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Evaluation of Water Samples Collected from Ulta Khera Mound from Mahabharata fame Hastinapur

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***Abstract:** In present scenario Hastinapur changed a lot, but some things have not been changed. When Archaeological Survey of India (ASI) was excavated in Hastinapur in 1950-52 and Dr. B.B. Lal reported that there has been no change in the climatic condition of Hastinapur since 3000 years. If we see the vegetation of Hastinapur, then we get some trees in such a large number as Neem (Azadirachta indica), Sheesam (Dalbergia sissoo), Keekar (Vachellia nilotica), Jamuna (Syzygium cumini) and Arjuna (Terminalia arjuna). These trees give more importance to the Hastinapur. This shows that the importance of Hastinapur is not less even today's contrast. We choose some water sources i.e. Amrit Koop (Well) and 3 handpumps, located on Ulta Khera mound in Hastinapur due to the religious beliefs. One interesting thing is that there is some folk stories are related behind the Amrit Koop that by bathing from this water skin disease must be cured. We have tried to merge some religious events/stories in science. Keeping all this in the mind we have tested some water samples of different sources of water on Ulta Khera Mound. After testing the samples results perplexed us. It is proved that Amrit Koop located on the mound is enough to cure skin diseases.*
***Keywords:** Ulta Khera Mound, Hastinapur, Amrit Koop, Sulphur, Skin Disease*

I. INTRODUCTION

Hastinapur (29º9'; 78°3') is a town in the Doab region of Uttar Pradesh in India approx. 37 km from district headquarter Meerut and 110 km north-east of Delhi on National Highway 119. According to the official records, Hastinapur is divided into two parts Hastinapur *Kaurwan* and Hastinapur *Pandwan*. Hastinapur is situated at *Ishan Kon* (North-East) from Delhi, a present capital of India. Hastinapur is situated in Mawana Tehsil of District Meerut, Uttar Pradesh. Hastinapur is related to the many events described in Mahabharata [1]. According to the Hastinapur excavation report published in Ancient India No. 10 and 11 the climatic condition didn't vary since 3000 years [4]. That means Hastinapur have some qualities by which it is known for. In this research paper we are talking about the medicinal properties exist in the source of water on the Ulta Khera Mound especially in Amrit Koop. Water is a natural resource and essential for survivals. Water is also a natural solvent and without water no one can live. There is about 75% water in human body. On earth approximately 97.2% water is salty and only 2.8% is present as fresh water from which about 20% constitutes ground-water **[2]**. 4/5th of the earth is covered with water. Adequate supply of fresh and clean drinking water is basic need for all human beings on Earth, yet it has been observed that millions of people worldwide are deprived of this water. Fresh water resources all over the world are threatened not only by over exploitation and poor management but also by ecological degradation. They may damage growing plants and transmit disease, which are harmful to living beings. In India there are two sources of drinking water i.e. Ground Water and Surface Water. In our research area there are one well known as Amrit Koop [1] and three handpumps situated near this well one is near Peer (approx. 50 metre distance from well) ,other one is in Raghuntah Mahal which is approximately 100 metre distance from Amrit Koop and another hand pump situated in Jayanti Mata Mandir. When I go for some historical research work on that mound I always found some peoples took bath in the water of Amrit Koop which is situated on the mound itself. When I ask the peoples that why you use such filthy water for bathing purpose then they told me that this water is very useful in curing skin diseases. From historical point of view this mound is also important [1, 3, 4]. Then I choose this particular area for my research, here mythology, history and science all are intersect. To the best of my knowledge none of the researcher had done the work on the water quality assessment of different sources on Ulta Khera Mound in Hastinapur.

II. MATERIAL AND METHODS

Water samples were collected in sterile white bottles from selected location of handpumps and well. Each sample was collected in a separate polystyrene bottle. These samples were stored at 4°C till further analyses. All care was taken to protect the samples from any contamination(s). Water samples were filtered through Whatman filter paper. The aliquot was used for further analysis (i)

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Physical (ii) Chemical methods were used to determine water quality. The Physical and chemical parameters of the water (i.e. pH, odour, conductivity) where assessed following the protocol as published elsewhere [Bharati et al, 2012; 5]

A. Physical

1) *Colour:* Colour change is not harmful unless it is associated with a toxic chemical, but it may affect the quality of sunlight that penetrates to a given. Depth inhibiting plant-animal metabolism. Most of trade wastes discharge into water systems have pronounced colour due to organic and inorganic complex. It has been reported that even a micro quantity (0.002 ppm) of magenta in water imparts a distinct red colouration. Water also become intensely coloured due to interaction been naturally occurring components in water and trade effluents which makes it unsuitable for various purpose.
2) *Odour:* Odour pollution of water in caused both by chemical agents (like hydrogen sulphite, free chlorine, ammonia, phenols, alcohols, esters, hydrocarbon) and biological agents (such as algae, fungi, micro-organism) lower the pH, higher will be the amount of H_2S produced and greater will be the odour nuisance. Certain organic and inorganic compounds of Nitrogen, Sulphur, Phosphorus and putrefied organic matters present in sewage cause foul odour in polluted water.
3) *Turbidity:* Turbidity in water mainly arises from colloidal matter, fine suspended particles and soil erosion. If water is dirty .i.e. light transmission inhibited, it is known as turbid water. The standard method of measuring turbidity is the Jackson Candle Turbidimeter first developed in 1990. It consist of, a long flat bottomed glass tube under which candle is placed Turbid water is poured into the glass tube until the outline of the flame is no longer visible. The centimetres of water in tube are then measured and compared to the standard turbidity unit.

B. Chemical

1) *pH:* pH is measured by a pH meter using a glass electrode which generates a potential varying linearly which the pH of solution in which it is immersed. It is a Nernst ion concentrations cell with Potential contracted by the activities of H^+ on either side of a very then glass membrane the latter is the bottom part of a bulb at the end of a glass tube contained a reference solution of fixed samples. pH measure of hydrogen ion activity is used to express the intensity of acidic or alkaline solution. It is also an important factor in water analysis since it enters into the calculation of acidity, alkalinity. pH 7 indicates neutral water, pH 7-14 alkaline and below 7 acidic.
2) *Conductivity:* Conductivity is the measure of concentration of mineral constituent in water. This gives the idea about dissolved solids in water. Dissolved salts ionized is aqueous medium and electrically charge ions conduct electric current between the two electrodes, the ability of conductance is dependent upon the concentration mobility and valency of ions. Inorganic substances show better conductance while organic compounds are poor current conductor as they do not dissociated, this conductivity give us good idea of ionic concentration of dissolved inorganic substances.
3) *Dissolved Oxygen (DO):* It is the amount of O_2 (gaseous oxygen) dissolved in the water. It enters in the stream of water by direct absorption from the atmosphere, by rapid movement, or as a waste product of plant photosynthesis. Water temperature and the volume of moving water can affect dissolved oxygen levels. Adequate dissolved oxygen is important for good water quality and necessary to all forms of life.
4) *Statistical Analysis:* All the data of chemical parameters are calculated on Microsoft Office Excel Worksheet and presented as mean ± standard error of mean (Mean ± SEM). Further, the results were analyzed by One Way Analysis of Variance (One way ANOVA) followed by Dunnet's t- Test as post-hoc analysis to measure the level of significance between samples on Statistical Package for the Social Sciences (SPSS, Version 17.0 of 2017, IBM, Illinois, USA). The "p" value less than 0.05 ($p < 0.05$) was considered to be statistically significant. All of the samples were collected randomly and were analysed in single lot in triplicate.

Table 1: Methods used for physicochemical parameters

S.No	Parameters	Methods
1.	Conductivity	Conductivity Meter
2.	Turbidity (NTU)	Turbidity Meter
3.	pH	pH meter.
4.	Metals in water	Group radical tests[6] followed by flame emission spectroscopy

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Fig 1: Collecting Sample from Handpump Near Peer on Ulta Khera Mound, Hastinapur

Fig 2 : Amrit Koop on Ulta Khera Mound

Fig 3: Collecting Sample from handpump near Jayanti Mata Mandir

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Fig 4: Collecting Sample from handpump in Raghunath Mahal

III. RESULTS

S.No	Parameters	Permissible Limit (BIS, 2012)	Amrit Koop (DK)	Raghunath Mahal (RM)	Near Peer (NP)	Jayanti Mata Mandir(JM)
1	Odour	-	Organic Chemical Smell	-	-	-
2	pH	6.5 ± 2.0	6.1 ± 0.01	6.92 ± 0.02* [a]	6.5 ± 0.01	6.9 ± 0.01* [a]
3	TDS (in ppm)	2000 ± 109	825 ± 10.5** [b]	585 ± 11.8** [b]	447 ± 12.1** [b]	550 ± 9.8** [b]
4	Conductivity (in mho)	-	1.069 ± 0.002	0.826 ± 0.001	0.727 ± 0.003	0.810 ± 0.003
5	Salinity (in ppt)	-	0.82 ± 0.02	0.7 ± 0.01	0.57 ± 0.03* [b]	0.50 ± 0.03** [b]
6	Temperature (°C)	-	34.3 ± 0.5	34.8 ± 0.2	35.1 ± 0.6	35.5 ± 0.7
7	Dissolved Oxygen	-	6.1 ± 0.7	6.01 ± 0.8	5.5 ± 0.7	6.09 ± 0.8
8.	Turbidity (NTU)	5 ± 0.7	6 ± 0.8	3 ± 0.9* [a]	4 ± 0.1	4 ± 0.2
9	Sulphate (mg/L)	400 ± 25.1	560.75 ± 20.4	20.52 ± 15.1** [b]	25.67 ± 10.3** [b]	27.85 ± 24.1** [b]
10	Iron (mg/L)	0.3 ± 0.001	1 ± 0.002** [b]	0.4 ± 0.004	0.3 ± 0.002	0.5 ± 0.003
12	Fluoride (mg/L)	1.5 ± 0.02	1.02 ± 0.02	1 ± 0.07	0.67 ± 0.6* [b]	0.88 ± 0.3
13.	Potassium	-	D	N.D.	N.D.	N.D.
14	Phosphorous	-	D	N.D.	N.D.	N.D.

Table 2: Different physicochemical parameters tested

N.D.- Not Detected
D – Detected
NTU - Nephelometric Turbidity Unit

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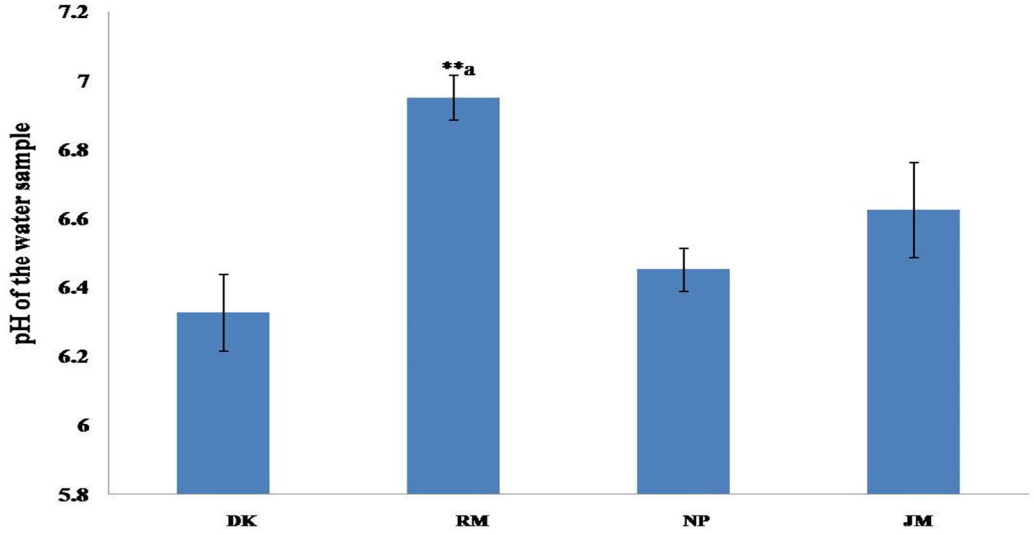

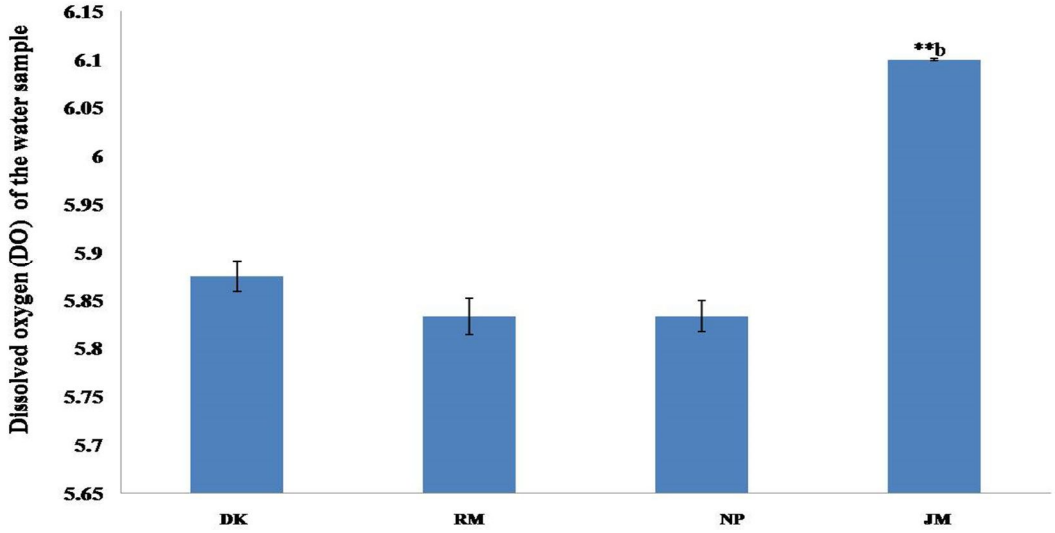

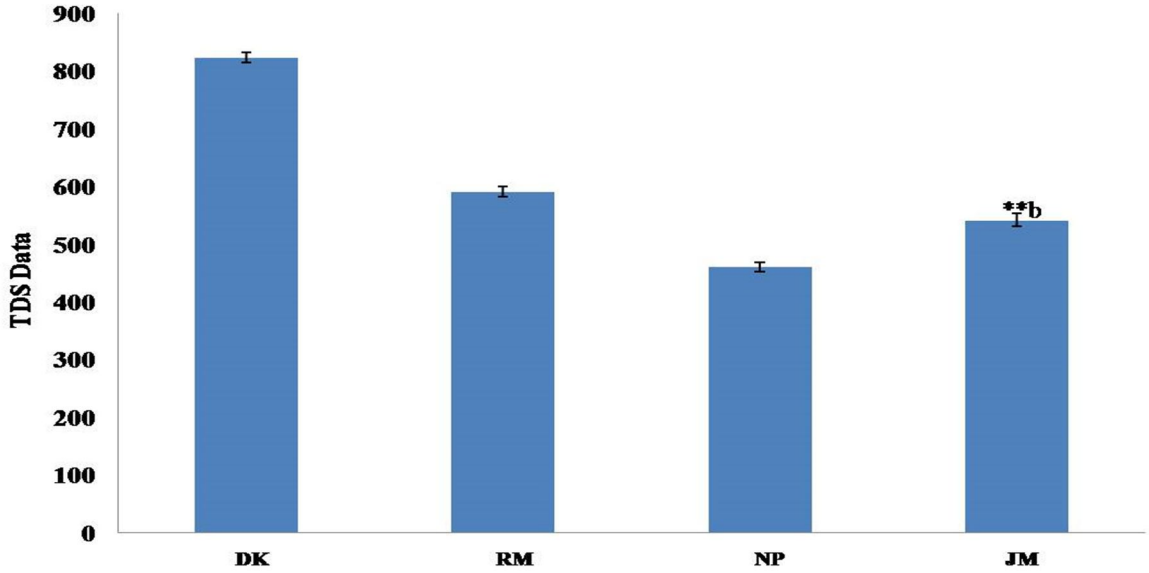

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IV. CONCLUSION AND DISCUSSION

It does not always happen that folk tales in society are wrong .This is not on a fictional basis, but on the basis of the results of this research.Nobody in Hastinapur knows when this Draupadi Koop (well) is being brought in the use of water bath, those skin diseases is not cured, they also come to bath here from various places. If the disease is not eradicated by this water, people in such a large number do not come here. The confluence of belief and faith in the people is found here, and it cannot be found anywhere else. When people come to Hastinapur, they also come to visit on Ulta Khera Mound and they did not stop themselves from seeing this well. Along with faith and belief, science also finds a united confluence in Hastinapur. This world has become enlightened scientifically with Hindu scriptures and Vedas. In the Srimad Bhagwad Gita, Shri Krishna has used the word science repeatedly to explain the concept to Arjun.

In the era of Mahabharata, before the war of Mahabharata, Vasudev Sri Krishna had come as a peace envoy in Hastinapur and Shri Krishna had a special attachment to Hastinapur. The reason of Shri Krishna becoming a peace ambassador was not only avert the war but also to show the character of Hastinapur which was also to mention the scientific reason. In the literature of Shri Krishna, it is particularly noticeable that there was a scientific reason behind every aspect of Krishna for example as described in Bhagawad Maha-Purana Kaliya Daman, in which the Yamuna was being pollution free by Sri Krishna on the other hand Putana Uddhar chapter suggested the remedy for breast-related disease in women. Putana was not only the monster but the epidemic spreading at that time, whose remedy was only told by Vasudev Shri Krishna. After this research, it is known that Shri Krishna had a scientific reason to come in Hastinapur. How? Let's see. It is believed that when Vasudev Sri Krishna came to Hastinapur, he had gone to Vidur Kuti and ate the Chenopodium album (Bathua), which indicates in that time the land adjacent to Hastinapur have the Sodium, Iron, Potassium etc as a mandatory nutritional element in the soil. It is clear that there is such an element in the land of Hastinapur which has the ability to cure many diseases now these elements are coming in the stream of Amrit Koop which are detected in this Koop. It means that the significance of the Hastinapur did not change with time.

The water quality assessment of all of the water samples have suggested that Amrit Koop (DK) is having highest amount of dissolved oxygen, sulphate as well as iron contents as well as phosphorus and potassium. Thus, the present study may suggest that due to the highest boring of Amrit Koop is more prone to underground water which is in closest proximity of the river Ganga. Hence the present study is in equivocal with the previous historical as well as excavation proofs that only the Amrit Koop but not the other handpumps are in direct underground water contact with the river Ganges which has clearly suggested that there was existence of the flow of River Ganges in the present proximity of excavation area. With highest level of sulphur content it is also evident that the water of Amrit Koop (but not the other hand pumps) are eligible for curing of skin diseases. It is suggested by workers that high content of sulphur and sulphur containing chemicals are worthy of curing numerous skin oriented problems. Sulfur has antibacterial [9], antidermatitis [10], antifungal [11] and keratolytic activity [11]. Sulfur is also used in dermatological disorders such as acne vulgaris, rosacea, seborrheic dermatitis, dandruff, pityriasis versicolor, scabies, and warts [11]. Sulfur in the presence of potassium and phosphorus gave the remarkable contribution in curing skin diseases. Thus, mythological scripts, folk and scientific data are in agreement about its healing effect. However, further water and soil assessment tests and studies are arrested to prove an in depth remark.

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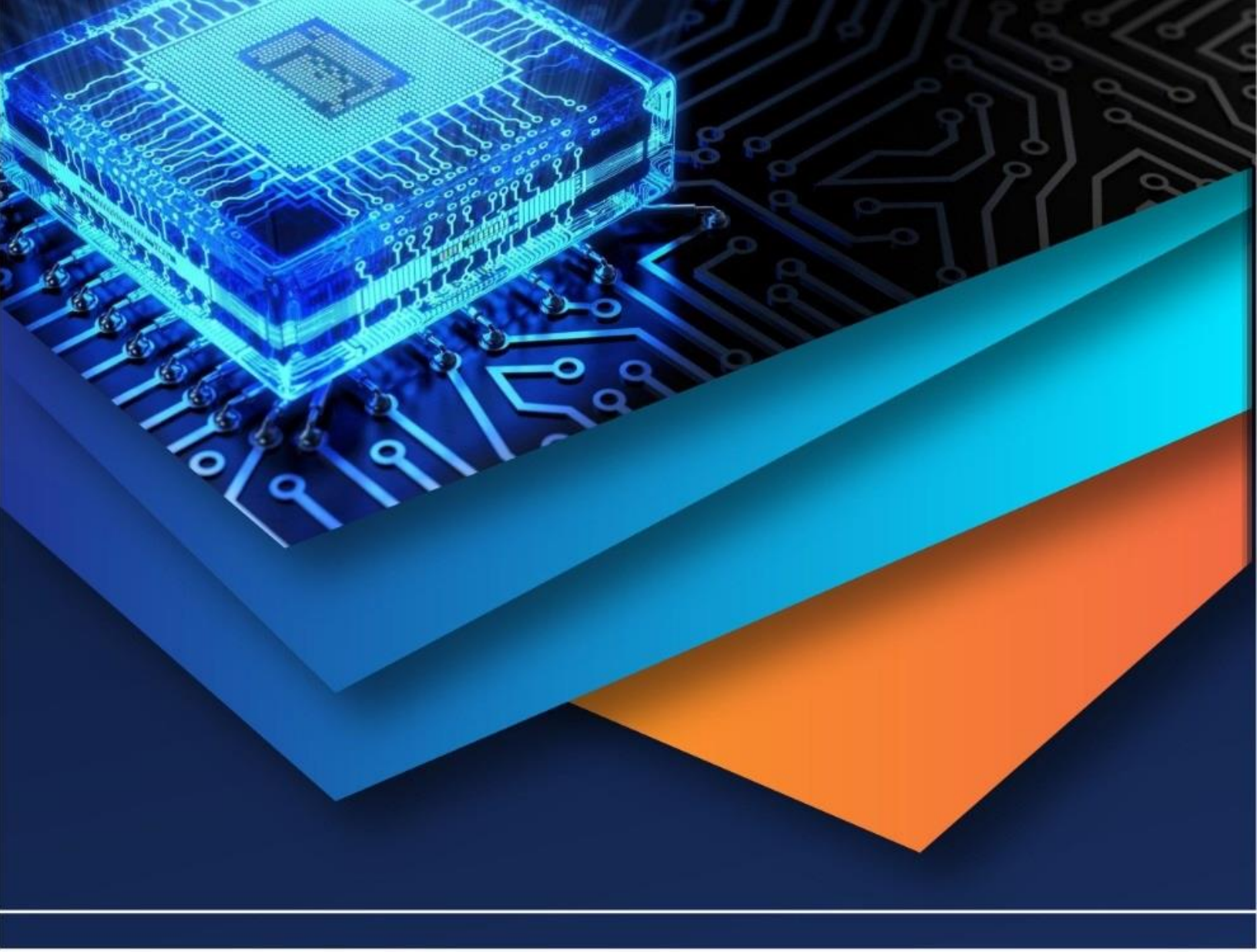

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