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# Study of Fish Diversity in Surya River in Palghar District, Maharashtra, India

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***Abstract:*** ***Surya River in Palghar district (M.S.) water resource helpful for drinking, agriculture and fisheries. It has good water storage capacity; the river is good source of fish fauna A study was undertaken in the Surya River of Palghar District during the year 2022 to 2024 to document the fish fauna and its conservation status. During the present investigation, fishes were collected and identified. The finding of the study revealed that the quality of the river water is affected due to least attention of the authorities and non- adherence of the policies by the anthropogenic activities. The fish fauna study unfolded the depleting conditions, as the survey conducted in the fish market and among fishermen community revealed disappearance of many species and deteriorating quality of existing fish species. A total number of 31 fish fauna under 10 orders, 14 families and 24 genera were recorded from the different sites of lentic and lotic ecosystems in Palghar district of Maharashtra State. The IUCN status of the fishes was also evaluated as lower risk near threatened, vulnerable, least concern, endangered, not evaluated and critically endangered the study on the Surya River calls an urgent need for conservation of the species in the river of the Palghar District. Different water parameters studied such as water temperature, pH, dissolved oxygen, alkanity, Hardness, free CO2, Nitrates and TDS were recorded and were found suitable for fish production accept some seasonal variations and due to temperature increase by organic matter, the water quality was affected.***

***Keywords: Surya River, Palghar district, fish diversity, Water Quality, Depleting Conditions.***

## I. INTRODUCTION

India has a vast biological heritage that qualifies it as one of the major diversity nations of the world (Gadgil, 1996). There are more than 1000 of small and big rivers flows in India. Importance of rivers is well understood in many parts of the world as breeding and nursery grounds for a wide variety of fishes. Riverine environments are among the most productive on earth creating more organic matter each year than comparably sized areas of forest, grasslands or agricultural land and have important commercial value with providing economic benefits for fisheries, tourism and recreational activities. Fishes are one of the most important groups of vertebrates influencing life in various ways. Fish plays an important role as it is to being used as food and also be utilized in biological control and recreation. Approximately 22,000 species of fishes worldwide have been recorded out of which nearly 2,420 are found in India, of which, 930 live in freshwater and 1,570 are marine (Kar 2003). From 18 century till to date various pioneers have studied about Ichthyofaunal diversity (Hamilton 1822, Day 1988, Menon 1999) from Himalayan rivers. Maharashtra State is rich in freshwater (dams, rivers, and lakes) reservoirs and its fish study. Hence Maharashtra state is one of the important states for natural resources and the fish production. Now Thane district divided into two districts Thane and Palghar alone shares about 23.6% of the total fish landing from Maharashtra. (Nair & Jyothi, 1990). Earlier workers taxonomy, biodiversity and distribution of fishes have been studied (Joshi et al., 2013). Today rivers are heavily exploited and are among the most threatened ecosystems. The constant decrease in the population of fish species is due to water pollution as various kinds of wastewater and other is disposed materials in the river water. So, it is very necessary to carefully asses the diversity status in these ecosystems. Freshwater resources are very precious for the life on earth. The number of dams, reservoirs, tanks, etc. has significantly increased in the past few years. The aquatic ecosystem is important and it has a large number of economically important animals, especially fish which is an important source of food.

River water is used for various purposes viz. drinking, agriculture, anthropogenic activities and fisheries. Diversity of Ichthyofauna is declining day by day due to increased human activities. Survey must be carried out in different seasons because fishes are the main trophic level of food chain in rivers. Biodiversity studies help in collecting data in scientific way and show the latest position of fishes in the river and their abundance. Biodiversity is a tool of fishery survey and by the help of genetic some hidden species can be searched. (Chandashieve et.al; 2007, Kumaran et.al;2010). Since fishes are the main source of food having economic value also are rich in proteins, vitamins and minerals.

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Studies of Biodiversity of fish have great importance for fisheries development. The object of present study is to know the abundance of fish species in the river in different seasons. Fish population is reducing due to increased human activities in rivers. Such studies will help in conservation of fishes by keeping regular watch on them because fish fauna is essential part of aquatic ecosystem. Environmental and seasonal changes are bringing drastic changes in the biodiversity of fishes in fresh water bodies now a day (Kannappan et.al;2013). Seasonal changes of the environment affect the biodiversity of fishes. Conservation plans will help us protection of fishes from environmental stress by acknowledging the fish community and thus will increase the fishes in natural resources. Main objective of study is to evaluate the relation of seasonal changes and its effect on water parameters and fishes.

Zooplanktons are essential components of the pond ecosystem, because they are present at the second tropic level as consumers (Wang et al., 2010; Sharma and Tiwari, 2011).

Fish diversity is declining rapidly each day due to unending anthropogenic stress. This diversity is not only the wealth of our world but it also has some serious implications on fishery. Thus, there is an urgent need for proper investigation and documentation of fish diversity in order to develop a fresh water fish diversity information. Any alteration or disturbance of the wetlands can have adverse impact on the environment and fishery potential (Khekare, 2015).

The present study deals mainly with the diversity of fishes along the Surya River. No study has been done related to fish diversity in this region to date.

## II. MATERIALS AND METHODS

### *A. Study Area*

The Surya Project area falls in Palghar District, which forms a part of the North Konkan Region, which lies between the Sahyadri hills in the east and the Arabian Sea in the west. It has a coastline of about 113 km. It lies Between 18°42' and 20°20' North latitudes and 72°45' to 73°48' East longitudes in eastern part of the state Its east-west spread is maximum at the south, which is about 100 km. District headquarters Palghar is about 92 km from the international airport and 145 km from Mumbai City.

The exact total length of the Surya River is not readily available in search results, but some sources provide partial or related figures. One source states the length of a related project's canal system is 80.88 km, and the river itself flows for a length of 54 km in some mapping data. The origin of Surya river is at Dhamni (Surya) Dam, Dahanu taluka at Navazevillage, Palghar district

### *B. Collection of Fish Samples*

The collections were made once a week from 4 points of the river during June 2022 to December 2024 with the help of local fishermen using different types of nets, namely gillnets, cast nets, and dragnets.

Different types of nets and boats were used with the help of local fishermen, and fish samples were collected during each monthly survey of all three stations. Collected fishes were preserved in 10% formaldehyde solution and were labelled on the spot with the serial number, location of collection, date, and local name. Photographs were taken before preservation, and species were identified on the basis of morphology (Jayram 1981, Day 1988, Day 1994, Talwar & Jhingaram 1991, and Jayaram 1999). Analysis of family, order, genus, and species was done.

Analysis of catch was done Analysis of the catch was done. The fishes caught were examined for their color or spots present on their body and recorded in the field. The species were ascertained on the basis of various morphometric characters with the help of Day (1988). This region has not been assessed for any ecological study before. Hence, it is chosen to assess fish diversity.

### *C. Collection of Water*

Samples of water from all three stations were collected every month between 7 AM and 10 AM in two BOD bottles (300 ml) and two-liter capacity PVC bottles. Water temperatures were recorded by minimum-maximum thermometers, pH by a digital pH meter on the spot, and the remaining tests were conducted in the laboratory using the method of APHA (1998).

## III. AIM AND OBJECTIVES

*1)* To Document The Fish Species Diversity Of The Surya River Along Its Abundance.
*2)* To Know The Present Status Of Fishes Present In The River.
*3)* To Know The Economic Value Of Species

The fishes were collected by local fishermen by using different types of nets, e.g., cast nets, hand nets, gill nets, and fishing rods, from June 2022 to June 2024. Analysis of the catch was done. The fishes caught were examined for their color or spots present on their body and recorded on the field. This region has not assessed for any ecological study before. Hence, it is chosen to assess fish diversity.

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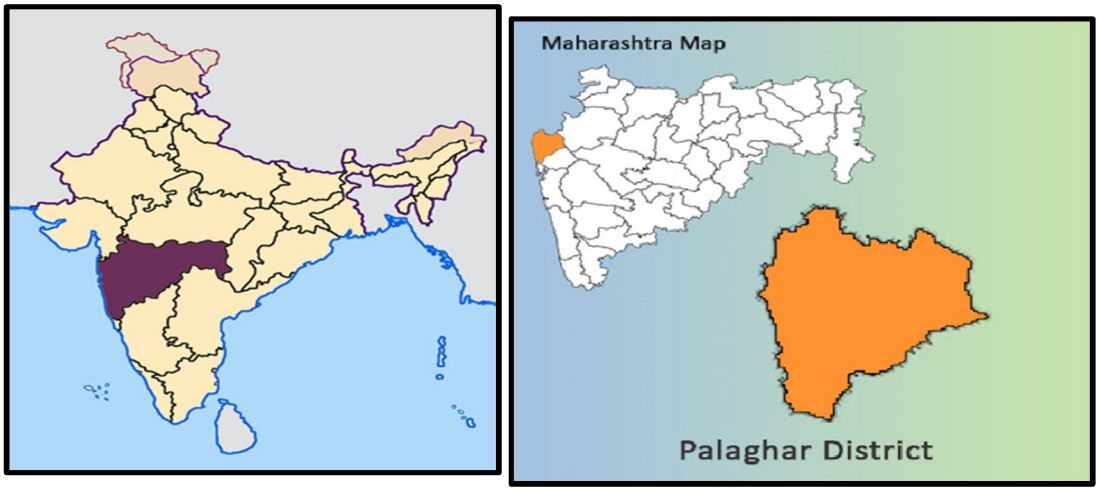



Figure 1: Map Showing Palghar district with Surya River

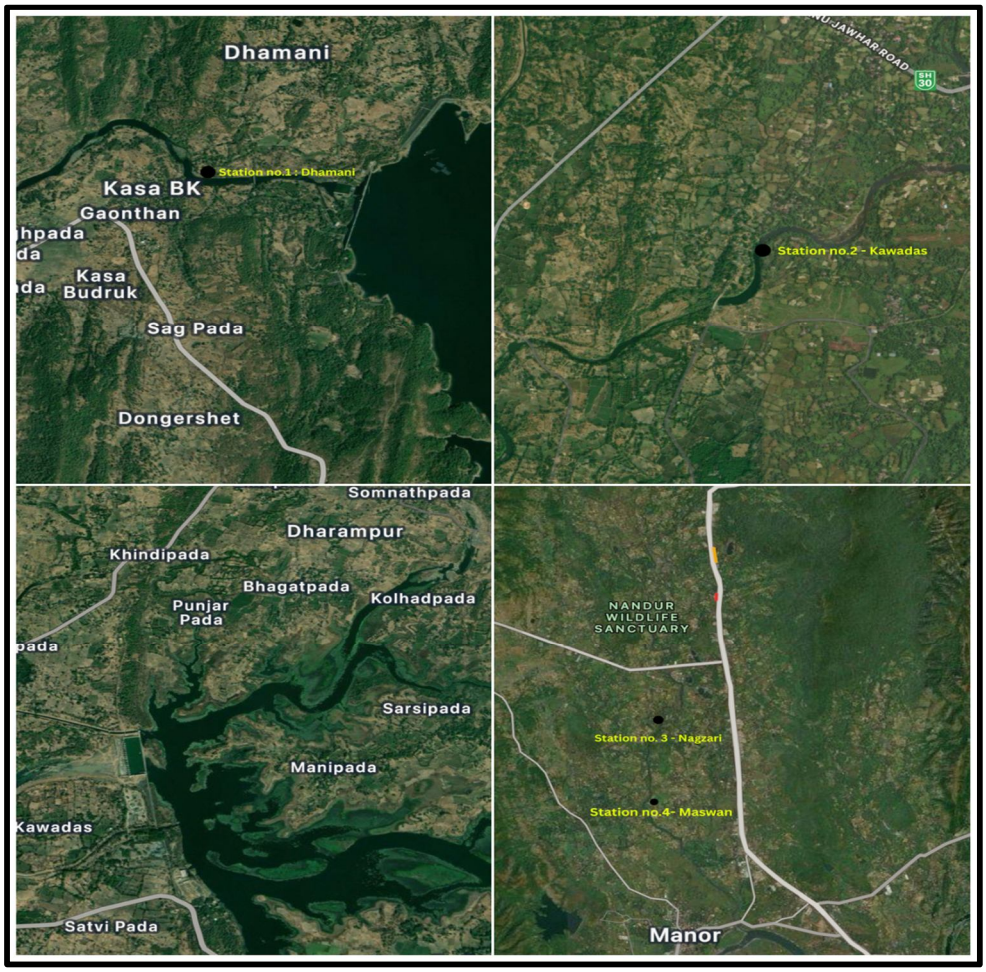



Figure 2: Google Map Showing Four sampling sites of Surya River, Palghar district
Station:1. Dhamni
Station:2. Kawadas
Station :3. Nagzari
Station:4. Maswan

## IV. RESULTS AND DISCUSSION

Present study reports 31 species (Table:1) of fishes belonging to 10 orders and 14 families and 24 genera.

Table 1: Identified Species With No. Of Species

| Sr. No. | Order | Family | Scientific Name | Conservation Status |
|---|---|---|---|---|
| 1. | Cypriniformes | Cyprinidae | Garra mullya (Sykes) | NT |
| 2. | Cypriniformes | Cyprinidae | Cyprinus carpio carpio (Linnaeus) | LC |
| 3. | Cypriniformes | Cyprinidae | Puntius chola (Hamilton) | LC |
| 4. | Cypriniformes | Cyprinidae | Puntius sophore (Hamilton) | LC |
| 5. | Cypriniformes | Cyprinidae | Puntius sarana sarana (Hamilton) | LC |
| 6. | Cypriniformes | Cyprinidae | Tor tor (Hamilton) | LC |
| 7. | Cypriniformes | Cyprinidae | Labeo rohita (Hamilton) | LC |
| 8. | Cypriniformes | Cyprinidae | Labeo boggut (Sykes) | LC |
| 9. | Cypriniformes | Cyprinidae | Catla catla (Hamilton) | LC |
| 10. | Cypriniformes | Cyprinidae | Rasbora daniconius (Boulenger) | LC |
| 11. | Cypriniformes | Cyprinidae | Salmostoma bacaila (Hamilton) | LC |
| 12. | Cypriniformes | Cyprinidae | Cirrhinus mrigala (Hamilton) | VU |
| 13. | Cypriniformes | Cyprinidae | Cirrhinus reba (Hamilton) | LC |
| 14. | Cypriniformes | Danionidae | Amblypharyngodon mola (Hamilton) | LC |
| 15. | Anabantiformes | Anabantidae | Anabas testudineus (Bloch) | LC |
| 16. | Siluriformes | Heteropneustidae | Heteropneustes fossilis (Bloch) | LC |
| 17. | Siluriformes | Clariidae | Clarias batrachus (Linnaeus) | LC |
| 18. | Siluriformes | Siluridae | Wallagu attu (Bloch & Schneider) | VU |
| 19. | Siluriformes | Siluridae | Ompok bimaculatus (Bloch) | NT |
| 20. | Siluriformes | Bagridae | Mystus seenghala (Hamilton) | LC |
| 21. | Cichliformes | Cichlidae | Tilapia sparrmanii (Smith) | LC |
| 22. | Synbranchifo rmes | Mastacembe lidae | Anguilla bengalensis (Gray) | NT |
| 23. | Synbranchiformes | Mastacembelidae | Macrognathus pancalus (Hamilton) | LC |
| 24. | Notopteridae | Notopteridae | Notopterus notopterus (Pallas) | LC |
| 25. | Perciformes | Channidae | Channa punctata (Bloch) | LC |
| 26. | Perciformes | Channidae | Channa striata(Bloch) | LC |
| 27. | Gobiiformes | Gobiidae | Glosogobius giuris (Hamilton) | LC |
| 28. | Beloniformes | Belonidae | Xenetodon cancila (Hamilton) | LC |
| 29. | Decapoda | Palaemonidae | Macrobrachium rosenburgii | LC |
| 30. | Decapoda | Palaemonidae | Macrobrachium raridens | LC |
| 31. | Decapoda | Palaemonidae | Metapenaeus dobsoni | LC |

Keys - CR=Critically endangered; EN=Endangered; VU=Vulnerable; NE - Not Evaluated, DD -Data Conservation, LC - Least Concerned, NT – Near threatened.
NE = Not Evaluated, + = Presence, - = Absence **(IUCN Red List - 2014.3.1)**

Biodiversity of fishes in a community is compulsory for balancing Station 1: stem and is also adversely affected due to the release of water in it (Pawara et al., 2014; Chaudhuri S.K., 2010). Species richness was studied, which is well indicated in the month of July, followed by the highest range in October (late monsoon), so results show richness and abundance during the months of monsoon and post-monsoon. Fish richness was greater at station 3. Seasonal variations in physico-chemical characters affect the fish population's growth and development. Climatic changes in freshwater ecosystems affect the nutrients (Bhatt S. D. 1992). Water temperature was low in winter, but overall temperature was suitable for fish production. pH was desirable Due to the effect on DO in the summer season, the effect on fish growth was observed. Alkanity was high from March to May at station 1, which indicates a reduction in fish production. Slightly higher hardness, but still it was not harmful for them. Turbidity after rains was high, but during the rest period it was supportive. Thus, balanced water parameters show abundance for fish production. Low fish productivity results when industrial and civic waste enters the river and some parameters get affected (Dande S.S. et al., 2018; Keshave et al., 2013; Samal D. et al., 2016).

Family-wise, the percentage of Cyprinidae was highest (41.94%) > Palaemonidae (9.68%) > Channidae (6.45%) > Siluridae (6.45%) > Mastacembelidae (6.45%) > Danionidae (3.23%) > Anabantidae (3.23%). Heteropneustidae (3.23%) > Clariidae (3.23%) > Bagridae (3.23%) > Cichlidae (3.23%) > Notopteridae (3.23%) > Gobiidae (3.23%) > Belonidae (3.23%) {Table:2}

Table 2: Order of Identified Species with No. of Species

| Sr. No. | Order | No. Of Species |
|---|---|---|
| 1. | Cypriniformes | 14 |
| 2. | Anabantiformes | 01 |
| 3. | Siluriformes | 05 |
| 4. | Cichliformes | 01 |
| 5. | Synbranchiformes | 02 |
| 6. | Notopteridae | 01 |
| 7. | Perciformes | 02 |
| 8. | Gobiiformes | 01 |
| 9. | Beloniformes | 01 |
| 10. | Decapoda | 03 |

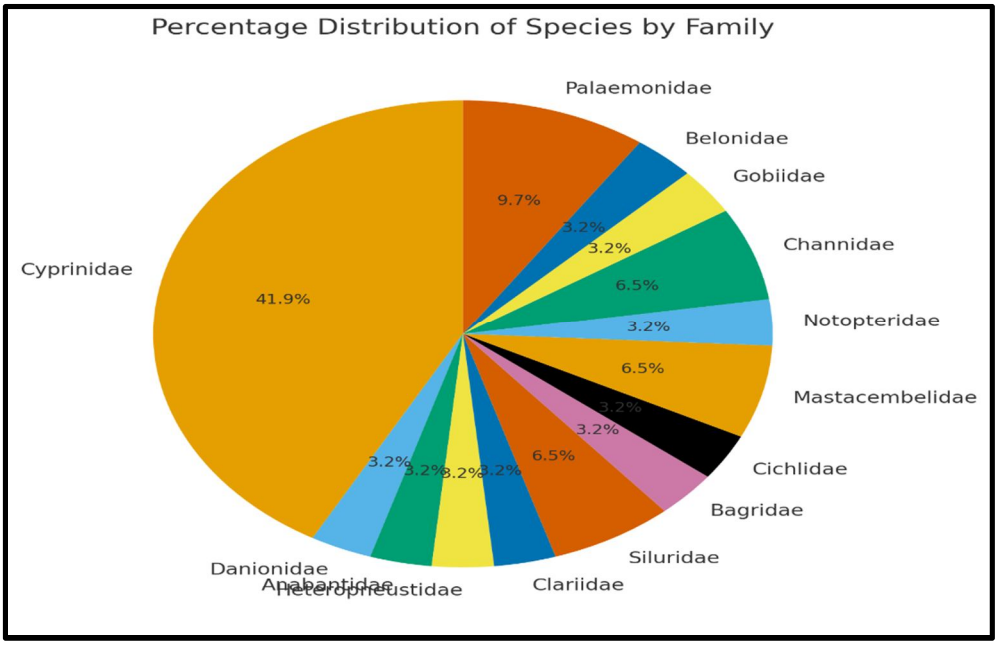
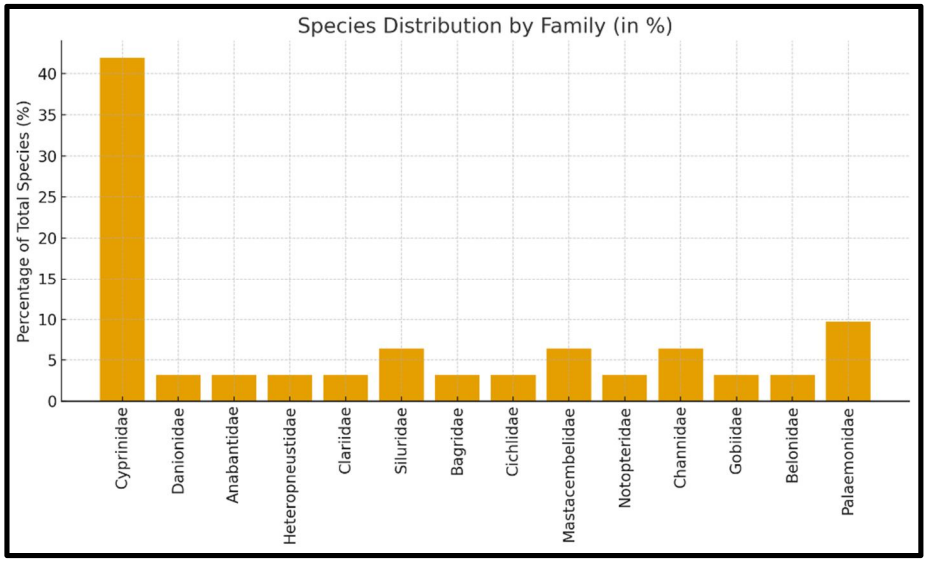



Figure 3 : Percentage occurrence of fish Order wise of Surya River, Palghar

Figure 4: Percentage occurrence of fish Family wise of Surya River, Palghar




## V. CONCLUSION

Survey of fish population is a great challenge. Fish diversity study needs extensive survey by calculating fish abundance, species composition changes due to seasonal changes which have been done in present study. It has been evaluated that the water of Surya River is good for fish production but during some period, human activities have threatened by sewage and organic matter increase resulting in decrease of fish percentage. Surya river water is suitable for development of Cyprinidaeformes > Siluriformes >Decapoda>Synbranchiformes> Perciformes > Anabantiformes > Cichliformes> Notopteridae > Gobiiformes > Beloniformes orders. Conservation of fish requires impartation of scientific training to fisherman so that small immature fishes are not caught. Available fishes are of good economic importance. Globalization brings great changes in fresh water habitat. Climatic changes and pollution are major threat for sustainable ecosystem management as well as to sustain the identified fish fauna in the tribal people should be aware about the threatening factors responsible for declining of fish fauna of the river.

The data obtained in the present study is also important in variety of manners such as to know the present status of fish fauna in the local region, it is helpful for the researchers as well as fishermen's, to get an idea about the tolerance and diversity of fish found in Surya River and choose exact variety of fish species for the culture so as to get maximum yield.

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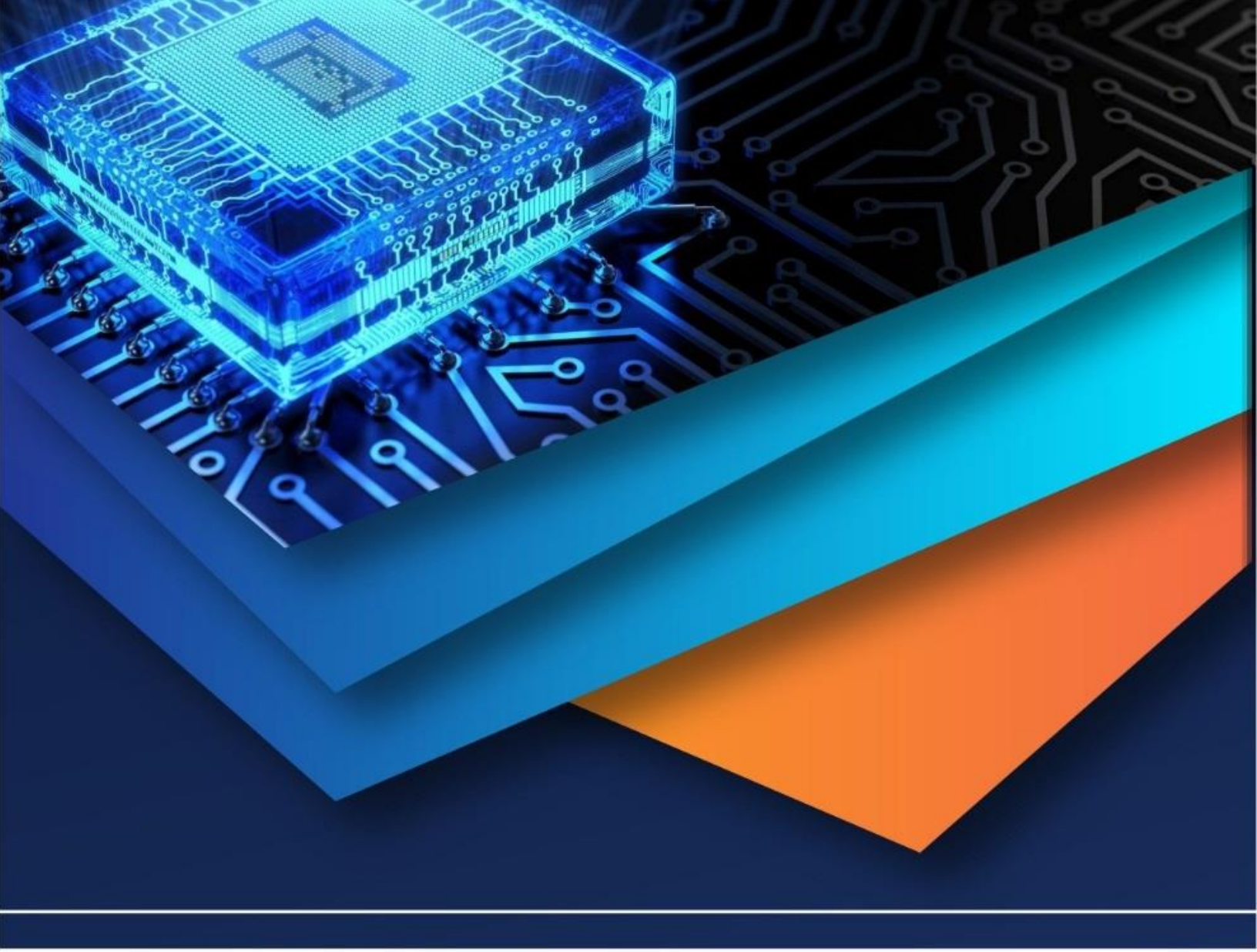
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