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Environment, Health & Safety Plan of a Transmission Line Project

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Abstract: ***Transmission lines are used to evacuate the power from one generating station to receiving station whether it is from power plants to substation or substation to substation. The transmission line capacity is from 132kV to 800kV of long distance to carry these power. There are so many hazards present while working with transmission line like typical tower design, insect bite, excavation hazards, Working at height, contact with live utilities, lightening hazards, imbalance conductor loading while conductor final sag, fall of materials from height, electrocution due to induction currents, heavy wind, Transportation of materials to remote locations where proper access is not available. Due to present of these unavoidable hazards, lot of accidents are occurring in transmission line. In order to minimise accident of project ,it should have a EHS Plan which contains the organisation roles and responsibilities ,Risk assessment of every activity and safe work method to execute the activity, legal requirements of project, Work permit system followed ,emergency action plan ,list of PPE's and Trade wise training details ,communication and reporting***

Keywords: Environment Health and Safety (EHS) plan, Building and other construction workers BOCW act , EHS risk assessment, Emergency response plan, Roles and responsibilities

I. INTRODUCTION

Environment Health and safety plan(EHS Plan) is main document to manage health and safety at site. The EHS Plan is an important integration document between the various approvals, authorisations and permits issued for specific components and/ or activities of the undertaking. EHS Plan is prepared before start of the actual work at site and reviewed if any necessary changes in the management, work method or change in the machinery. EHS plan is prepared to accomplish the following objectives. 1)To determine broad parameters of EHS management at site.2)Establish & define chain of command for resolution of all hazard prevention issues.3)Define individual hazard prevention & safety promotion responsibility at each level of the construction team.4)Identify highly hazardous operations within the scope of work and specify integrate preventive measures to mitigate the same.5)To ensure compliance with relevant applicable legislation.6)Continual EHS performance improvement by directing focus on the key areas for improvement in a consistent manner.

II. METHODOLOGY

The EHS Plan should cover the all project activities. The following are the main contents of EHS plan

A. Project Highlights

In project highlights project details ,major activities and major machinery used to execute the activities are mentioned. For transmission line project under project highlights these are to be mentioned where is the office location /store to be located ,the major activities are foundation ,tower erection and stringing quantities are mentioned. Expected dates to start and end of the project ,total man power procurement at the time of peak work, the major machinery like excavator, self loader, winch machine, hydra, truck, tractor, Puller and tensioner machine.

B. EHS Organisation Chart

The EHS organisation chart contains the reporting system which is two types one is administrative purpose reporting to concern Project Manager and Functional reporting to the concern safety head.For transmission line safety officer is functional reporting to cluster EHS manager and administrative purpose reporting to project manager, under safety officer safety steward/safety supervisors will report to him.

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C. Roles & Responsibilities

Roles and responsibilities each person responsibilities related to transmission line project are mentioned.As per the BOCW act chapter VII Rule 38 Safety Committee and Safety Officers:-

In every establishment wherein five hundred or more building workers are ordinarily employed, the employer shall constitute a Safety Committee consisting of such number of representatives of the employer and the building workers as may be prescribed by the State Government: Provided that the number of persons representing the workers, shall, in no case, be less than the persons representing the employer. (2) In every establishment referred to in sub-section (1), the employer shall also appoint a safety officer who shall possess such qualifications and perform such duties as may be prescribed.

As per BOCW rules 1998 chapter II

1) Rule 5. Duties and responsibilities of employers, employees and others

a) It shall be the duty of every employer who is undertaking any of the operations or works related to or incidental to building or other construction work to which these rules apply—

- To comply with such of the requirements of these rules as are related to him: Provided that the requirements of this clause shall not affect any building worker if and so long as his presence in any place of work is not in the course of performing any work on behalf of his employer and he is not expressly or impliedly authorised or permitted by his employer to do the work; an
- To comply with such of the requirements of these rules, as are related to him in relation to any work, act or operation performed or about to be performed by him.

b) It shall be the duty of every employer who erects or alters any scaffold to comply with such of the requirements of the provisions of these rules as relate to the erection or alteration of scaffolds having regard to the purpose or purposes for which the scaffold is designed at the time of erection or alteration; and such employer, who erects, installs, works or uses any plant or equipment to which any of the provisions of these rules apply, shall erect, install, work or use such plant or equipment in a manner which complies with those operations.

c) Where a contractor, who is undertaking any of the operations or works to which these rules apply, appoints any artisan, tradesman or other person to perform any work or services under a contract for services, it shall be the duty of the contractor to comply with such of the requirements of these rules as affect that artisan, tradesman or other person and for this purpose any reference in these rules to an employee shall include a reference to such artisan, tradesman or other person and the contractor shall be deemed to be his employer.

d) It shall be the duty of every employee to comply with the requirements of such of these rules as are related to the performance of or the refraining from an act by him and to co-operate in carrying out these rules.

e) It shall be the duty of every employer not to permit an employee to do anything not in accordance with the generally accepted principles of standard safe operating practices connected with building and other construction work as specified by the Central Government.

f) No employee shall do anything which is not in accordance with the generally accepted principles of standard safe operating practices connected with building and other construction work as specified by the Central Government.

g) No person related with any building and other construction work shall wilfully do any act which may cause injury to himself or to others.

h) It shall be the duty of every employer not to allow lifting appliance, lifting gear, lifting device, transport equipment, vehicles or other device or equipment to be used by the building workers which does not comply with the provisions given in the rules.

i) It shall be the duty of the employer to maintain the latrines, urinals, washing facilities and canteen in a clean and hygienic condition. The canteen shall be located in a place away from the latrines and urinals and polluted atmosphere and at the same time be easily accessible to the building workers.

j) It shall be the duty of the employer to abide by the dates fixed and notified by him for payment of wages for a period in accordance with these rules and no change in such dates and such period shall be effected without notice to the building workers and the inspector. The employer shall ensure timely payment of wages as specified under these rules and at the place and time notified by him. Where the employer is a contractor, he shall ensure that the wages of the building workers are paid in the presence of a representative of the employer of establishment or owner of premises from whom he has taken work on contract and obtain signatures of such representative in token of having witnessed the payment of wages.

k) It shall be the duty of the employer to ensure that the lifting appliance, lifting gear, earth moving equipment, transport equipment or vehicles used in the building or other construction work undertaken by him conforms to the requirements relating to

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testing, examination and inspection of such equipment as provided under these rules. It shall be the duty of every person in the service of the government or any local or other public authority to comply with the requirements relating to him given in these rules.

2) *Rule 6. Responsibilities of architects, project engineers and designers:-*

a) It shall be the duty of the architect, project engineer or designer responsible for the design of any project or part thereof or any building or other construction work to ensure that, at the planning stage, due consideration is given to the safety and health aspects of the building workers who are employed in the erection, operation and execution of such projects and structures as the case may be.

b) Adequate care shall be taken by the architect, project engineer and other professionals involved in the project, not to include anything in the design which would involve the use of dangerous structures or other processes or materials, hazardous to health or safety of building workers during the course of erection, operation and execution as the case may be.

c) It shall also be the duty of the professionals, involved in designing the buildings, structures or other construction projects, to take into account the safety aspects associated with the maintenance and upkeep of the structures and buildings where maintenance and upkeep may involve special hazards.

3) *Rule 8. Duties and Responsibilities of Workers*

a) It shall be the duty of every building worker to comply with the requirements of such of these rules as relate to him, and act and co-operate in carrying out the requirements of these rules and if he discovers any defects in the lifting appliance, lifting gear, lifting device, concerning any transport equipment or other equipment, to report such defects without unreasonable delay to his employer or foreman or other person in authority.

b) No building worker, shall unless duly authorised or except in case of necessity, remove or interfere with any fencing, gangway, gear, ladder, hatch covering, life-saving appliances, lighting or other things whatsoever required by the Act and these rules to be provided. If any of the aforesaid thing is removed, such thing shall be restored at the end of the period during which its removal was necessary, by the persons engaged in that work.

c) Every building worker, shall use only means of access provided in accordance with these rules and no person shall authorise or order another to use means of access other than such means of access.

d) It shall be the duty of a building worker to keep the latrines, urinals, washing points, canteen and other facilities provided by the employer for securing his welfare in a clean and hygienic condition.

D. Project EHS Committee Details

As per the BOCW act chapter VII rule 38 Safety Committee

1) In every establishment wherein five hundred or more building workers are ordinarily employed, the employer shall constitute a Safety Committee consisting of such number of representatives of the employer and the building workers as may be prescribed by the State Government: Provided that the number of persons representing the workers, shall, in no case, be less than the persons representing the employer. Project committee members are each person from each department including subcontractor. A committee will be formed & every month EHS meeting will be conducted. The MOM of meeting is circulated to all persons. The project manager is acted as chairman of committee and safety officer is secretariat of the committee. Secretary will circulate agenda of the meeting at least two days in advance of the schedule date of the meeting.The discussion made in committee meeting should be complied by all persons in a project.

E. EHS Risk Assessment

To assess the risk of the activities to be executed, rate the risk levels as per the risk assessment matrix, and identify the control measures so as to bring the risk level to ALARP. EHS Risk assessment shall be conducted by a team of persons who have a thorough knowledge of the work to be assessed. Team members may include Project Manager, Area / Section In charges & Execution Engineer, Subcontractors, Workmen. EHS Risk Assessment shall be done for routine & non routine activities.

The input for conducting the EHS Risk Assessment shall include

1) List of work activities
2) List of machinery and tools used
3) Records of past incidents and accidents
4) Relevant legislation
5) Relevant codes of practice or specifications

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6) Details of existing control measures
7) Feedback from staff, clients, suppliers, interested parties
8) Other information such as material safety data sheet (MSDS), manufacturer's instruction manual
9) Copies of any relevant previous risk assessments

The evaluation shall be done by the situation may arise due the possible outcome of Hazards will be primarily classified in to three categories. They are normal Situation ,abnormal situation and emergency situation. For health and safety hazards all will be treated as abnormal situation only. Environmental Parameters if the impacts are beyond the specified limit as per the standard it will be treated as Abnormal otherwise it will be treated as normal. The Emergency situation are like Occupational Injury and Illness, Fire and Explosions ,Gas leakage – Toxic Release, Security breaches ,Civil Disturbances / Political Disturbances / Military Aggression, Air Raid RIOT and Natural Calamities – Flood, Cyclone, Earthquake etc.

a) Identifying the Existing risk Control Measures;

- Determining the likelihood of occurrence (probability);
- Assessing the potential severity of the health & safety hazards, environmental aspects;

b) Matrix for Hazard Identification Risk Assessment

- Once the likelihood and severity have been established, the risk / impact level can be determined.
- To determine the risk / impact level, select the appropriate row for Severity and the appropriate column for Likelihood; the cell where they intersect indicates the Risk / Impact Level.

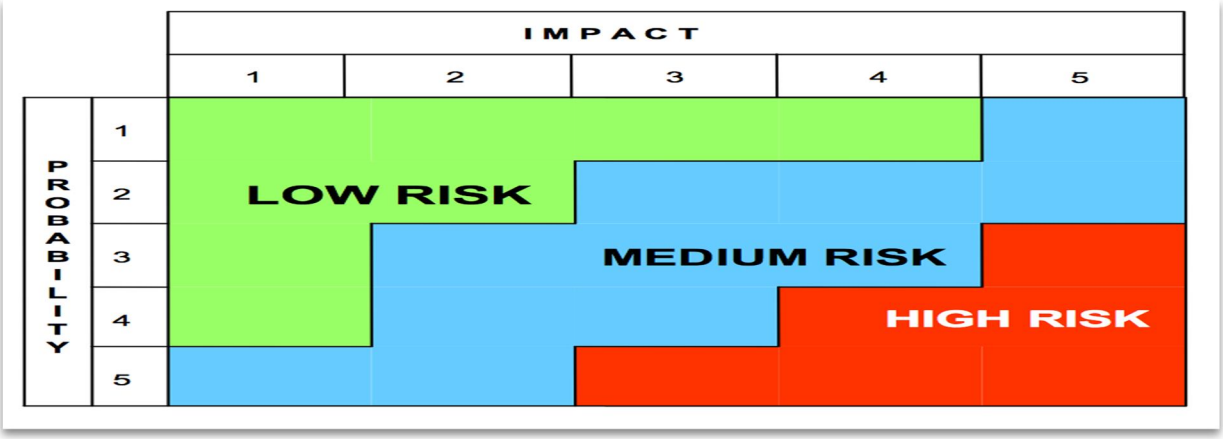


Table 1:HIRA Matrix

F. Severity of Hazard (Impact)

Severity is the degree or extent of injury or harm caused by the hazards, or as a result of an accident. Severity of hazard is classified as per the table given below.

Severity Descriptions (The highest category will always be used)		
Value	Result of Hazard to Personnel	Result of Hazard to Assets / Progress
5	Single or multiple Fatality	Catastrophic Damages, Critical Delay
4	Serious Injury requiring hospitalisation	Major Damages, Serious Delay
3	Lost Time Accident	Serious Damage, Moderate Delay
2	Injury requiring Medical Treatment but not Lost Time	Moderate Damage, Minor Delay
1	First Aid treatment only	Minor Damage, No Delay

Table2: Severity Table

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G. Likelihood of occurrence (Probability)

Likelihood of occurrence of an accident or incident or ill health is classified as per the table given below.

Probability Descriptions (The highest category will always be used)		
Value	Status	Description
5	Inevitable	Happens regularly on this site
4	Most Likely	Known to have occurred on this site in the past
3	Likely	Known to occur on other sites
2	Unlikely	Known to occur in the industry
1	Most Unlikely	Never known before

Table 3: Probability Table

H. Control of Risk / Impact:

Based on the level determined, controls should be selected to reduce the risk / impact level to an acceptable level. This can be done by reducing the Severity and/or Likelihood. Health & Safety Risks, Environmental Impact Residual

1) *Risks / Impact:* Residual risks / Impacts are the remaining risks, impacts for which the planned controls are not able to effectively remove or control. It shall be ensured that the residual risks / impacts are acceptable and manageable.

I. List of Applicable legal & other Requirements

The transmission line project involves to fulfil the following Indian legal requirements

1) Labour License
2) Workmen Compensation Policy
3) Inter State Migrated Labour
4) ERA- Erection Risk Policy
5) GPA- Group Personal Accident Insurance Policy)
6) PF-REGISTER Certification
7) Indian Electricity Act 2003 & Rules 1956
8) Gas Cylinder Rules 1981, 2004
9) Environment Protection Act, 1986 and Rules 2009, 2012
10) Air (Prevention and Control of Pollution) Act, 1981
11) Water (Prevention and Control of Pollution) Act, 1974 amendment 2003
12) The Noise Pollution (Regulation and Control) Rules, 2000 & 2010
13) Recycled Plastic Usage Rules, 2003 & 2011
14) Hazardous waste management Rules 2008,
15) Batteries (Management and Handling) Rules, 2010
16) Petroleum Act 1934 & Petroleum Rules 2002
17) Motor Vehicles Act, 1988 & Motor Vehicle Rule' 2013 & 2014
18) Explosives Act 1884 the explosives rule 2008,
19) The Bio-Medical Waste (Management and Handling) Rules, 2011
20) The Ozone Depleting Substances (Regulation And Control) Rules, 2000
21) Plastic Waste. (Management and Handling) Rules, 2011
22) Child Labour (Prohibitions & Regulations) Act, 1986 and Rules 1988
23) Implementation of E-Waste Rules 2011

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J. Work permit system

Work permit system are issued to high risk activities ,where the proper control measures are taken to brink the risk level to as low as reasonable practicable. Work permit system is applied before start of work and surrounded after finish of work/every day. In transmission line project they are several work permit systems are followed like Height work permit, Excavation Permit, Night work Permit,Blasting work permit ,Hot work permit and permit to work on LT/HT lines

K. Checklists and reports

For effective implementation of EHS management system at project checklist and reports are playing key role in identifying the existing hazards and precautions whether followed at site.

Activity	Checklist / Report concerned
Screening and induction of workmen	Screening for workmen form
Inspection of Electrical items	Electrical Safety Report
PEP-Talk Report	Daily PEP-TALK
Inspecting the vehicle for its fitness and certifying	Equipment fitness report for hydra Fitness report for Vehicle &Earth Moving Equipment Check list.
Identification /Usage of proper PPE & Safety Device	Specification of PPE & Safety Devices
Violation in adopting EHS Norms	EHS Norms Violation Report
Working on Corrective Action and Preventive Action	CAPA Register
Fire Drill	Fire Drill Register
Inspection of Foundation, Tower erection, Stringing Activity	Check list for Foundation, Tower Erection, and stringing checklists.
Inspection of Tools & Tackles	Check List For Tools & Tackles

Table4: Checklist and reports

L. Emergency Response Plan

BOCW rules 1998 Part-III of Safety and Health of Chapter-IV general provisions Rule 36.Emergency action plans

An employer shall ensure at a construction site of a building or other construction work that in case more than five hundred building workers are employed at such construction site emergency action plan to handle the emergencies like—

1) Fire and explosion;
2) Collapse of lifting appliances and transport equipment;
3) Collapse of building, sheds or structures, etc.;
4) Gas leakage or spillage of dangerous goods or chemicals;
5) Drowning of building workers sinking of vessels; and
6) Land slides getting building worker buried, floods, storms and other natural calamities, is prepared and submitted for the approval of the Director General.

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M. List of job specific PPE to be used

There are wide variety of personal protective equipment are using at site depends Upton the work assigned to them.All the PPE are fulfilled approved standard and ensured everyone is using it at site.As per the below table PPE are issued from store.

	Head Protection	Foot Protection	Protection against Dust	Welding helmet	Hand Protection	Fall Protection	Safety harness	Material fall protection	Shoulder protection
Executives / Engineers / supervisor	√	√				√	√		
Foreman	√	√							
Unskilled workmen	√	√							√
Formwork	√	√			√				√
Scaffolding	√	√			√	√	√	√	
Bar bending works	√	√			√				√
Rigging	√	√			√	√	√	√	
Welding	√	√	√	√	√	√	√		
Fitter	√	√			√	√	√	√	
Blasting	√	√	√		√				

Table 5:PPE matrix

N. Training

This section shall give a matrix of applicable Training versus category of people. For the training appropriate facility are to be maintained at site level for every three months refresh tracings to be conducted as per the following Matrix.The training records to be maintained. It is legal mandatory to assign a job after trade training completion.

	EHS Induction	EHS Plan Briefing	Concreting Safety	Electrical safety	Emergency response plan	Excavation Safety	Fire prevention & Control	Material handling Safety	Plant & machinery Safety	PPE's	Work at height Safety
PM / CM		√			√		√				
Site Engineers	√	√	√	√	√	√	√	√	√	√	√
Site Supervisors & Foreman	√	√	√	√	√	√	√	√	√	√	√
EHS Supervisors / Steward	√	√	√	√	√	√	√	√	√	√	√

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Sub-contractor	√	√		√	√					√	
P&M Supervisor, Technician & Helper	√	√		√	√		√	√	√	√	√
Drivers,Equipment Operators & Helpers	√	√	√	√	√		√	√	√	√	√
Bar bending workmen	√	√	√	√	√		√	√		√	
Security personnel	√	√		√	√		√				
Visitor	√	√			√		√				

Table6: Trade wise Training details

O. Communication and Reporting

Cascading any EHS messages down the line is vital for the success of any EHS Management System and to ensure that all personnel are aware of EHS issues the following technique shall be adopted.

1) *EHS Notice Board:* EHS Notice board will be fixed at site office and other conspicuous locations for cascading EHS messages such as EHS Notices, Safety Alerts, Posters and accident evaluation etc., shall be regularly updated.Install and maintain EHS performance board showing Safety statistics i.e. days without LTI etc.
2) *Monthly Incentive:* Safe Man of the month shall be selected on the basis of EHS performance evaluation and will be given a certificate of commendation along with a token gift.

III.PROBLEM IDENTIFICATION

The EHS plan is covers all the EHS management system requirements and legal requirements but even every project now days are having EHS plan but the implementation is not upto mark.Due to this accidents are happening, there is a gap between documentation and implementation of EHS plan at site level.The following are some of the problem in implementation of EHS plan in project level.

A. Lack of literacy workmen to understand the EHS Plan
B. Not available of EHS plan at working place
C. Irrelevant information to performing the activity
D. No spare time to read the EHS plan
E. Not updated even though the process changed
F. Poor supervision
G. Lack of Training
H. Lack of knowledge on roles and responsibilities of employees related to environment health and safety
I. Unstable employment and migrant labour

IV.CONCLUSIONS

Any lifting activity requires systematic approach to handle all unexpected situations and it will play major role in preventing loss of life, company reputation and property damages. Particularly in metro construction industries it is necessity to give paramount importance to safety of lifting operations. In any industry for execution of safe lifting operations, Always need to keep in mind fitness of lifting equipment and lifting accessories, competency of the lifting team , each high-risk lifting activity must have dedicated lifting plan, never overload cranes and slings than its safe working load, a proper communication needs to setup with defined signals to avoid confusion, traffic diversion and traffic management plan is key requirement to metro sites as these activities having interface with public vehicle and to ensure road safety.

In recent years accidents related to lifting are reduced in the metro industries as compared to previous times, it is because of companies are giving highest priority to safety of the people. Also, National Safety Council & Regional Labour Institutes are conducting regular technical trainings on lifting operations to develop competencies in different industries based on their needs.

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I take this opportunity to convey my kind regards and thanks to my Principal, Dr.R.NALLUSAMY, M.E., Ph.D., for valuable guidance and co-operation extended to me to complete this Project Work.

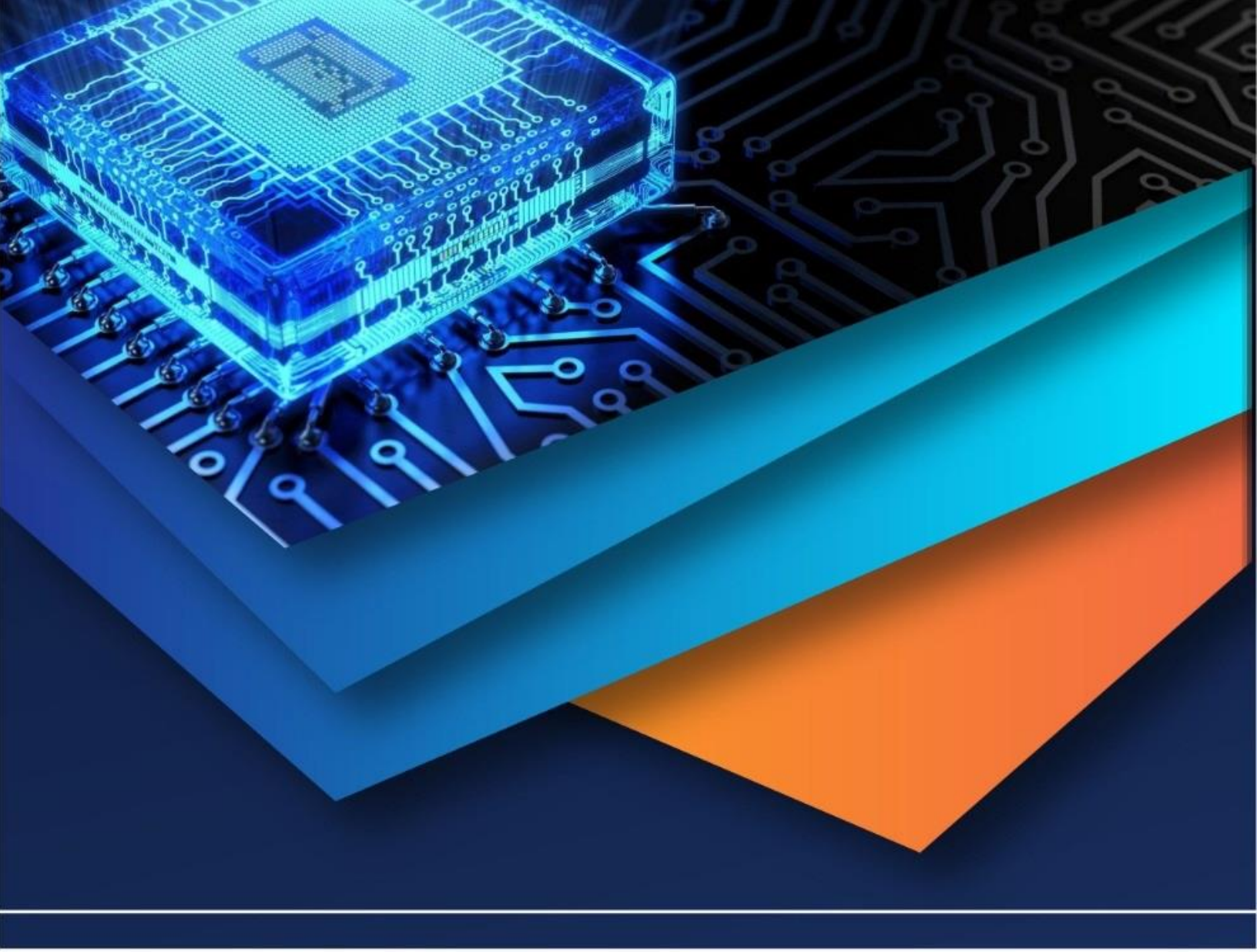
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