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Conventional Medicinal Plants and Their Pharmaceutical Applications: An Overview

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Abstract: Medicinal plants are present all over the world. They are showing pharmaceutical activity from ancient days to till now. These plants are from different families. Different types of parts like roots, stem, bark, flowers, fruits, seeds, etc used as sources of these plants. Numerous diseases and symptoms can be treated using these plants. Lots of chemical ingredients like alkaloids, glycosides, tannins, terpenoids, resins, flavonoids, saponins, steroids, fixed oils, proteins, carbohydrates, etc are found in those plants. Sometimes these medicinal plants are also used as ethnomedicines. Daily life is totally dependent on these plants. Lots of plants like Neem, Tulsi, Vasaka, Vinca, Cinchona, Amla, Brahmi, Cinnamon, Aloe, Ashoka, etc are available in India to treat different types of diseases. The review study focuses the details of conventional cum traditional plants and their different pharmaceutical applications.

Keywords: Medicinal plants, Alkaloids, Glycosides, Neem, Tulsi, Vasaka, Vinca, Cinchona, Amla, Brahmi, Cinnamon, Aloe, Ashoka.

I. INTRODUCTION

Regular different types of symptoms as well as diseases are the part of our life. Different types of synthetic as well as natural remedies are present to treat it on time. But the synthetic products are having sometimes side effects and unsafe in comparison to natural products. So, medicinal plants are giving us natural remedies from long times. Medicinal plants usually release many secondary metabolites. These secondary metabolites are showing different types of pharmaceutical applications due to the presence of alkaloids, glycosides, tannins, flavonoids, resins, steroids, volatile oils, fixed oils, saponins, etc as secondary metabolites. Additionally, these metabolites controlled several plant functions. They can protect the plants from the external injuries as well as different foreign pathogens. They perform as growth supporter of the plants. These can help detoxification process. Besides they can regulate different secretions from the plants. The plants are showing antioxidant, antiviral, antibacterial, antifungal, anticancer, anti-diabetic, antihypertensive, anti-malarial, antiulcer, astringent and so many other pharmaceutical applications. These plants are found in Asia as well as Africa and Europe, USA. Roots, leaves, fruits, seeds, bark, stem, flowers like different types of parts are showing lots of chemical ingredients like alkaloids, glycosides, etc. Alkaloids are having hetero or non hetero aromatic compounds or polynuclear aromatic hydrocarbons whereas glycosides are conjugated compounds of sugar and non sugar parts. On another sides, resins are transparent, solid-semisolid compounds with large carbon atoms. Tannins are polyphenolic compounds. Flavonoids are also polyphenolic compounds with 15 carbon atoms. Terpenoids are composed of hydrocarbons. Fixed oils are non volatile, viscous, thick compounds. These plants are belonging from so many families like Meliaceae, Leguminosae, Apocynaceae, Acanthaceae, etc [1-7].

II. CONVENTIONAL MEDICINAL PLANTS

Table 1: Details of Some Important Conventional Medicinal Plants with Their Pharmaceutical Applications

Sl. No.	Common Name	Botanical Name	Family	Parts Used	Chemical Constituents	Uses	References
1	Neem	<i>Azadirachta indica</i>	Meliaceae	All aerial parts	Nimbin, Nimbidin, Azadirachtin, Salanin, Nimboesterol, Meliantriol, Quercetin, Kaempferol, Nimbolide	Antiviral, Antibacterial, Antifungal	[8-10]
2	Tulsi	<i>Ocimum sanctum</i>	Lamiaceae	Fresh and dried leaves	Eugenol, Methyl eugenol	Expectorant, Antiviral, Antibacterial,	[1,6,11-13]

						Antifungal, Insecticidal, Anti-diabetic	
3	Vasaka	<i>Adhatoda vasica</i>	Acanthaceae	Fresh and dried leaves	Vasicinone, Vasicol, Vasicine, Adhatodic acid, Adhatodine	Anti-tussives, Bronchodilators	[1,5,14-16]
4	Vinca	<i>Catharanthus roseus</i>	Apocynaceae	Whole plants	Vinblastine, Vincristine, Vindogentianine	Anticancer, Anti-diabetic	[1,5,17-20]
5	Cinchona	<i>Cinchona officinalis</i>	Rubiaceae	Dried bark, root and stem	Quinine, Cinchonine, Quinidine, Hydroquinine, Cinchonidine	Anti-malarial	[1,5,21]
6	Amla	<i>Emblica officinalis</i>	Euphorbiaceae	Dried as well as fresh fruits	Tannins, Vitamin C, Phyllembin	Laxative, Diuretic, Refrigerant, Antioxidant	[1,3,22-24]
7	Brahmi	<i>Bacopa monnieri</i>	Scrophulariaceae	Fresh leaves	Bacosides A-B, Asiatic acid, Brahmine, Brahmic acid	Nervine tonic, Diuretics, Anti-epileptic agent	[1,4,25-27]
8	Cinnamon	<i>Cinnamomum zeylanicum</i>	Lauraceae	Inner bark (dried)	Eugenol, Pinene, Caryophyllene	Antiseptic, Stomachic, Astringent, Carminative	[1,6,28]
9	Aloe	<i>Aloe vera</i>	Liliaceae	Leaves juice	Barbaloin, Aloin Aloe emodin	Purgative	[1,4,29]
10	Ashoka	<i>Saraca indica</i>	Leguminosae	Dried stem bark	Leucopelargonidin, Leucocyanidin, Ketosterol, Catechol	Uterine tonic, Sedative, Oxytocic	[1,3,30]
11	Belladonna	<i>Atropa belladonna</i>	Solanaceae	Dried leaves as well as flowering tops	Belladonnine, Atropine, Hyoscyamine, Hyoscine, Homotropine, Scopolamine	Antispasmodic, Anti-cholinergic compound	[1,5,7,31-34]
12	Liquorice	<i>Glycyrrhiza glabra</i>	Leguminosae	Dried roots	Glycyramarin, Glycyrrhetic acid, Glycyrrhizin	Antiulcer, Antispasmodic, Anti-inflammatory, Expectorant, Demulcent, Antioxidant, Antiviral, Laxative	[1,4,35]
13	Serpigandha (Sarpagandha)	<i>Rauwolfia serpentina</i>	Apocynaceae	Dried roots as well as rhizomes	Reserpine, Ajmaline, Ajmalicine, Rescinnamine, Serpentinine, Serpentine, Rauwolfinine, Yohimbine,	Antihypertensive	[1,5,36-38]
14	Ginger	<i>Zingiber officinale</i>	Zingiberaceae	Dried rhizomes	Gingerol, Shogaol, Zingerone, Gingedols, Zingiberene	Flavoring agent, Carminative	[1,2,39]
15	Capsicum	<i>Capsicum annum</i>	Solanaceae	Dried fruits	Capsanthin, Capsaicin	Stomachic,	[1,2,40-41]

						Carminative, Appetizer	
16	Turmeric	<i>Curcuma longa</i>	Zingiberaceae	Dried rhizomes	Curcumin, Camphene, Camphor, Curcuminoids	Anti-inflammatory, Antioxidant, Antiseptic	[1,2,42-44]
17	Jalap	<i>Ipomoea purga</i>	Convolvulaceae	Dried tubercles	Convolvulin, Glycoresin, Jalapin	Cathartic	[1,2,45]
18	Podophyllum	<i>Podophyllum hexandrum</i>	Berberidaceae	Dried roots as well as rhizomes	Podophyllotoxin, Ethoposide, Podophyllotoxone	Anticancer	[1,2,46]
19	Arjuna	<i>Terminalia arjuna</i>	Combretaceae	Dried stem bark	Arjunetine, Arjunic acid, Arjunine, Arjungenin , Ellagic acid	Cardiotonic, Febrifuge, Anti- dysenteric compounds, Hypotensive	[1,3,47]
20	Haritaki	<i>Terminalia chebula</i>	Combretaceae	Dried ripe fruits	Ellagic acid, Chebolic acid, Gallic acid, Pyrogallal	Astringent, Laxative, Stomachic	[1,3,48-50]
21	Digitalis	<i>Digitalis purpurea</i>	Scrophulariaceae	Dried leaves	Digoxin, Digitoxin, Digitoxigenin, Purpurea glycoside A-B, Lanatosides A-C	Cardiotonic	[1,4,51]
22	Thevetia	<i>Thevetia peruviana</i>	Apocynaceae	Dried seeds	Thevetin A-B, Peruvosidic acid, Thevenerin	Cardiotonic	[1,4,52]
23	Indian Senna	<i>Cassia angustifolia</i>	Leguminosae	Dried leaflets	Sennosides A-D, Rhein, Aloe-emodin, Kaempferol	Purgative	[1,4,53]
24	Bhumi Amla	<i>Phyllanthus niruri</i>	Euphorbiaceae	Dried leaves	Phyllanthin, Hypophyllanthin, Quercetin, Rutin, Ellagitannins, Sesquiterpenes, Phenolic acids, Coumarins	Hepatoprotective, Anti-inflammatory, Antioxidant, Antiviral, Anti- diabetic, Antimicrobial, Antifungal, Analgesic and antipyretic, Anti- tumor	[54-56]
25	Onion	<i>Allium cepa</i>	Alliaceae or Liliaceae	Bulbs and leaves	Allicin, Vitamins A, C, and E, Quercetin, Diallyl sulfide, Glutamic acid, Potassium, Magnesium, Calcium, Phosphorous, Iron, Sodium, Arginine, Choline	Anthelmintic, Carminative, Aphrodisiac, Expectorant, Antioxidant, Anti- inflammatory, Anti-diabetic, Anticancer	[57]
26	Henna	<i>Lawsonia inermis</i>	Lyrthraceae	Dried as well as fresh leaves	Hennoside A-C, Lawson	Antibacterial, Antifungal, Hair dye	[1,4,58]
27	Shataveri	<i>Asparagus racemosus</i>	Liliaceae	Dried leaves and roots	Shatavarin I-IV, Quercetin, Rutin, Diosgenin	Diuretic, Galactagogue	[1,4,59-60]
28	White Birch	<i>Betula alba</i>	Betulaceae	Buds, Bark and leaves	Betulin, Chlorogenic acid, Caffeic acid,	Anticancer, Antibacterial,	[61-62]

					Hyperoside, Myricetin, Kaempferol, Betuligenol, Xylenol, Cresol, Saponins, Tannins, Coumarins, Betulinic acid, Lupeol, Oleanolic acid	Antiviral, Antifungal, Antiprotozoal, Antileishmanial, Antimalarial	
29	Senega	<i>Polygala senega</i>	Polygalaceae	Dried root	Senegin, Presenegenin, Senegenic acid	Used for the treatment of bronchitis and gastritis, Expectorant	[1,4,63-64]
30	Chirata	<i>Swertia chirata</i>	Gentianaceae	Dried plant	Sweroside, Gentianine, Gentiopicrosin, Amarogentin, Chiratin	Stomachic, Antipyretic, Febrifuge	[1,4,65]
31	Bhringraj	<i>Ecilipta alba</i>	Asteraceae	All herbs	Wedelic acid, Wedelolactone, Demethylwedelolactone, Apigenin, Luteolin, Ecliptal	Hepatoprotective, Used for hair growth	[1,5,66-68]
32	Fenugreek	<i>Trigonella foenum-graecum</i>	Fabaceae	Seeds, stem and leaves	Diosgenin, Trigonelline, Trimethylcoumarin, Trigocoumarin, Nicotinic acid, Eugenol, Caproic acid, Globulin, Lecithin, Albumin, Histidine, Vitamins-A, B1, B2, C, Phosphorous, Zinc, Iron, Calcium, Sulphur	Hyperlipidemic, Anti-diabetic, Anticataract, Immunomodulatory, Antioxidant	[69]
33	Shankpushpi	<i>Canscora decussata</i>	Gentianaceae	All aerial parts	Shankpushpine, Convolvine	Antiepileptic	[1,5,70-71]
34	Kulekhara	<i>Hygrophila auriculata</i>	Acanthaceae	Leaves and roots	Hygrophiline, Catechins, Quercetin, Steroidal saponins, Luteolin, Iron, Magnesium, Calcium	Hematinic, Diuretic, Tonic	[72]
35	Joba or Jova	<i>Hibiscus rosa-sinensis</i>	Malvaceae	Leaves, stem, root and flower	Myricetin, Kaempferol, Quercetin, Rutin, Luteolin, Gossypetin, Cyanidin 3,5-diglucoside, Hibiscetin, Hyperoside, Isoquercetin, Lupeol, β -Sitosterol, Ursolic acid, Chlorogenic acid, Gallic acid, Protocatechuic acid, Ellagic acid, Saponins	Antioxidant, Anti-diabetic, Antibacterial, Ameliorative, Antifungal, Cardioprotective, Immunomodulatory, Hepatoprotective, Gastroprotectant, Analgesic, Anti-inflammatory	[73-75]
36	Carrot	<i>Daucus carota</i>	Apiaceae	Root, leaves, fruits and seeds	Germacrene, Carotol, Vitamin A ₁ , Bergamotene, Myristicin, Geranyl acetate, α - β carotene, Quercetin, Apigenin,	Anti-Inflammatory, Carminative, Antiseptic, Diuretic, Antilithic,	[76-77]

					Luteolin, Kaempferol, Limonene, Geraniol, Linalool, Nerolidol, Sabinene, Caryophyllene, Ginsenoide, Phytol, Squaline, Farnesol	Hepatoprotective, Anticancer, Anti-diabetic, Antifungal, Cardio-protective, Antibacterial, Antiulcer, Antimicrobial, Antidepressant, Anti-dementia, Analgesic	
37	Tomato	<i>Solanum lycopersicum</i>	Solanaceae	Fruits	Minerals, Lycopene, Lutein, β carotene, Vitamin K, Vitamin C	Antioxidant, Neuroprotective, Anti-diabetic, Anti-inflammatory, Cardio-protective, Anticancer, Antimicrobial	[78]
38	Pomegranate	<i>Punica granatum</i>	Puniaceae	Fruits, Seeds and flowers	Ellagitannin, Punic acid, Gallotannin, Punicalagin, Palmitic acid, Icosanoic acid, Oleic acid, Citric acid, Linolenic acid, Punicic acid, Chlorogenic acid, Malic acid, Gallic acid, Caffeic acid, Protocatechuic acid, Catechin, Ferulic acid, Phloridzin, Quercetin, Stearic acid, Malvidin, Petunidin, Cyanidin, Ascorbic acid, Fumaric acid, Succinic acid, Oxalic acid	Antioxidant, Anti-diabetic, Anti-diarrheal, Anti-inflammatory, Anticancer, Wound-healing, Cardio-protective, Antihypertensive	[79-80]
39	Clove	<i>Eugenia caryophyllus</i>	Myrtaceae	Dried flowering buds	Eugenol, Eugenol acetate, Caryophyllenes	Dental analgesic, Antiseptic, Carminative, Flavoring agent, Gastroprotective	[1,6,81]
40	Bitter Orange Peel	<i>Citrus aurantium</i>	Rutaceae	Dried or fresh ripe fruits pericarp	Limonene, Citral, Citronellal	Antioxidant, Flavoring agent, Antimicrobial, Carminative	[1,6,82]
41	Arnica	<i>Arnica montana</i>	Compositae	Dried flowering heads cum tops	Arnifolin, Epoxyhelanalin, Helanalin	Antitumor, Antifungal, Anti-inflammatory, Anti-hyperlipidemic, Anthelmintics, Anti-rheumatic	[1,6,83-84]
42	Artemisia	<i>Artemisia annua</i>	Asteraceae	Herb	Artemisinin, Artemisinic acid, Arteether, Arteannuin B, Caryophyllenes	Antioxidant, Anti-malarial	[1,6,85-86]

43	Jatamansi	<i>Nardostachys jatamansi</i>	Valerianaceae	Dried rhizomes	Jatamansone, Nardostachone	Sedative, Anti-epileptic, Antispasmodic, Diuretic, Flavoring agent, Anti-arrhythmic, Emmenagogue, Stomachic, Antihypertensive, Antibacterial, Anti-asthmatic, Antifungal, Antioxidant, Anti-diabetic, Neuroprotective, Hepatoprotective, Anticonvulsant, Nematicidal	[1,6,87]
44	Ajowan	<i>Trachyspermum ammi</i>	Umbelliferae	Dried ripe fruits and seeds	Pinene, Thymol, Carvacrol, Saponins, Nicotinic acid, Minerals	Antiseptic, Anthelmintic, Antifungal, Antispasmodic, Carminative, Insecticide, Flavoring agent, Antiviral, Antihypertensive, Hepatoprotective, Antiulcer, Anti-platelet, Anti-tussive, Diuretic, Anti-hyperlipidemic, Anesthetic, Nematocidal	[1,6,88-89]
45	Beetroot	<i>Beta vulgaris</i>	Chenopodiaceae	Roots	Betaine, Glycine, Betacyanin, Saponins, Betanins, Folate, Flavonoids, Phenolic acids, Polyphenols, Minerals, Ascorbic acid, Carotenoids, Vitamin A, C, B ₁ , B ₂ , B ₆ , B ₁₂	Diuretic, Antimicrobial, Carminative, Antioxidant, Antifungal, Antidepressant, Anti-inflammatory	[90]
46	Coriander	<i>Coriandrum sativum</i>	Umbelliferae	Dried ripe fruits	Pinene, Geraniol, Coriandrol, Coriandrons A-E, Camphor, Borneol, Citronellol, Dihydrocoriandrin	Flavoring agent, Spasmolytic, Carminative, Stomachic, Antioxidant, Diuretic, Anti-diabetic, Anticonvulsant, Anti-mutagenic, Anthelmintic, Antimicrobial	[1,6,91]
47	Ashwagandha	<i>Withania somnifera</i>	Solanaceae	Dried roots	Somniferine, Withanine,	Anti-rheumatic,	[1,5,7,92]

				and stem bases	Withanolide, Somnine, Somniferinine, Tropine, Anaferine, Isopelletierine, Cuscohygrine, Pseudo-tropine, Pseudo-withanine, Anahydrine, Sitoindoside VII-VIII, Wwithaferin	Sedative and hypnotic, Immuno-modulatory, Hypotensive, Anti-stress	
48	Datura	<i>Datura metel</i>	Solanaceae	Dried leaves and flowering tops	Atropine, Hyoscine, Scopalamine, Hyoscyamine, Tropine, Daturanolone, Apohyoscine, Tigloidine, Fastusic acid, Meteloidine, Norhyoscine, Cuscohygrine, Daturadiol	Anti-cholinergic, Antiulcer, Antifungal, Herbicidal, Insecticidal, Antioxidant, Antibacterial, Anticancer, Hypoglycemic	[1,5,7,93-96]
49	Punarnava	<i>Boerhavia diffusa</i>	Nyctaginaceae	Fresh and dried herb	Borhavine, Boeravinone A-O, Punarnavoside	Stomachic, Diuretic, Expectorant, Antioxidant, Antibacterial, Anti-inflammatory, Antimicrobial, Anticonvulsant, Immuno-modulator, Genoprotective, Hypolipemic, Anti-diabetic, Anti-asthmatic, Analgesic, Anti-fibrinolytic, Anti-hepatotoxic, Anti-carcinogenic, Contraceptive	[1,5,97-98]
50	Mango	<i>Mangifera indica</i>	Anacardiaceae	Dried stem bark	Mangiferin, Glycine, Catechin, Shikimic acid, Protocatechuic acid, Aminobutyric acid, Alanine, Quercetin, Gallic acid, Kaempferol, Xanthone, Vitamin A-C, Copper, Potassium, Sodium, Iron, Citric acid, Magnesium, Phosphorous, Tartaric acid, Zeaxanthin, Lutein, Niacin, Thiamine, Riboflavin, Ellagic acid, Rhamnetin, Gallotannins, Anthocyanins, Propyl	Anti-rheumatic, Anti-dysenteric, Anti-diarrheal, Antimicrobial, Analgesic, Antioxidant, Astringent, Antifungal, Hepatoprotective, Anticancer, Immuno-modulatory, Antihypertensive, Anti-helminthic, Antiulcer, Antipyretic, Anti-allergic, Antiviral,	[1,3,99-106]

					gallate, Methyl gallate, Chlorogenic acid, Vanillic acid	laxative, Anti-tumor, Gastroprotective, Anti-parasitic, Anti-malarial, Astringent, Antiemetic, Refrigerant, Anti-hyperglycemic, Anti-inflammatory, Haematinic, Carminative, Anti-obesity	
51	Anantmul	<i>Hemidesmis indicus</i>	Asclepiadaceae	Dried roots	Lupeol, Hemidesmin I, Hemidesminine, Saponins, Iso-vanillin, β -sitosterol, Lupeol acetate, Limonene, Borneol, Linalyl acetate, Isocaryophyllene	Anti-inflammatory, Flavoring agent, Anti-rheumatic, Blood purifiers, Anticancer, Anti-leptotic, Antiulcer, Anti-diabetic, Antimicrobial, Diuretics, Anti-diarrheal	[1,4,107]
52	Kalmegh	<i>Andrographis paniculata</i>	Acanthaceae	Dried leaves and tender shoots	Kalmeghin, Andrographolide, Andrographiside, Neoandrographolide	Anthelmintic, Bitter tonic, Stomachic, Hepatoprotective, Anti-dysenteric, Vermicidal, Antiviral, Antibacterial, Antipyretic, Hypoglycemic, Expectorant, Analgesic, Abortifacient, Hepatoprotective, Sedative, Laxative	[1,4,108]

III. CONCLUSION

The world has a rich supply of therapeutic plants. Numerous families include these medicinal plants. Alkaloids, glycosides, tannins, flavonoids, steroids, resins, saponins, terpenoids, fixed oils, and other chemical components can be found in their many sections, which include roots, bark, stems, flowers, fruits, seeds, leaves, and more. These therapeutic plants can be used to treat a wide range of conditions. As a result, they demonstrated several medicinal applications in addition to antibacterial, antiviral, antifungal, anticancer, anti-diabetic, carminative, astringent, and antihypertensive properties. Presently new research is going on different medicinal plants for their newer pharmaceutical applications.

Conflicts of Interest: Nil

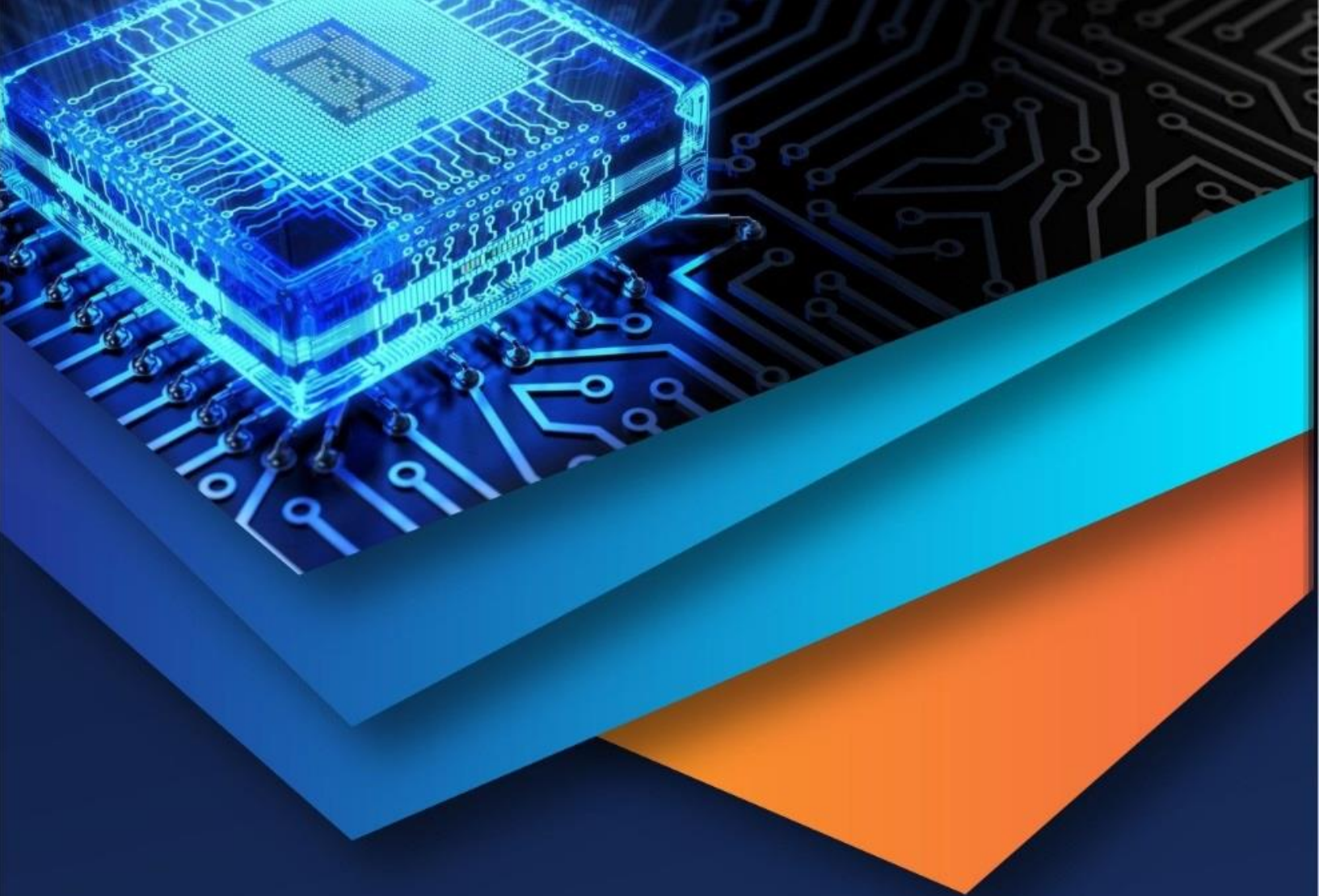
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