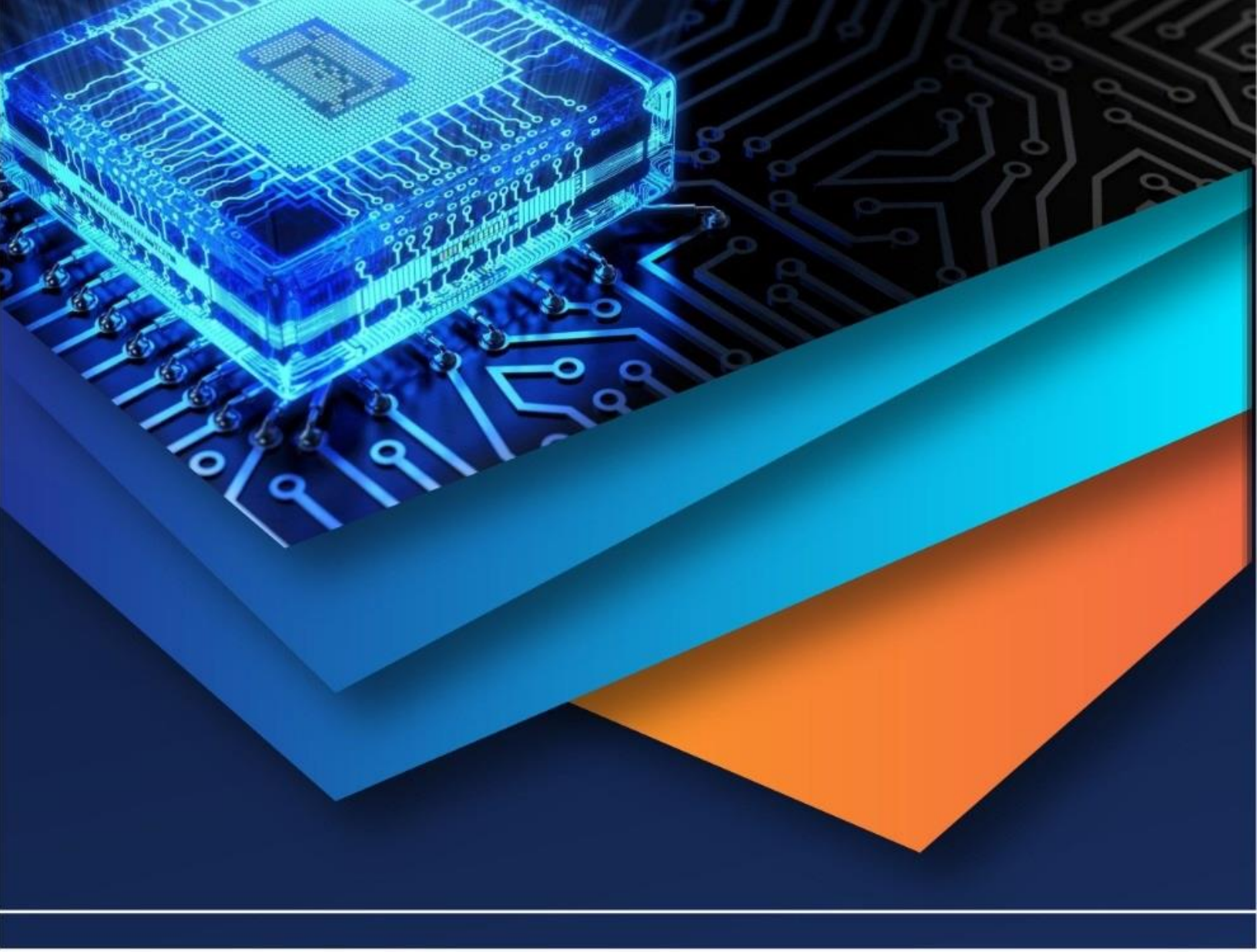
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