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Comparative Study of Physico-Chemical Parameter Between Marathwada And Western Maharashtra's Water Body

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Abstract - The study was conducted during June 2015 to May 2016. The present work is aimed to compare the physico-chemical properties of Fresh water bodies. The analytical investigation reveals the study of physico-chemical parameter of two water bodies. The parameter are Temperature, Total dissolved solids, pH, Dissolved oxygen, free carbon dioxide, Biological oxygen demand, Chemical oxygen demand, Hardness, Calcium and Magnesium. The study was designed to monitor seasonal variation in water parameter for drinking water quality, water use for irrigation and pisciculture.
Key Words - Majalgoan Reservior, Chaphal Reservior, pH, Do, Co2.

I. INTRODUCTION

Water is a great gift of nature, it is life supporting material. There is no life without water, it very much essential for healthy growth of organisms. Water plays very significant role in the life cycle of organisms. Water pollution is becoming the most challenging threat to human beings as a result of rapid industrialization and growth of population throughout the world. (Deshpande et, al, 2009). A water bodies are affected by biotic and abiotic factors like surrounding climax and washer person, fisherman and domestic sewage will be dumped in river. Excess use of fertilizers, insecticides, pesticides by farmers will float through water and mix in reservoir water. (Pradeep kumar patel, 2015). Improper and inadequate waste water treatment facilities in India huge source volume of waste water is being discharged into the river and lakes. It is practiced in various towns and cities.(Nataraja S., *et al.*, 2009).
Water is a universal solvent and is a major constituent of all living organisms. A plentiful supply of clean water is essential for the survival of human beings, plants and animals. According to World Health Organization about 80% of all the diseases of human beings are causes by water. (T. Nirmala *et al,*. 2010) All lotic habitats such as rivers, nala, spring and canals are important because they are abundance natural resource.

II. MATERIALS AND METHODS

The water samples for physico-chemical analysis were collected from Majalgoan reservoir , marathwada and Chaphal reservoir, western Maharashtra. From four different sampling location in the early morning that's are Station 1, Station 2, Station 3 and Station 4. The samples were collected for every month in sterilized containers from a depth of 5-10 cms below the surface of water. Separate samples were collected from four sampling stations and analyzed in laboratory and compare some physico-chemical parameters like Temperature, Total Dissolved Solids, pH, Dissolved oxygen, Free carbon dioxide, Biological oxygen demand, Chemical oxygen demand, Hardness, Calcium and Magnesium etc. of both water bodies for one year.

A. Data analysis

Table 3.1: Mean of Parameter from Station 1of Majalgaon Reservior.

	Monsoon Mean ± SD	Winter Mean ± SD	Summer Mean ± SD
Temp	27.6 ±1.72	25.5 ±4.77	28.55 ±2.01
TDS	200 ±1191	149 ±122	217.5 ±2814.50
pH	7.75 ±0.07	7.9 ±0.19	8.25 ±0.15

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DO	6.58 ±2.22	8.40 ±2.74	6.05 ±2.46
Free CO_2	4.73 ±25.77	6.29 ±23.07	3.63 ±29.64
BOD	5.95 ±2.57	4.90 ±3.37	7.18 ±0.81
COD	6.64 ±1.07	4.88 ±0.84	2.68 ±0.30
Hardness	120 ±450	139.75 ±39.38	111.50 ±250.50
Ca	67.75 ±77.38	80.50 ±81.50	66.25 ±31.38
Mg	12.69 ±45.58	14.38 ±11.03	10.99 ±10.62

Table 3.2: Mean of Parameter from Station 2 of Majalgaon Reservior.

	Monsoon Mean ± SD	Winter Mean ± SD	Summer Mean ± SD
Temp	27.23 ±2.77	26.23 ±5.64	28.43 ±5.06
TDS	214.25 ±3846.38	149.25 ±158.38	233.75 ±9108.38
pH	7.65 ±0.14	7.80 ±0.03	8.23 ±0.09
DO	6.93 ±5.86	8.38 ±10.26	5.08 ±3.87
Free CO_2	3.75 ±18.06	5.89 ±20.59	3.30 ±39.91
BOD	4.61 ±8.27	5.08 ±1.14	6.73 ±1.49
COD	5.99 ±1.02	4.13 ±0.91	2.64 ±0.54
Hardness	118 ±313	143.75 ±61.38	109.75 ±342.38
Ca	62.75 ±147.38	82.75 ±28.38	69.75 ±1.38
Mg	13.66 ±26.68	14.82 ±5.33	9.72 ±20.42

Table 3.3: Mean of Parameter from Station 3 of Majalgaon Reservior.

	Monsoon Mean ± SD	Winter Mean ± SD	Summer Mean ± SD
Temp	27.65 ±4.02	25.45 ±3.57	27.90 ±1.11
TDS	177.50 ±424.50	152 ±169	186 ±2111
pH	7.80 ±0.13	8.03 ±0.07	8.15 ±0.22
DO	6.23 ±6.14	8.30 ±4.87	6.70 ±6.14
Free CO_2	5.20 ±29.29	5.40 ±15.20	3.45 ±31.33
BOD	4.38 ±3.22	4.35 ±0.79	6.90 ±2.83
COD	7.00 ±2.19	4.65 ±2.57	2.93 ±0.39
Hardness	121.75 ±244.38	139.75 ±211.38	103.25 ±108.38
Ca	63 ±135	78.75 ±96.38	68.75 ±114.38
Mg	14.27±2.15	14.82 ±22.33	8.38 ±0.27

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Table 3.4: Mean of Parameter from Station 4 of Majalgaon Reservior.

	Monsoon Mean ± SD	Winter Mean ± SD	Summer Mean ± SD
Temp	26.83 ±3.32	26.18 ±4.13	29.35 ±4.83
TDS	174.50 ±473.50	147.25 ±97.38	195 ±2935
pH	7.78 ±0.09	8.03 ±0.06	8.18 ±0.06
DO	6.38 ±5.11	8.65 ±4.01	6.15 ±2.79
Free CO_2	4.64 ±18.36	6.28 ±20.08	4.10 ±42.95
BOD	5.58 ±1.63	4.95 ±2.49	6.30 ±2.97
COD	6.26 ±4.59	4.14 ±0.57	2.48 ±0.09
Hardness	116.50 ±440.50	135.25 ±80.38	107.75 ±81.38
Ca	60.75 ±28.38	75 ±36	65.25 ±48.38
Mg	13.54 ±14.63	14.64 ±10.19	10.32 ±4.28

Table 3.5: Mean of Parameter from Station 1of Chaphal Reservior.

	Monsoon Mean ± SD	Winter Mean ± SD	Summer Mean ± SD
Temp	30.05 ±14.31	27.90 ±19.95	28.63 ±23.31
TDS	294 ±91	260.75 ±137.38	352.75 ±2997.38
pH	7.85 ±0.23	7.48 ±00	8.35 ±0.37
DO	5.95 ±0.90	7.50 ±0.17	6.60 ±1.22
Free CO_2	3.10 ±0.04	3.18 ±0.25	1.83 ±0.31
BOD	5.65 ±2.23	4.98 ±0.66	7.48 ±0.48
COD	7.18 ±0.90	5.15 ±1.01	4.08 ±0.46
Hardness	140.75 ±24.38	125.25 ±89.38	137.50 ±46.50
Ca	77.00 ±103	87.50 ±76.50	71.25 ±29.38
Mg	11.03±3.72	13.36 ±6.14	15.46 ±4.43

Table 3.6: Mean of Parameter from Station 2 of Chaphal Reservior.

	Monsoon Mean ± SD	Winter Mean ± SD	Summer Mean ± SD
Temp	30.23 ±13.87	28.00 ±19.69	28.65 ±27.65
TDS	291 ±479	260.25 ±185.38	350.75 ±3537.38
pH	7.83 ±0.39	7.53 ±0.02	8.40 ±0.36
DO	5.90 ±1.05	7.45 ±0.17	6.40 ±0.91
Free CO_2	3.20 ±0.13	3.15 ±0.46	1.68 ±0.35

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BOD	6.43 ±1.76	5.70 ±1.69	7.23 ±1.12
COD	6.30 ±0.97	5.40 ±0.19	3.50 ±1.03
Hardness	140 ±34.00	123.75 ±96.38	136 ±19.00
Ca	68.50 ±10.50	87.50 ±50.50	73 ±27
Mg	12.61 ±16.46	16.14 ±4.53	16.66 ±2.58

Table 3.7: Mean of Parameter from Station 3 of Chaphal Reservior.

	Monsoon Mean ± SD	Winter Mean ± SD	Summer Mean ± SD
Temp	30.18 ±13.59	25.78 ±12.66	28.65 ±27.45
TDS	286 ±826	252.50 ±653.50	364.50 ±2804.50
pH	7.75 ±0.27	7.53 ±0.02	8.40 ±0.36
DO	5.95 ±1.05	7.43 ±0.11	6.30 ±1.17
Free CO_2	3.13 ±0.19	3.13 ±0.46	1.63 ±0.40
BOD	4.95 ±0.74	5.08 ±1.23	7.18 ±2.20
COD	7.04 ±0.99	5.58 ±0.08	4.68 ±0.04
Hardness	137.75 ±13.38	123.00 ±108	135.25 ±9.38
Ca	63.50 ±30.50	87.50 ±76.50	76.25 ±13.38
Mg	12.08 ±13.69	13.99 ±16.22	16.68 ±4.54

Table 3.8: Mean of Parameter from Station 4 of Chaphal Reservior.

	Monsoon Mean ± SD	Winter Mean ± SD	Summer Mean ± SD
Temp	29.65 ±24.81	25.70 ±11.70	28.65 ±26.34
TDS	293 ±423	262.50 ±205.50	351.25 ±3832.38
pH	7.75 ±0.35	7.48 ±0.01	8.35 ±0.29
DO	5.93 ±1.05	7.48 ±0.23	6.43 ±1.67
Free CO_2	3.20 ±0.25	2.98 ±0.13	1.88 ±0.37
BOD	6.10 ±1.34	5.78 ±1.72	6.73 ±1.57
COD	6.76 ±3.21	5.55 ±0.31	3.35 ±0.06
Hardness	139.25 ±37.38	124.50 ±94.50	137.75 ±31.28
Ca	66.50 ±8.50	88 ±77	74.25 ±10.38
Mg	13.53 ±9.33	14.86 ±3.15	13.95 ±15.27

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Volume 5 Issue II, February 2017
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Table 3.9: Average Parameter of Monsoon in Majalgaon Reservior.

	Station 1	Station 2	Station 3	Station 4	Average
Temp	27.6	27.23	27.65	26.83	27.33
TDS	200	214.25	177.5	174.5	191.56
pH	7.75	7.65	7.8	7.78	7.75
DO	6.58	6.93	6.23	6.38	6.53
Free CO_2	4.73	3.75	5.2	4.64	4.58
BOD	5.95	4.61	4.38	5.58	5.13
COD	6.64	5.99	7	6.26	6.47
Hardness	120	118	121.75	116.5	119.06
Ca	67.75	62.75	63	60.75	63.56
Mg	12.69	13.66	14.27	13.54	13.54

Table 3.10: Average Parameter of Winter in Majalgaon Reservior.

	Station 1	Station 2	Station 3	Station 4	Average
Temp	25.5	26.23	25.45	26.18	25.84
TDS	149	149.25	152	147.25	149.38
pH	7.9	7.8	8.03	8.03	7.94
DO	8.4	8.38	8.3	8.65	8.43
Free CO_2	6.29	5.89	5.4	6.28	5.97
BOD	4.9	5.08	4.35	4.95	4.82
COD	4.88	4.13	4.65	4.14	4.45
Hardness	139.75	143.75	139.8	135.25	139.63
Ca	80.5	82.75	78.75	75	79.25
Mg	14.38	14.82	14.82	14.64	14.67

Table 3.11: Average Parameter of Summer in Majalgaon Reservior.

	Station 1	Station 2	Station 3	Station 4	Average
Temp	28.6	28.43	27.9	29.35	28.56
TDS	218	233.8	186	195	208.06
pH	8.25	8.23	8.15	8.18	8.20
DO	6.05	5.08	6.7	6.15	6.00
Free CO_2	3.63	3.3	3.45	4.1	3.62
BOD	7.18	6.73	6.9	6.3	6.78
COD	2.68	2.64	2.93	2.48	2.68
Hardness	112	109.8	103.25	107.75	108.06
Ca	66.3	69.75	68.75	65.25	67.50
Mg	11	9.72	8.38	10.32	9.85

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Volume 5 Issue II, February 2017
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Table 3.12: Average Parameter of Monsoon in Chaphal Reservior.

	Station 1	Station 2	Station 3	Station 4	Average
Temp	30.05	30.23	30.18	29.65	30.03
TDS	294	291	286	293	291.00
pH	7.85	7.83	7.75	7.75	7.80
DO	5.95	5.9	5.95	5.93	5.93
Free CO_2	3.1	3.2	3.13	3.2	3.16
BOD	5.65	6.43	4.95	6.1	5.78
COD	7.18	6.3	7.04	6.76	6.82
Hardness	140.75	140	137.75	139.25	139.44
Ca	77	68.5	63.5	66.5	68.88
Mg	11.03	12.61	12.08	13.53	12.31

Table 3.13: Average Parameter of Winter in Chaphal Reservior.

	Station 1	Station 2	Station 3	Station 4	Average
Temp	27.9	28	25.78	25.7	26.85
TDS	260.75	260.25	252.5	262.5	259.00
pH	7.48	7.53	7.53	7.48	7.51
DO	7.5	7.45	7.43	7.48	7.47
Free CO_2	3.18	3.15	3.13	5.78	3.81
BOD	4.98	5.7	5.08	5.78	5.39
COD	5.15	5.4	5.58	5.55	5.42
Hardness	125.25	123.75	123	124.5	124.13
Ca	87.5	87.5	87.5	88	87.63
Mg	13.36	16.14	13.99	14.86	14.59

Table 3.14: Average Parameter of Summer in Chaphal Reservior.

	Station 1	Station 2	Station 3	Station 4	Average
Temp	28.6	28.65	28.65	28.65	28.65
TDS	353	350.8	364.5	351.25	354.81
pH	8.35	8.4	8.4	8.35	8.38
DO	6.6	6.4	6.3	6.43	6.43
Free CO_2	1.83	1.68	1.63	1.88	1.76
BOD	7.48	7.23	7.18	6.73	7.16
COD	4.08	3.5	4.68	3.35	3.90
Hardness	138	136	135.25	137.75	136.63
Ca	71.3	73	76.25	74.25	73.69
Mg	15.5	16.66	16.68	13.95	15.69

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III. RESULTS AND CONCLUSION

The pH, BOD and COD are similar in both reservoirs at monsoon season as reported by Koorosh Jalilzadeh *et al.,* (2009), Sudesh D. Rathod *et al.,* (2009). The temp of Majalgaon reservoir was 27.33°C and Chaphal reservoir was 30.03 °C, Chaphal reservoir show a more temp than Majalgoan reservoir which may be due to their climatic and topographical condition. Mountain area of Chaphal reservoir is more retain temp. TDS of Majalgaon reservoir was 191.56 mg/L and Chaphal reservoir was 291 mg/L it was near about 100 mg/L is more than Majalgaon reservoir soil of Chaphal reservoir is more dissolve in water than soil of Majalgaon reservoir Sayyed Hussain *et al.,* (2012). DO of Majalgaon reservoir was 6.53 mg\L and 5.93 was Chaphal reservoir, Free CO_2 in Majalgaon reservoir was 4.58 mg/L and 3.16 mg/L was in Chaphal reservoir the DO and Free is more in Majalgoan reservoir than Chaphal reservoir due their aquatic ecosystem. M. O. Aremu *et al.,* (2014). Hardness was 119.06 mg/L in Majalgaon reservoir and 139.44 mg/L in Chaphal reservoir it is more than Majalgaon reservoir. Poonam Bhadja *et al.,* (2013). The Ca was 63.56 mg/L in Majalgaon reservoir and in Chapahl reservoir Ca Was 68.88 mg/L which is more than Majalgaon reservoir Istifanus Y. Chindo *et al.,* (2013). The Mg was 13.54 mg/L in Majalgaon reservoir and 12.31 mg/L in Chaphal reservoir which in less than Majalgaon reservoir. K. Shanmugasundaram *et al.,* (2014).

In winter season pH and Mg of both reservoir was similar Sandeep Arya *et al.,* (2013). The temp of Majalgaon reservoir was 25.84°C and 26.85 °C was Chaphal reservoir which more than Majalgaon reservoir. The TDS of Majalgaon reservoir was 149.38 mg/L and Chaphal reservoir was 259 mg/L which was more than Majalgaon reservoir Basavaraja Simpi *et al.,* (2011). The DO of Majalgaon reservoir was 8.43 mg/L and Chaphal reservoir was 7.47 mg/L which was less than Majalgaon reservoir Jinal Y. Patel *et al.,* (2015). The Free CO_2 of Majalgaon reservoir was 5.97 mg/L and Chaphal reservoir was 3.81 mg/L which was less than Majalgaon reservoir Shalini Shivhare *et al.,* (2014). The BOD of Majalgaon reservoir was 4.82 mg/L and Chaphal reservoir was 5.39 which was more than Majalgaon reservoir Nidhi Saxena *et al.,* (2011). The COD of Majalgaon reservoir was 4.45 mg/L and Chaphal reservoir was 5.42 mg/L which was more than Majalgaon reservoir Shweta Sao (2015). Hardness of Majalgaon reservoir was 139.63 mg/L and Chaphal reservoir was 124.13 mg/L which was less than Majalgaon reservoir Amanial Haile Reda (2016). The Ca of Majalgaon reservoir was 79.25 mg/L and Chaphal reservoir was 87.63 mg/L which was more than Majalgaon reservoir S. Ponnusamy *et al.,* (2016).

.In summer season pH and Temp of both reservoirs was similar Narayana, J. *et al.,* (2008). The TDS of Majalgaon reservoir was 208.06 mg/L and 354.81 mg/L was in Chaphal reservoir which is more than Majalgaon reservoir. Nikesh G. Kotadiya *et al.,* (2016). The DO is 6 mg/L in Majalgaon reservoir and 6.43 mg/L in Chaphal reservoir which 0.43 mg/L more than Chaphal reservoir R. S. Lendhe *et al.,* (2004) The free CO_2 was 3.62 mg/L in Majalgaon reservoir and 1.76 mg/L in Chaphal resevior which is less than Majalgoan reservoir. The BOD was 6.78 mg/L in Majalgaon resevior and 7.16 mg/L in Chaphal reservoir which high than Majalgoan reservoir Farha Aziz *et al.,* (2013). The COD was 2.68 mg/L in Majalgaon reservoir and 3.90 mg/L in Chaphal reservoir which was more than Majalgaon reservoir Manjappa S (2004). The Hardness was 108.06 mg/L in Majalgaon reservoir and 136.63 mg/L was in Chaphal reservoir which more than Majalgaon reservoir S. A. Manjare *et al.,* (2010). The Ca was 67.50 mg/L was in Majalgaon reservoir and 73.69 mg/L in Chaphal reservoir which more than Majalgaon reservoir Jayabhaye U. M. (2008). The Mg was 9.85 mg/L in Majalgaon reservoir and 15.09 mg/L in Chaphal resevior which was more than majalgaon reservoir Shastri (2008).

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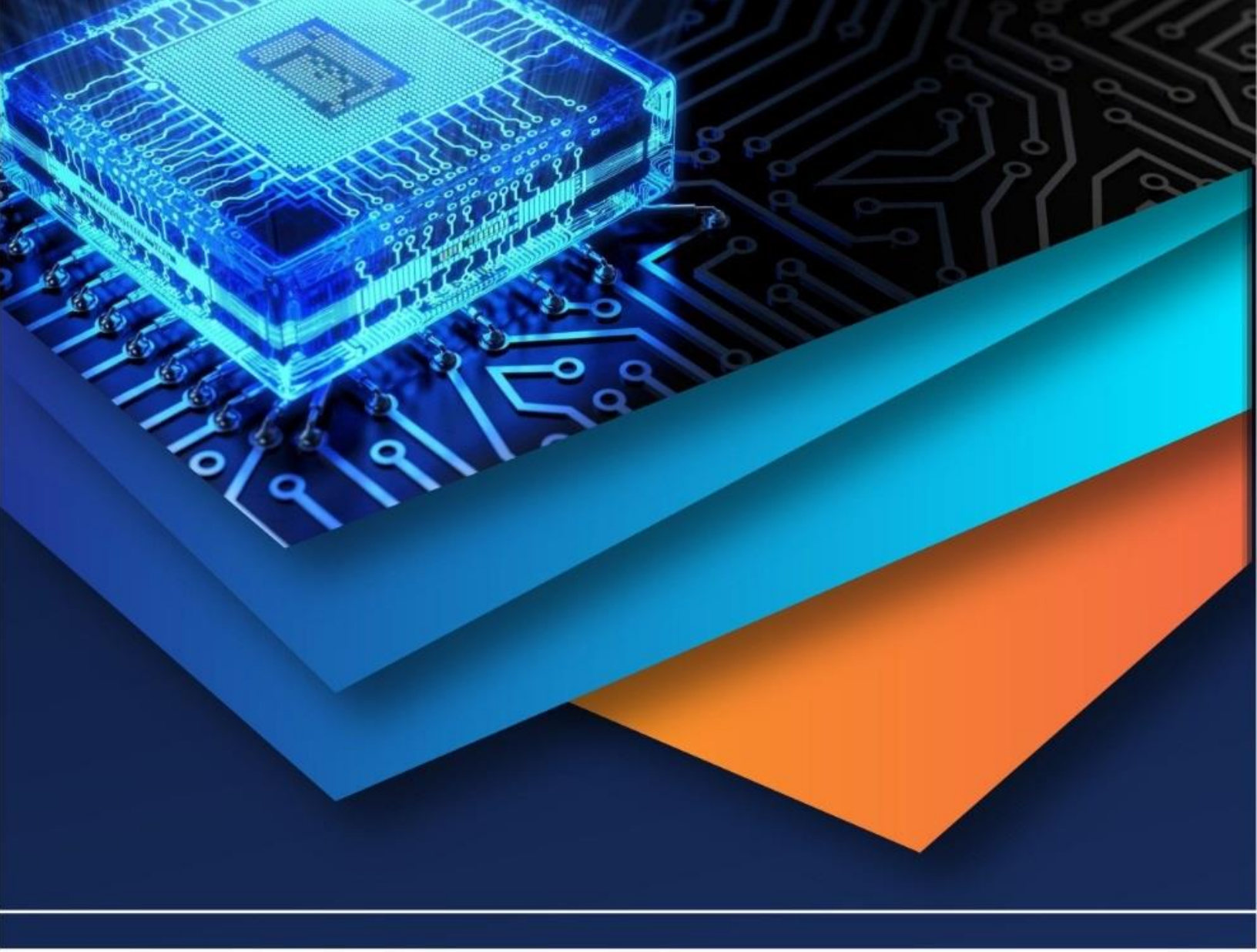

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