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Hydro Power Projects in J&K State-Potential Scenario

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Abstract: ***As energy becomes the current catchphrase in business, industry, and society, energy alternatives are becoming increasingly popular. Hydroelectricity exists as one option to meet the growing demand for energy and is discussed in this paper. Numerous consideration factors exist when building hydropower plants; whether the concerns are global or local, each has been measured when discussing this renewable energy source. From environmental and economic costs of constructing such plants to proposing the addition of hydropower generating capabilities in Jammu and Kashmir, the authors have used personal experience from field studies and intensive research to cover the topic of Hydro Power Projects in J&K State-Potential Scenario.***
Keywords:-Hydro power, Renewable Energy, Micro and Mini projects, Energy Deficit

I. INTRODUCTION

The advancement of the economic scenario, and due to the policy reforms as carried out in the recent years has revitalizing effect on various sectors of economy which is now tranquilizer for accelerated growth in the years to come, this rate of growth is difficult to sustain due to infrastructure bottlenecks.

Along with others, one of the key impediments affecting rate of growth (also industrial production) is the non-availability of quality energy. Government under the infrastructure development programmed has initiated various measures including setting up of an infrastructure finance funding agency, seeking private participation and FDI for infrastructure projects including power generation and achieving speedily clearance of such projects. Hydroelectric Power Projects, though they involve long incubation period are still considered to be the reliable and cheap option as the potential energy of water is tapped for generation of power. Hydroelectric power projects are Eco-friendly and except for maintenance they do not require any fuel for energy generation.

J&K State is one of the potential regions for generation of power through Hydroelectric propeller, important river basins of State having large potential of power generations of power include Indus and its tributaries, Jhelum and its tributaries, Chenab and its tributaries; as well as Taw water resources.

State of J&K is deficit in power supply and even for its own requirement around 70% of power is imported / purchased from outside states.

State of J&K has the potential of generation of around 25,000 MWs. of hydroelectric power. Investigation work on some of the potential sites has been carried out and in some cases detailed investigation including drawing out the feasibility report and seeking clearance of CEA have been initiated / carried out.

II. NATIONAL POWER SCENARIO

The Country in general faces with acute power shortage demand. By the end of the Eighth Plan period it was around 48,000 MW, whereas Government had proposed to add 30,540 MW during the 8th Plan period. In 2012 it was still short of 12,000 MW.And till March 2017 it has come down to 4700 MW.

The enormous growth in demand for power in India is due to the steep growth in economy and growth experienced in industrial production. The energy shortage in India was about 7459 MU with the peak shortage at 1.6 % as on March 31, 2017. The wide gap in demand and supply can only be met through private participation and FDI. Visualizing this aspect, the Government has opened the energy sector for the private participation. The Government has offered various incentives for setting up power projects by the private partners.

III. POWER SECENARIO: J&K STATE

In spite of about 25,000 MW of the Hydro Electric Power potential of the J&K State, 3132.87 MWhave been harnessed so far. Jammu & Kashmir's (J&K) power demand is mostly met by the Central Generating Stations (CGS) and the State's own sources. The State's own installed generation capacity is 1,419.37 MW comprising of 1,110 MW of Hydroelectric Power Stations, 198 MW

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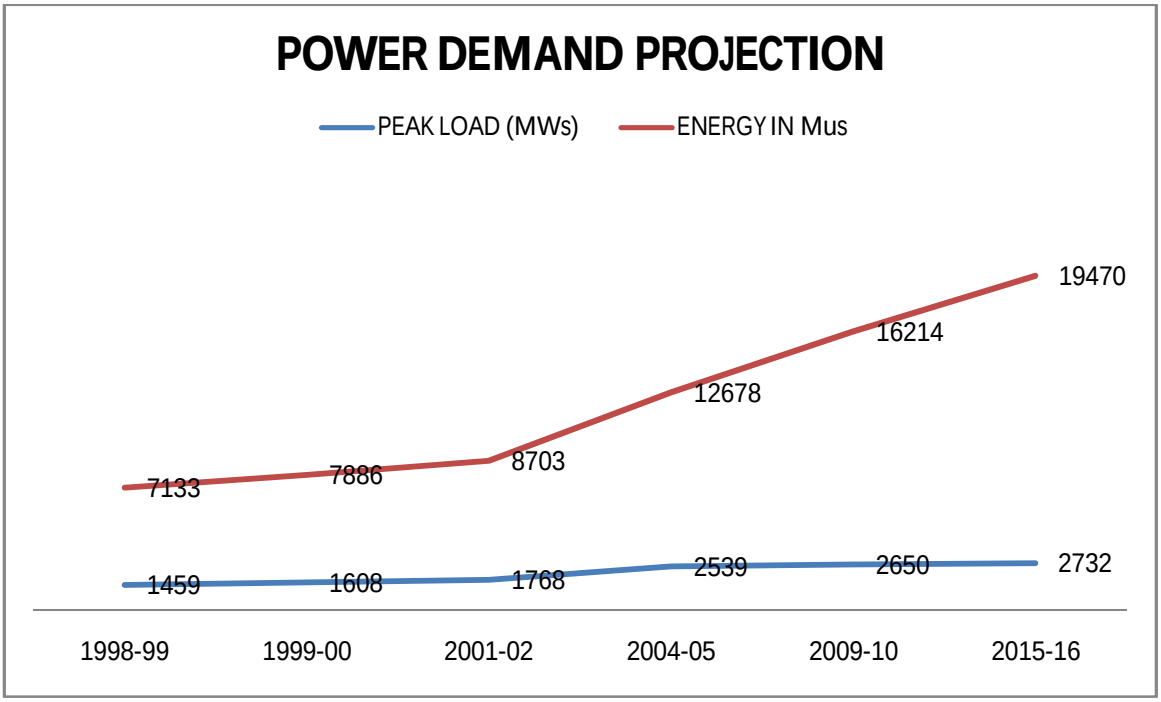
thermal (Gas turbine) and 110.96 MW of SHPs. The State owned plants contribute to 45 % of the total energy requirement. Allocations from CGS contribute to the majority (53%) of the power supply and remaining (2.0 %) is sourced from private sector.
JKPDD is expecting a capacity addition/ increased allocation totaling 228.9 MW from CGS which currently stands at 1,671.25MW. Generation capacity available from private players (Including Solar/Wind) is expected to increase by 787.5 MW by 2018-19. As the peak demand for power is projected to increase to 2,983 MW by FY19, the State is expected to face a peak deficit of 270 MW. However, in terms of energy availability, the State is likely to face a deficit of 1,060 MU in FY19.
The average generation from the above generating is around 900 MUS. Generated from Gas Turbines (operated for a limited period during winter).
Central Electricity Authority, Ministry of Energy, has conducted a survey so as to forecast the power demand of J&K State. The peak load demands (and requirement of energy) are expected to increase to 1768 MWs in 2001-01 and 3832 MWs in 2009-10. The demand projections for the State of Jammu and Kashmir are given in Table below.

Table 1:- POWER DEMAND PROJECTION (AS PER CEA) IN J&K

S.No	YEAR	PEAK LOAD (MWs)	ENERGY IN Mus
1.	1998-99	1459	7133
2.	1999-00	1608	7886
3.	2001-02	1768	8703
4.	2004-05	2539	12678
5.	2009-10	2650	16214
6.	2015-16	2732	19470

(Source:- CEA-2017)



Despite large purchases from NHPC / NTPC / NORTHERN GRID, J&K State is deficit in power availability position resulting in curtailment during summer and winter months.

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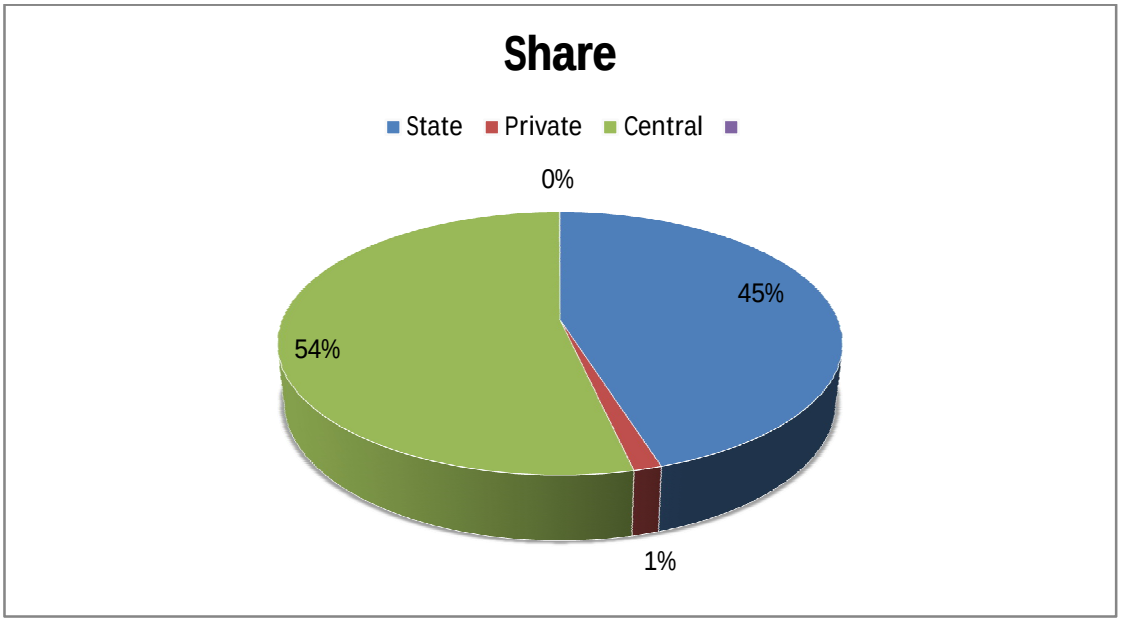
Table 2:- Installed Capacity (MW) as on November 2015

Sector	Thermal	Hydro	RE	Total
State	198.41	1,110	101.96	1,410.37
Private	-	0	42.50	42.50
Central	630	1,041	-	1,671.00
Total	828.41	2,151	142.46	3,124.00

(Source: - JKSPDCL)



A. Potential of hydroelectric Power in J&K State

The State of Jammu and Kashmir, which extends from extreme Himalayans to the plains of Jammu region is divided into three major river basin.

1) Indus River and its tributaries.
2) Jhelum River and its tributaries.
3) Chenab River and its tributaries.

Additionally Ravi River has small catchment area and another site namely Sewa River has the potential of generation of hydroelectric Power. In addition there are mini Hydel power generation sites which have adequate potential of generating of power of small magnitude mainly to cater to the requirement of the respective regions.

In addition to Hydel, the State has potential of tapping Solar and Wind energy particularly in Ladakh and other such region where generation, transmission and distribution cost due to isolated habitats is relatively very high. In Pugga valley region of Ladakh there is potential of geo-thermal energy and some investigation as well as few installations (particularly for using geo-thermal energy in the form of steam for refining of Borax and Sulphur as well as for heating purposes) have been successfully tried. As per the estimates carried out from time to time, the State has hydroelectric Potential of around 25,000 MW out of the above said river basins. The State thus can become a major power producer and supply the surplus power to other parts of Country.

State can judiciously exploit the hydroelectric power potential and besides meeting its own growing demand can supply power to the National Grid, which is the assured consumer in view of wide demand - supply gap. In addition to large and medium projects a total of 104 no. of small hydro projects capable of generating continuous power have been identified in the State. The total installed capacity of these schemes is estimated at 8, 28,500 KWs.

Besides the power projects under operation as well as those awaiting clearance from CEA, investigation work in respect of some potential the medium and micro / mini projects has been carried out. The details regarding installed capacity; expected energy generation of such projects is given in table below.

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Table 3:- POWER PROJECTS UNDER INVESTIGATION

S.No.	NAME / LOCATION	CAPACITY (MWs)	ENERGY (MWs)
A	Medium		
1.	Lower Kalnai , Doda	50	35
2.	Lower Ans , Udhampur	37	18
3.	Parnai , Rajouri	37	19
4.	Mandi , Rajouri	37	19
5.	Bichllery , Rajouri	36	18
6.	Naiaguh , Kishtwar	200	100
7.	Uri - II , Baramulla	200	100
8.	Sonmarg , Srinagar	83	45
9.	New Ganderbal , Srinagar	50	27
10.	Sewa - II , Kathua	90	45
B	Micro / Mini		
11.	MawarHydel , Handwara	6	3
12.	Boniyar Stage - II , Baramulla	6	3
13.	Lidder , Anantnag	30	15
14.	Vishar , Kulgam	15	7
15.	AruHydel , Anantnag	30	15
16.	WangatHydel , Srinagar	30	15
17.	SandarnHydel , Anantnag	6	3
18.	Lassipora , Handwara	4	3
19.	Kahmil , Handwara	4	1
20.	Chingus - II , Rajouri	2	1
21.	Neeru , Doda	25	12
22.	Paniklor, Kargil (Par Kochok)	30	6
23.	Chatok , Kargil	7	3

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24.	Pugga , Leh	1	
25.	IgopheMerileng, Leh (Merlaezng)	4	2

Source: JKSPDCL

Table 4:- Plant wise details of allocated capacity from Central sector projects (Dec 2015)

Plant Name	Fuel	Capacity (MW)	Allocated Capacity (MW)
Salal	Hydro	690	237
Dulhasti	Hydro	390	82
Uri-I	Hydro	480	163
Sewa-II	Hydro	120	23
NimoBazgo	Hydro	45	38.25
Uri-II	Hydro	240	49
Chutak	Hydro	44	44
Rihand STPS	Thermal	1,000	70
Rihand STPS Stg. - II	Thermal	1,000	94
Rihand STPS Stg. - III	Thermal	1,000	66
Unchahar - I TPS	Thermal	420	14
Unchahar - II TPS	Thermal	420	30
Unchahar - III TPS	Thermal	210	13
Dadri NCGPS	Gas	830	56
Anta GPS	Gas	419	29
Auraiya GPS	Gas	663	44
Narora Atomic Power Station(NAPS)	Atomic	440	33
Chamera HPS- I	Hydro	540	21
Chamera HPS- II	Hydro	300	19
Chamera HPS- III	Hydro	231	16
Tanakpur HPS	Hydro	94	7
Dhauliganga HEP	Hydro	280	17
NathpaJhakri HPS	Hydro	1,500	105
Tehri Stage - I	Hydro	1,000	48
Koteshwar HEPS	Hydro	400	18
Parbati-III HEP	Hydro	520	36
Rampur HEP (Unit#1,2,3,4,5,6)	Hydro	412	29
Koldam HEP (800 MW)	Hydro	800	89
Farakka STPS (1600 MW)	Thermal	113	14
Kahalgaon - I (840 MW)	Thermal	261	31
Mezia unit 6 (250 MW)	Thermal	150	18
Kahalgaon - II (1500 MW) [498 MW firm+ 343MW in lieu of Tala]	Thermal	841	83
Rajasthan Atomic Power Station (RAPS U-3 &4) - Firm power	Atomic	374	35
Diverted Unallocated power from Western Region to J&K		100	100
Total		16,327	1771.25

The State proposes to execute some of the projects with private participation as well as through FDIs.

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IV. PRIVATE PARTICIPATION IN POWER PROJECTS

Due to the potential of generation of hydroelectric projects and there being the possibility of adequate transmission network for supply of power to the Northern and other grids (and vice versa) the State plans to harness the hydroelectric potential which would result in overall development of the State. Geographically the State is in advantageous position to harness the hydroelectric potential. The surplus power can economically be supplied to the national grid on long term basis. Few projects are identified for private participation as well as Foreign Direct Investment.

In case of some of the projects the feasibility of the proposals including seeking clearance from CEA etc. has been done. The projects identified / proposed for private participation as also for foreign direct investment are enlisted in tables below.

Table 5: - POWER PROJECTS PROPOSED FOR PRIVATE PARTICIPATION WITH DETAILS

S.No	NAME OF HYDRO PROJECT	DAM HEIGHT	Water Conductor Tunnel Open Channel	Head	Design discharge in Cumecs
1.	Sewe Stage - II	41 M	10.60 Km. - 9 M Dia.	562 M	25.62
2.	Parnai Project	5 M	9.70 Km. - 3.2 M Dia.	373 M	12.03
3.	Kishanganga	103 M	21.66 Km. - 6.5 M Dia.	632 M	57.30
4.	Bursar	252 M	4.70 Km. - 10.5 M Dia.	255 M	460.00
5.	Pakal - Dul	77 M	14.78 Km. - 7 M Dia.	582 M	301.00
6.	Sawalkot	195 M	8.60 Km. - 9 M Dia.	201 M	350.00
7.	Chutak	Weir	0.4 Km. - 3 M Dia.	44 M	31.00
8.	Uri - II Phase				
9.	Parkachak	Weir	0.4 Km. - 3 M Dia.	80 M	17.00
10.	Baglihar	141 M	23 Km. - 9 M Dia.		

(Source:- JKSPDCL)

Table 6:- POWER PROJECTS PROPOSED FOR PRIVATE PARTICIPATION WITH DETAILS

S. No.	Installed Capacity (MW)	Annual Generation (GWH)	Approx. Cost (Crores)	Nearest Rail Head
1.	120	658	350	Kathua (120 KM)
2.	37.5 (Lifting barrage)	250.81	150	Jammu (225 KM)
3.	330	1460	1000	Jammu (465 KM)
4.	1020	2476	3000	Jammu (300 KM)
5.	1000/2000	4259	2500	Jammu (300 KM)

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6.	600	2500	1800	Jammu (165 KM)
7.	12	55	60	Jammu (520 KM)
9.	30/30	148	150/250	Jammu (585 KM)
10.	450	2050	2000	Jammu (140 KM)

(Source:-JKSPDCL)

For the private sector participation as well as FDIs the project besides technically feasible should confirm to financial viability norms to enable them to raise finances from different sources, In order to ensure proper return as also for the proposals to be financially viable, the Government of India have time and again announced package of incentives for attracting private investment in power sector. The incentives and concessions for private participation as well as for FDI in case of the power projects are given below.

V. INCENTIVES PACKAGE FOR POWER PRODUCERS IN PRIVATE SECTOR

A. A 16 percent return on equity assures for investment in power.
B. The private sector can take up distribution as licensees or can come in as generating companies.
C. The private sector can set up projects - thermal, Hydel, wind and solar of any size.
D. Maximum debt equity ratio of 4:1 allowed.
E. Eleven percent of outlay must come from promoter's contribution.
F. Sixty percent of outlay must come from sources other than Indian public financial institutions.
G. Foreign private investment up to 100 percent foreign equity permitted.
H. Five-year tax holiday allowed for new companies involved in either generation or distribution.
I. Custom duty for import of equipment reduced to 20 percent.
J. Generating companies to sell power on a suitably structured two-part tariff mechanism.
K. The two-part tariff mechanism declared will be used as a guideline for negotiating the tariff between the State and IPPs.
L. Incentives rate of return of up to 0.7 percent on equity for every percentage point increase in PLF beyond 68.5 percent.
M. Hydro tariff notification improved upon providing better cover for hydrological / geological risks and long gestation period.
N. Competitive bidding made mandatory.

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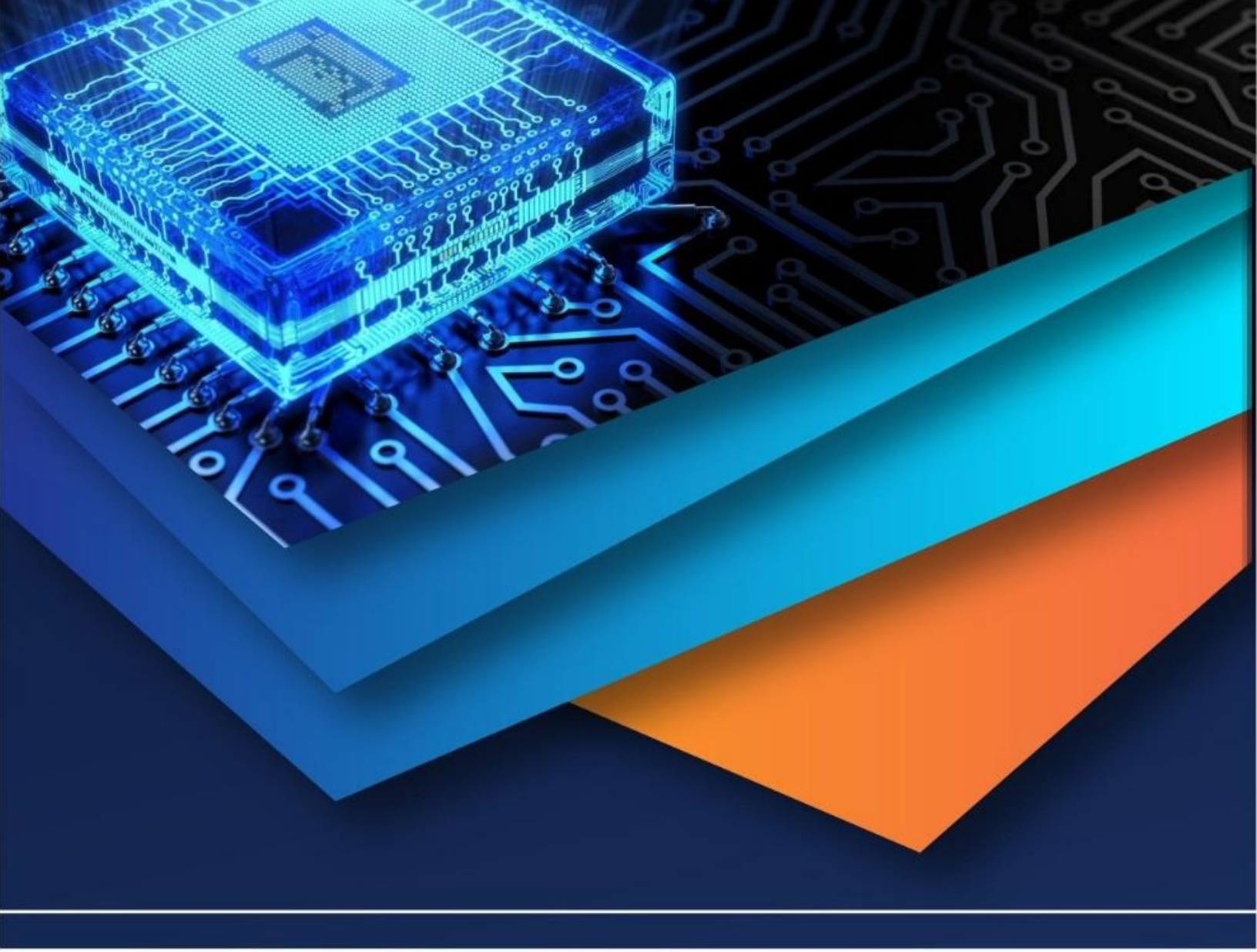

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