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A Review Paper on Water Pollution in Rivers of the City

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Abstract: ***The availability and quality of water resources has an impact on the political, social, and economic development of a society. Water is deemed dangerous to human and aquatic life when it is contaminated by unexpected chemicals. This water is referred to as being polluted. Water pollution results from many factors. Natural factors include the biodegradation of plant and animal parts in clear water, siltation caused by riverbank erosion, and others. Water pollution caused by humans includes things like fertilisers, household garbage, and industrial waste. Maharashtra's surface water contamination is at an alarmingly high level. Water is essential for all living things, thus there is no need to elaborate. For physiologic purposes, they either directly or indirectly consume water. If the water being consumed is contaminated, harm will undoubtedly result. The worst aspect is that this spreads via the food chain to other people. As a result, we need to be aware of the harmful effects that contaminated water may have on us. One of the fundamental resources required for humanity to survive on Earth is water. The Ganga, Yamuna, and Sabarmati rivers are revered by the Indian population, while the Mithi River is significant for its biodiversity. It is customary to drink from and bathe in the sacred rivers. However, a number of contaminants, including pesticides, heavy metals, organic waste, chemical waste, and sewage discharge, impair the water quality of these rivers. The water is no longer safe for human consumption, raising the risk of disease outbreak. Due to the direct exposure of people and other life forms to hazardous substances and heavy metals through contaminated river water, there is a danger of developing several fatal diseases. This study's goal is to investigate the sources of water contamination in significant Indian rivers and its potential health risks. Although we cannot completely stop water pollution today, reduction is crucial. It's time we started working on it by taking some action.***

Keywords: Water resources, Water pollution, contaminated water, Industrial waste, household garbage, Sewage discharge

I. INTRODUCTION

Living things require water as a critical resource. Water is a fundamental element of all living things since it is involved in the majority of biochemical events that occur throughout the metabolism and growth of living things. Since no life can exist on this planet without water, it is known as "Natural liquid Gold." Since practically all inorganic substances dissolve in water, it is frequently referred to as the "universal solvent." 71% of the surface of the globe is covered by water, but only 3% of that water is fresh water, which is found in the form of ice caps, glaciers, rivers, lakes, ponds, streams, and ground water supplies.

The river is the most significant and sensitive freshwater system and is essential to the survival of all species. Freshwater systems' sustainability is under risk due to the deteriorating water quality, which offers grounds for concern. Indian environmental researchers recently described the state of India's freshwater resources and how they are managed as a serious environmental issue, with major effects such as nutrient enrichment, acidification, and toxic substances identified in household waste, agricultural waste, sewage, and industrial effluents. According to a study, biological, organic, and inorganic pollutants have contaminated about 70% of India's surface and ground water resources. The wastewater pollutants are harmful to environment and public health. The biological decomposition of organic compounds could result in killing of fishes and generation of foul odors. There are many pollutants that could exhibit toxic effects on aquatic life and the public health. Water borne diseases are also eliminated through proper wastewater treatment. The wastewater treatment is removal of contaminants from water. The chemical contamination of water sources due to certain industries or from natural sources. High turbidity can inhibit the effects of disinfection against micro-organisms and enable bacterial growth. Drinking water should be colorless, since drinking water coloration may be due to the presence of colored organic matter.Although scents can be caused by a variety of things, including biological activity, industrial pollutants, and microbial diseases that pose health risks, they mostly originate from organic molecules. Increased human population, industrialization, the use of fertilisers in agriculture, and human activity all contribute to water pollution.

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The existence of water constituents at their ideal levels, which support the growth of plants and animals, is referred to as the water quality. The growth of living organisms in the water body depends on a number of critical parameters, including temperature, turbidity, nutrients, hardness, alkalinity, dissolved oxygen, etc. The relationship between all hydrological characteristics, such as the physical, chemical, and biological characteristics of the water body, is referred to as water quality. Physico-chemical, biological, and other types of data are therefore analysed to determine the quality of water.

II. LITERATURE REVIEW

Ahmed Shabbir Khan, Ankur Anavkar, Ahmad Ali, Nimisha Patel and Hina Alim [1] in this paper author said that It is urgent to survey the water quality of rivers including the Ganga, Yamuna, Sabarmati, and Mithi. River water quality is obviously subpar according to WHO and BIS norms. Due to the rising pollution load in the rivers, aquatic and biodiversity habitats close to riverbeds are more at risk. As the output of chemicals and petrochemicals has expanded over time, so has the volume of effluents emitted. Many people have died as a result of the flooding, which has also contributed significantly to the spread of other diseases. By dry weight, the brick did not absorb more water than 20%.

Priyank Pravin Patel, Sayoni Mondal, Krishna Gopal Ghosh [2] In this paper, author examined how the lockdown significantly affected the Yamuna's water quality throughout the Delhi NCT stretch, as seen by improved WQI ratings and a marked decrease in BOD and COD levels. However, the FC had risen at a few locations, perhaps as a result of animal waste and domestic sewage outflows (which remained generally unabated). Similar decreases in pollutant loads were also seen in drain effluents, and the most polluted drains in this reach were identified. The turbidity and SPM of the river had significantly decreased as well. The analyses carried out were limited by several data restrictions, but it was nonetheless possible to verify that the Yamuna's water quality had improved. However, despite these advancements, the WQI status was unable to reach the required CPCB standards.

Nutan Maurya [3] In this study Author has clearly demonstrated that even while the Yamuna River's water quality falls short of that of a healthy river, it nevertheless plays a crucial role in the lives of many people. For the majority of people, the river serves as a reflection of their youth. The majority of responders described the river as a dirty waterscape with a miraculous character. Despite the flow of dirty water through the river, they hold to the notion that it is inherently sacred. This extended human interaction with the river aids in the creation of local ecological knowledge, such as variations in native fish species, seasonal variations in water quality, peak pollution discharge timing, effects of pollution on aquatic flora and fauna, and changes in river topography and hydrology over time, etc. Grey infrastructure and recreational areas are more likely to grow in and around the river due to the management of the urban portion of the river. The ongoing sewage drain discharge into the river hasn't been totally controlled, though. Participating riverine communities in the river cleaning programme may serve to raise general public awareness of broader environmental concerns, which will then increase pressure for adherence to environmental laws and regulations.

Soundaji, Bansode Aniruddh [4] In This investigation author has demonstrated unequivocally that the water quality significantly deviates from ideal levels due to the massive sewage discharges at sites I, III, and IV. The addition of sewage and untreated trash is negligent in the presence of harmful organisms that endanger the city's population. due to human activity at the discharge points, direct release of wastewater, and sewage into the river from various drains and ghats. Despite its ability to self-purify, river water was considerably contaminated. The problem of river pollution is made worse by the improper disposal of home sewage and waste, which are recognised as important sources of water contamination at all locations in addition to human bathing and washing, burning of dead bodies, and tossing of carcasses. Due to the discharge of significant amounts of raw sewage and municipal trash, the river was badly contaminated at all sites, as evidenced by the high microbiological counts. The four main causes of the river Godavari's water quality deteriorating at various ghats were urban sewage, waste, illegal garbage dumping, trash, and human interferences along with population growth. All sites with water quality below desired standards indicated that the entire stretch of land needed suitable treatment before being used by humans. Controlling the discharge of untreated municipal sewage and trash disposal is necessary to keep the river clean. Ongoing monitoring of the riverwater for various physicochemical parameters is also necessary to ensure the Godavari maintains its ecological equilibrium.

Dwivedi ,Seema [5] According to this study Author examined that, Kanpur's Panlci industrial area's industries and the southern Kanpur region's municipal trash are the river's main polluting causes.The river's Kanpur shore is where five significant drains conveying these contaminants converge.

Remaining ash slurry from the Panki Thermal Power Plant, nitrogenous and non-nitrogenous wastes from Duncan's Industry Ltd., wastes from L.M.L. and other companies, sewage, and agricultural wastes are the main pollutants. hazardous metals are included in the very hazardous effluent that is released into the river. The effluents have a considerable potential for pollution, far surpassing the necessary limitations established by ISI (IS: 2490, 1981) for the safe disposal of industrial effluent into surface waterways. River is subjected to pollutant loads that are greater than what it can absorb. 7. The river's oxygen budget is exceedingly low, occasionally dropping to zero. None of the stations' water meets ISi requirements for natural surface waters (IS: 2296, 1982).

Sharma Deepshikha [6] The findings of this study to the author demonstrate that using WQMs, regulatory interventions related to reducing river pollution in developing nations like India may be developed and evaluated. Prior to the creation of an RQRP, sophisticated environmental modelling techniques are rarely employed in India. The conclusion suggests that embracing the effectiveness of scientific instruments before drafting any river-restoration plans could result in possible gains in terms of both time and expense overruns. To carry out source apportionment in Delhi, the study has supplied a thorough inventory of a number of potential river-polluting sources. Four potential interventions to reduce the pollution loadings to the river have been tested in the research region.According to the findings, water is crucial to establish new STPs wherever they are needed and include technical developments for tertiary treatment alternatives, recycling, and reuse. Wastewater recycling through delivery to the city's "green area" has been suggested. The zone-wise area identified by Delhi Development Authority is the projected "green area" considered in the current study. It turns out to be the city's prospective area for recycling and reuse. As a means of enhancing water quality, it is evident that wastewater treatment has a significant impact on the water quality. The findings show that it is challenging to reach the target DO, BOD, and TC at all monitoring stations, even after implementing high-efficient tertiary treatment and recycling alternatives. So, at the conclusion, the flow augmentation approach has been suggested. Results from the little incremental flow augmentation from the u/s reservoir are not encouraging. Larger variations in the flow augmentation, however, have produced better outcomes.

Bagul V. R., Shinde D. N., Chavan R. P., Patil C.L. [7] The following conclusions were reached by author after analysing the data and information in this review paper: No truly clean water can be found. Some chemicals naturally combine with water. Once more, certain natural contaminants were automatically removed. Both natural and man-made sources, such as factories and agricultural chemicals, heavily pollute rivers. People's unconsciousness is another factor in water contamination. Teaching that applying too many pesticides and fertilisers does not increase agricultural output is especially important for rural populations. Humans and aquatic plants may be harmed directly or indirectly by polluted water. That is, the ecology is impacted by water contamination. Through water consumption, toxic compounds immediately harm living things. Some poisonous substances build up in the body and eventually manifest their pollution.

Quy-Toan Do, Shareen Joshi, Samuel Stolper [8] This paper by the author provides empirical evidence that 1987 Supreme Court decision in the Mehta versus Union of India case mandating, among other things, tanneries in the district of Kanpur to shut down, indeed induced a drop in infant neo-natal mortality and that the reduction in industrial pollution is the main channel of impact. We find that both the effects on pollution and infant mortality are localized to the few district where the ruling applied, but are found to be long lasting.

Chandra, Sameer [9] In pre monsoon season, the concentration of pollutants in Gomti river found higher than post monsoon season in studied years 2009, 2010 and 2011.Most of the populated sites are situated in the locality nearby the area whereas untreated sewage, effluent and domestic drains disposal sites are located, whereas sites situated in rural areas are less affected. As the river flow through the city from upstream to downstream the concentrations of the pollutant are increased. Studied site’s sediments are found unpolluted from metals ions i.e. As, Fe, Cu and Cd, whereas the concentration of Fe and Cu was found above the MAL in water at most of the studied time at sites Laxaman mela, Hanuman setu and Shaheed park. Concentration of nitrate, nitrite, ammonium, phosphates, chloride and sulphate are found in high concentration. However, nitrate and phosphate were found 2-4 folds, 10-20 folds respectivelyhigher than MAL in studied season of the years 2009, 2010 and 2011.

Panigrahi AK, Pattnaik S [10] The following conclusions were reached to the author after analysing the data and information in this review paper: Solid wastes should be disposed after treatment and must be banned plastic bags. Industrialists should responsible that water must be treated before falling into river. Increase Community awareness programme. Before reaching the pollutants into river the drainage water should be treated and proper management requires those drains directly enter into the river. Must be installed sewage treatment plant and after treatment this water should be used for domestic purpose. For evaluation of contamination quality of waste water effluent must be checked time to time. Proper disposal of toxic chemicals should be maintained.

Pratap Kumar Panda,Rahas Bihari Panda,Prasant Kumar Dash [11]The present work by the author's concludes them that the river water in India and abroad is largely polluted with respect to physically, chemically and bacteriologically due to the entry of pollutants from various sources such as industry, mines, agriculture, urban, domestic and medicals. Besides, this work establishes a relationship among different physico-chemical parameters. The DO is related with temperature, photosynthesis, respiration and turbidity. The pH is related with temperature, photosynthesis, dissolved carbon dioxide and chloride. Further, the work found that, the value of DO is lower during summer season due to high temperature and higher during winter season due to low temperature. Hence temperature and DO are inversely related. It is also found that in certain cases, the value of DO increases during rainy season due to flood and aeration. The review also finds that the DO and BOD are reciprocally related with certain deviation. The deviation highlights that DO and BOD increase due to simultaneous rise of concentration of pollutants and dissolved oxygen.

Dipak Paul [12] This review article summarizes the current situation of heavy metal pollution in the river Ganga to the author. Several studies of heavy metal pollution show that the levels of various heavy metals in the river Ganga water and sediment are far above the acceptable concentrations. The metals enter the environment through aquatic life systems and plants and animals surrounding the river. The hazard of bioaccumulation and biomagnification of the heavy metals make them a big risk to human health and welfare. Hence, it is necessary that steps be taken to minimize the metallurgical effluent load deposited into the river Ganga. This review suggested that various sources of heavy metals in the water and sediments of the river Ganga should be closely monitored; improvement of conditions and industrial effluent and domestic sewage discharge should be reduced.

Harendra Singh, Divya Raghuvanshi, Ruby Pandey, Arti Yadav, Beenu Tripathi, Pramod Kumar and D. N. Shukla [13] On the basis of experimental findings by the authors it was found that the river water in summer, monsoon and winter seasons show different level of fluctuations in heavy metals from place to place. The seasonal changes in the water quality of the rivers were imparted mainly due to catchment characteristics and seasonal effects. These variations were noted due to the change in the volume of industrial and sewage waste being added to river at different stations of the stretch. Concentrations of trace metals like Co, Cu, Ni, Zn and Pb in water of the river were recorded below the permissible limit at most of the selected sites, whereas the level of Cd in water exceeded the permissible limit. The present experimental data indicates that the pollution level along the river Ghaghara is not very high but the increasing population load in the basin may cause irreparable ecological harm in the long-term well masked by short term economic prosperity. The experimental data suggests a need to implement common objectives, compatible policies and programmes for improvement in the industrial waste water treatment methods. It also suggests a need of consistent, internationally recognized data driven strategy to assess the quality of waste water effluent and generation of international standards for evaluation of contamination levels. The existing situation if mishandled.

D.S. Pardeshi and Sharda Vaidya [14] From the result of present study the author concludes that Waldhuni river water is unfit for drinking purposes. It needs the treatment to minimize the contamination of all its pollutants. All the physical and chemical properties of Waldhuni river water were in undesirable limits. The results obtained from the present investigation will be useful in study ingremediation treatment of the river. The results of these indicate that the water at present is totally unsafe for any type of use.

Ashali Chandrakant Kharake, Vaishali Sanjay Raut [15] In this study water quality of Godavari river in Nashik city was evaluated by the Authors. To evaluate water quality of Godavari river 10 sampling stations were determined, and 8 parameters were selected. The physico-chemical analysis of water samples indicates that the river water sample has alkaline properties. As pollutants are added in the river water at various stations, it has decreased dissolved oxygen value. Due to addition of pollutant at these stations BOD and turbidity values have increased. TDS and F-coli parameters showed increased value at S10 due to sewage and burial activities. From the above analysis, it has been concluded that the acceleration of population increases the human interventions along the river which deteriorate the water quality. Hence, the suggested measures would help to minimize human interventions in and along the river Godavari. It is also helpful to minimize negative consequences of such impacts in the future and conserve the water resource.

Kosha A. Shah, Geeta S. Joshi [16] In the present study the authors found out that, all the water quality parameters showed variation at the three monitoring stations along the Sabarmati River. A narrow variation of pH was observed for all the stations. The main cause of deterioration in water quality at these three monitoring stations was due to the high anthropogenic activities, illegal discharge of sewage and industrial effluent, lack of proper sanitation, unprotected river sites, and urban runoff. There is a need of regular and detailed water quality monitoring of the Sabarmati River which is presently carried out by the state pollution control board.

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There is a need to the identify changes or trends in water quality over time and space, to obtain necessary information to design specific pollution prevention programs and to determine whether goals such as compliance with pollution regulations or implementation of effective pollution control actions are being met.

Navendu Sharma and Yogesh Kumar Walia [17] This study for physicochemical specifications of Satluj river water suggests to the authors that the various parameters depend upon the chemical hydrology of the study area and also on the different sites from which waste water is released. The results obtained for physicochemical properties during this study were found varied with the standard values for water quality given by World Health Organization, 2011 (WHO)20, Bureau of Indian Standards, 2012 (BIS)21 to classify the polluted sites as per their pollutant load. The results obtained were analyzed and compared with the WHO, BIS and ICMR standards and discussed in brief. The analysis of data reveals that turbidity, chemical oxygen demand, biological oxygen demand and chlorides were found to be higher than the permissible limit prescribed by WHO, BIS and ICMR.

Anil K Dwivedi [18] In light of the above study the author came to the conclusion that the level of water pollution have reached to the alarming stage. The quality of water in most part of the world has degraded, though the situation in India is more severe. Indian philosophers believe that “thought of a person depends on the type of food and water to which he is fed”. We have conquered the nature to pollute it but still we have failed to understand the nature policy even less than 10%. Daily thousands of casualties are reported, most of them are told to be due to heart attack. It is a big question before the cardiologists that is only heart, the most sensitive organ in our body? Because accumulation of the xenobiotic compounds has been reported in different specific target organs which are important cause of deaths now-a-days but its actual cycle is unexplored. No compound in nature is medicine or poison, it is only the those to which the subject is exposed. It is demand of the time to move towards sustainable development.

Saurabh Mishra, Amit Kumar, Shilpa Yadav and M.K. Singhal [19] Based on the analysis of heavy metals by the authors, it has been revealed that Zn and Pb are the major parameters responsible for water pollution in the river Kali. The overall PI indicates that, the river water was severely contaminated (i.e. PI>3) in both seasons with respect to both standard for inland water quality and drinking water quality. This severe contamination was mainly due to land run off, dredging, other linked anthropogenic activities and the discharge of industrial/urban effluents into river Kali. To classify the contamination level, PI was more significant to CI. The PI variation in both pre and post monsoon season indicated that the river was more contaminated during pre-monsoon than the post monsoon. This variation may be due to the addition of waste water during rainy season. The result also revealed that river water is not fit for irrigation as well as drinking purposes.

Borthakur T.A., Kumar D., Singhal A [20] The results of present investigation to the authors makes it clear that the values of water quality parameters obtained at site-2 is high as compared to site-1 and site-3 except for the values of Dissolved Oxygen. This shows high pollution level at site-2 as compared to site-1 and site-3. Therefore, this stretch of river is not fit for beneficial uses of water except for irrigation, fish culture and industrial cooling. The study on the DO level further suggests the presence of the septic zone near the site-2. The water quality of the river is relatively good when it enters the city, then the water quality deteriorates to a very low level in the mid-city region and finally, due to its self-cleansing capacity recovers itself to a better level after it moves out of the city. It also helps in identifying the zone inside the city to be highly polluted and the urgent requirement of the authorities to take various steps for the betterment of River Brahmaput

III. METHODOLOGY

A flow chart is produced as the overarching research methodology for this project.

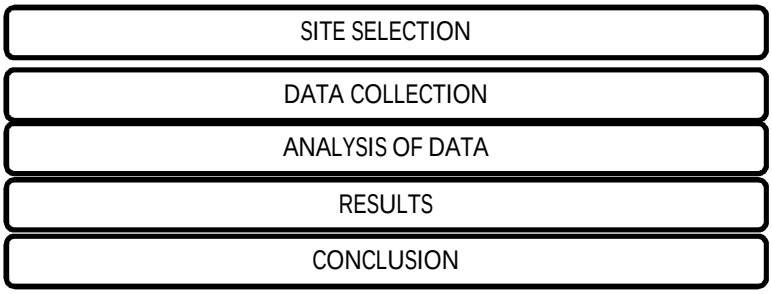

Fig-: Schematic Diagram of Methodology

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IV. CONCLUSION

The river water pollution is a gigantic problem not only in India but also for the entire world. Both developed and developing countries are suffering from river water pollution, though the gravity of pollution differs from place to place. The present work concludes that the river water in India and abroad is largely polluted with respect to physically, chemically and bacteriologically due to the entry of pollutants from various sources such as industry, mines, agriculture, urban, domestic and medicals. Besides, this work establishes a relationship among different physico-chemical parameters.

Thus, the review work gives an overall picture on river water pollution in India and interrelationship among different physico-chemical parameters so as to study and check the water pollution for the benefit of the society as a whole.

Pollution affects whole biodiversity on aquatic ecosystems. Many fishes are died due to effects of heavy metals pollution on river. Due to discharge of heavy metals contamination eutrophication occurred. Many species of river are extinct due to pollution and ultimately it leads to loss of biodiversity. Plantation of trees on the bank of river is the effective solution to reduce river pollution. To overcome river pollution plastic should be banned as it affects food chain. If we not aware about river pollution in future it will seriously affect human population.

V. ACKNOWLEDGMENT

Firstly, we are profoundly grateful to Dr. Pallavi Kharat for her expert guidance and continuous encouragement throughout to see that this project rights its target since its commencement to present. I would like to thanks Prof. Lt. Col. Sanjay Karodpati Head of Civil Engineering Department of Dr.D.Y.Patil School of Engineering & Teechnology Lohegaon , Pune and Prof. Manoj. U. Deosarkar Project Coordinator whose invaluable guidance supported us in this project.

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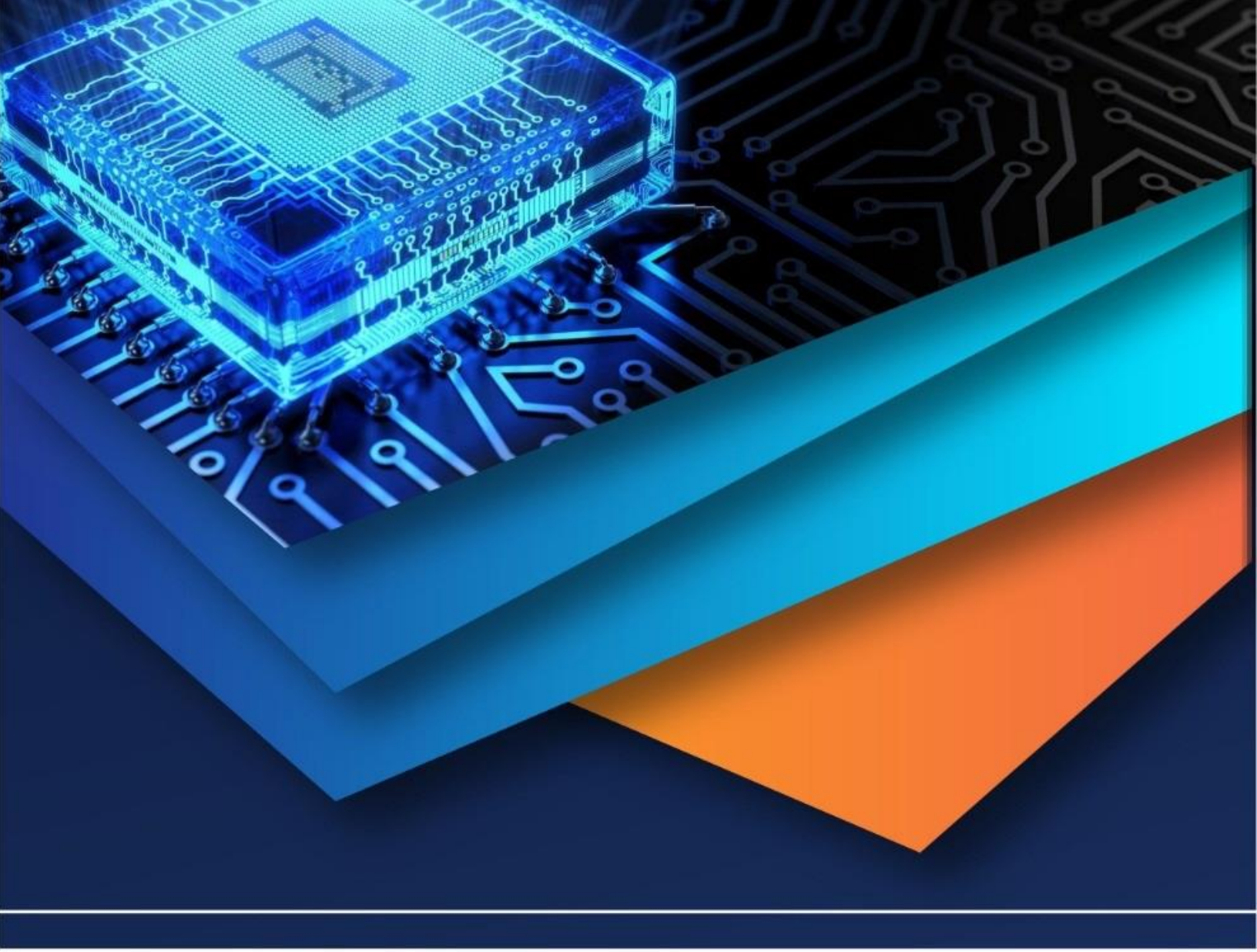

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