KWARA STATE POLYTECHNIC, ILORIN

INSTITUTE OF TECHNOLOGY
MECHANICAL ENGINEERING TECHNOLOGY DEPARTMENT

A TECHNICAL REPORT ON
STUDENTS INDUSTRIAL WORK EXPERIENCE SCHEME
(SIWES)

BY

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BEING A REPORT SUBMITTED TO THE SIWES UNIT, INSTITUTE OF TECHNOLOGY CHAPTER, KWARA STATE POLYTECHNIC, ILORIN

IN PARTIAL FULFILLMENT FOR THE REQUIREMENT FOR THE STUDENT INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES)

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DEDICATION

This report is dedicated to God Almighty, my family, whose support was unwavering, and to the resilience within me, which has propelled me to successfully complete this Student industrial work experience through my own determination, hard work, and perseverance.

ACKNOWLEDGEMENT

I would like to thank the Almighty God, my strong pillar, my source of inspiration, wisdom, knowledge and understanding. He has been sources of my strength, commitment and patience to pass various obstacles throughout this program also, my profound gratitude goes to the Kwara State Polytechnic Management for including the Student Industrial Workshop Experience Scheme (SIWES) to the National Diploma programmed which enable me to learn and gain more experience outside the campus.

Also, I will like to say a big thank you to the management of Nigeria Sugar Company Bacita for giving me the opportunity to be trained under an organization of high status.

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CHAPTER ONE

INTRODUCTION TO SIWES

Historical Background of SIWES

The Students Industrial Work Experience Scheme (SIWES) is a skill acquisition initiative introduced by the Federal Government of Nigeria with the primary objective of bridging the gap between theoretical education and practical industrial experience for students in higher institutions. The scheme is designed to equip students in Engineering, Technology, Sciences, Agriculture, Medicine, Management, and other fields with hands-on experience that complements their classroom learning. The program applies to students in universities, polytechnics, monotechnic, and colleges of education across Nigeria.

SIWES was first introduced during the 1973/1974 academic session and was initially funded by the Industrial Training Fund (ITF). At the time, there was a growing concern that graduates lacked the necessary practical skills and industrial exposure to seamlessly integrate into the workforce. Many industries had to spend extended periods retraining newly employed graduates to equip them with practical skills. The scheme was created to address this deficiency by exposing students to real-world industrial environments during their academic programs, thereby reducing the time and cost involved in training them after graduation.

The scheme has since become an integral part of the Minimum Academic Standards (MAS) as established by the National Universities Commission (NUC), the National Board for Technical Education (NBTE), and the National Commission for Colleges of Education (NCCE). SIWES plays a crucial role in ensuring that students, particularly in technical and vocational fields, experience the practical side of their studies before graduation.

Aims and Objectives of SIWES

SIWES is a strategic initiative designed primarily to facilitate the acquisition of relevant skills by students in their respective fields of study. By immersing students in real-life work environments, the program enhances their employability and prepares them for the challenges they will face upon graduation. Below are the specific objectives of SIWES:

Provide Industrial Placement: SIWES offers placement opportunities in industries for students enrolled in higher institutions. These placements are approved by the relevant regulatory authorities, such as the National Universities Commission (NUC), the National Board for Technical Education (NBTE), and the National Commission for Colleges of Education (NCCE). The aim is to allow students to acquire hands-on work experience and technical skills relevant to their academic programs.

Prepare Students for the Real Work Environment: The program helps prepare students for the realities of the workplace by allowing them to experience first-hand the dynamics of the work environment. This exposure gives them a clearer understanding of professional expectations and challenges, fostering a smoother transition from school to the workforce.

Enhance Future Employment Opportunities: By offering students exposure to potential employers and work environments, SIWES also serves as a networking opportunity. Students may establish contacts with industry professionals and companies, potentially enhancing their prospects for future employment.

IMPORTANCE OF SIWES

Since its inception, SIWES has played a critical role in shaping the quality of education and workforce readiness in Nigeria, particularly in the fields of science, engineering, and technology. Below are some of the key contributions of the SIWES program:

1. **Improvement in Science and Technology Education:** The program has significantly enhanced the practical aspect of science and technology education in Nigeria. By providing students with hands-on experience, it complements theoretical learning and produces graduates who are better equipped to apply their knowledge in practical situations.
2. **Increased Employment Opportunities:** Graduates who have participated in SIWES are more employable due to their exposure to real-world work environments. Employers tend to prefer candidates who possess not only academic qualifications but also practical experience, which SIWES provides.
3. **Better Standard of Living:** The program indirectly contributes to an improved standard of living by producing skilled graduates who are more likely to secure well-paying jobs in the industrial and technological sectors. This contributes to national development by creating a pool of highly skilled professionals.
4. **Production of Skilled Graduates:** SIWES ensures that students graduate with not only theoretical knowledge but also the practical skills necessary to thrive in their respective fields.

CHAPTER TWO

ORGANIZATION OVERVIEW AND STRUCTURE

Nigeria Sugar Company, Bacita, operates as a vertically integrated agro-industrial entity dedicated to sugar production. The company is structured into various functional units to ensure efficiency and productivity in its operations.

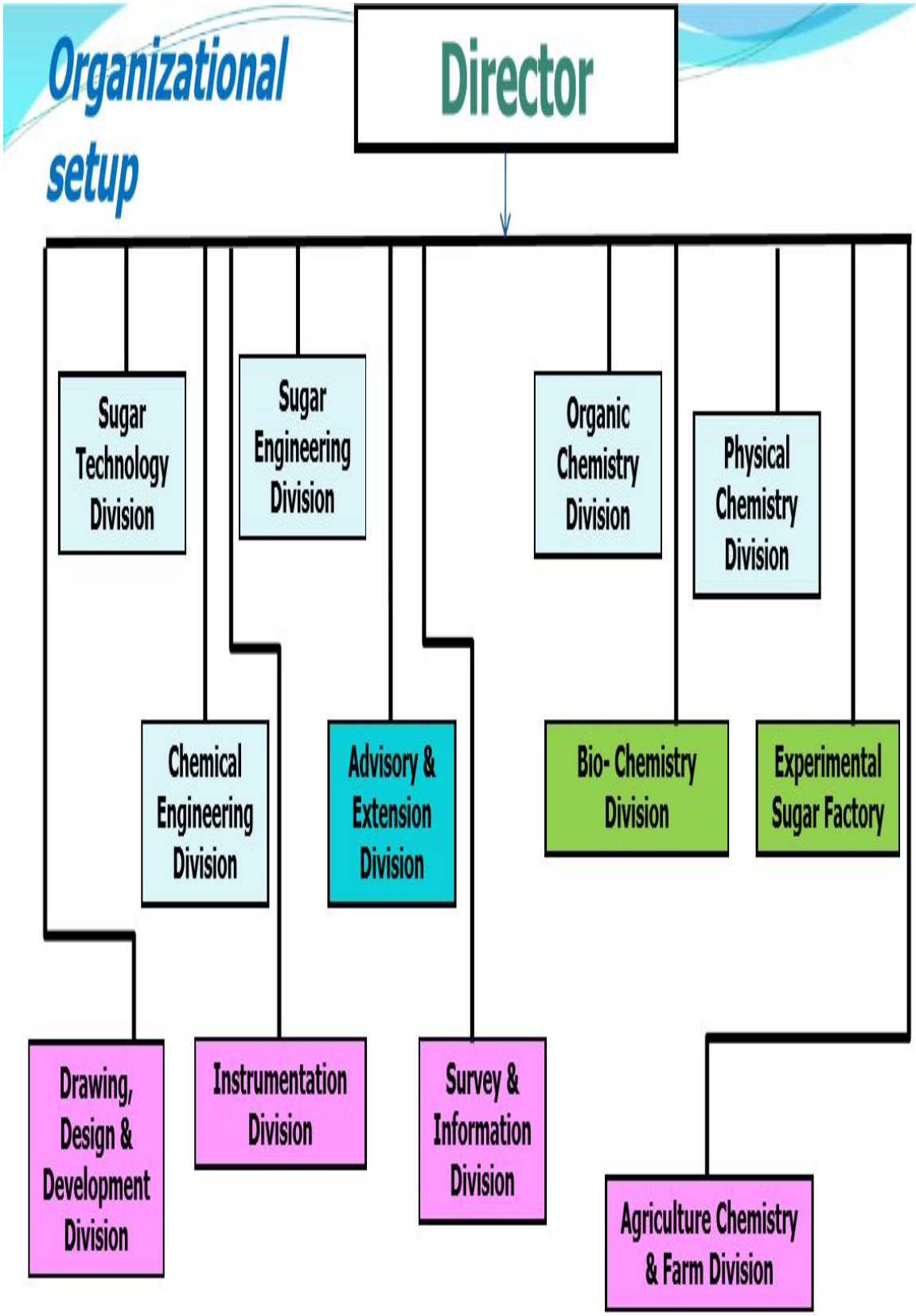
Management Structure

The company follows a hierarchical management system, headed by a General Manager, under whom various departmental heads oversee key aspects of production and administration. These include:

- **Agricultural Department** – Oversees sugarcane cultivation, pest control, and irrigation.
- **Production Department** – Handles milling, juice extraction, crystallization, and refining processes.
- **Quality Control Department** – Ensures compliance with national and international sugar standards.
- **Engineering and Maintenance Department** – Manages the maintenance and repair of machinery and equipment.
- **Finance and Administration Department** – Takes charge of budgeting, procurement, and human resources.
- **Marketing and Sales Department** – Focuses on branding, distribution, and market expansion.

This structured approach enables the company to maintain efficiency, adhere to regulatory standards, and sustain growth in sugar production and distribution.

ORGANIZATION ORGANOGRAME


Organizational setup
Director
Sugar Technology Division
Sugar Engineering Division
Organic Chemistry Division
Physical Chemistry Division
Chemical Engineering Division
Advisory & Extension Division
Bio- Chemistry Division
Experimental Sugar Factory
Drawing, Design & Development Division
Instrumentation Division
Survey & Information Division
Agriculture Chemistry & Farm Division

GUIDE LINES FOR SAFETY IN THE WORKSHOP

Safety is the state of being 'safe', the condition of being protected from any physical or electrical and other types of consequence, failure, damage, error, accident or any other event that could be considered non-desirable. For anyone working in workshop, safety should be his/her first priority. Some guide lines for safety in the workshop.

i. Qualified or suitable trained personnel only to use equipment.

ii. Wear suitable attire for operating machinery or equipment.

iii. Keep equipment and the surrounding area clean and tidy at all times.

iv. Always seek instruction before using an unfamiliar piece of equipment.

v. Only use tools and machines for their intended purpose.

vi. Report any damaged equipment and do not use it until it has been repaired by a qualified person.

vii. Where machine guards are provided, they must be kept in place.

viii. Never distract the attention of another staff member when operating equipment and never indulge in horseplay.

ix. Always use the appropriate personal protective equipment.

x. long hair must be restrained.

xi. Familiarize oneself with all ON/OFF buttons on equipment, circuit breakers, and disconnect switches of a bench.

xii. Avoid loose wires, cables, and connections.

xiii. Assume any exposed metal is live with electricity unless otherwise verified.

IMPORTANT SIGNS/LABELS AND THEIR MEANING

In every workshop, safety is essential; luckily enough, there are danger signs on any product which are classified as harmful. These signs help to warn the workers/students of the possible danger or hazard in the workshop.

Some of the signs are:

i. Electric Shock; - can be found on a machine with electrical connections

ii. General warning: - This warning signs are usually used to indicate danger ahead.

CHAPTER THREE

ACQUIRED SKILLS AND AREAS OF EXPOSURE

During my Student Industrial Work Experience Scheme (SIWES), I acquired various technical skills and was exposed to a range of practical applications and engineering concepts. These experiences are summarized as follows:

FARM LAYOUT PRACTICAL

During the practical session, I learned the principles of farm layout, which involves systematically arranging farm components like farmland, irrigation channels, pathways, and storage areas to optimize efficiency and productivity. The Activities involved analyzing land topography, identifying essential components, and designing layout plans with considerations for drainage, accessibility, and crop spacing. Tools such as measuring tapes, pegs, and ropes were used to mark boundaries and plan arrangements.

PURPOSE OF FARM LAYOUT

The purpose of the farm layout is to maximize land use, improve irrigation efficiency, and separate various farm activities for better organization and management. We explored different types of layouts, including block layout and strip layout, and their applications in real-world farming.


PEGS AND ROPE

Measuring tapes, pegs, and ropes were used to mark boundaries and plan arrangements.

SPECIFIC OBSERVATION

One of my key observations was how proper drainage systems prevent waterlogging and improve soil health. I also noticed that aligning pathways with the natural slope of the land reduces erosion and simplifies transportation. During the practical, suggested positioning the storage area closer to the access road to enhance operational efficiency.

IMPACT OF THE PRACTICAL

This session highlighted the importance of proper planning in ensuring sustainable and efficient farm operations. It provided hands-on experience in designing layouts that balance productivity and environmental sustainability.

LAND SURVEY USING LEVELING COMPASS

I participated in land surveying using a leveling compass. This activity involved marking contours, identifying high and low areas, and preparing the land for effective irrigation and drainage systems.

TOOLS USED

- **Leveling Compass:** Measures angles and gradients.
- **Staff:** Marks specific heights for level determination.
- **Measuring Tape:** Ensures accuracy in distance measurement.

LEVELING COMPASS, TRIPOD STAND AND STAFF USED DURING THE PRACTICAL

TRACTOR

A tractor is a powerful and versatile machine primarily used in agricultural, construction, and industrial applications. It is engineered to provide high torque at low speeds, making it capable of performing a variety of tasks such as plowing, tilling, planting, and transporting heavy loads.

CHAPTER FOUR

TRACTOR PISTON IN THE CYLINDER

I had the opportunity to learn about the operation and function of the tractor piston within the engine cylinder. The piston is a vital component of the internal combustion engine, responsible for converting the energy from fuel combustion into mechanical power.

OBSERVATION:

I observed how the piston moves up and down within the cylinder during the four-stroke engine cycle:

- Intake Stroke: The piston moves downward, allowing the air-fuel mixture to enter the cylinder.
- Compression Stroke: The piston moves upward, compressing the air-fuel mixture to prepare it for ignition.
- Power Stroke: After ignition, the force from the combustion pushes the piston downward, generating power.
- Exhaust Stroke: The piston moves upward again to expel exhaust gases from the cylinder.
- Practical Experience:

  During maintenance, I participated in inspecting the piston for wear and tear, ensuring it maintained a proper seal with the cylinder walls. I also learned about the importance of piston rings, which prevent gas leakage and facilitate lubrication.

PISTON AND RING

This experience deepened my understanding of how the piston-cylinder system contributes to the efficient functioning of a tractor's engine and its role in delivering power for various field operations.

FARM IMPLEMENTS MOUNTED TO THE TRACTOR

- **Implements:** These include plows, harrows, planters, and cultivators.
- **Attachment:** Implements are mounted using the three-point linkage system, which provides stability and ease of operation.

- **Functions:** Implements are used for soil preparation, planting, and other farming operations, reducing manual labor and increasing efficiency.

DICS PLOUGH MOUNTED TO A TRACTOR

GENERAL MAINTENANCE

- Tighten loose screws and bolts.
- Regularly clean the tractor to prevent rusting.
- Store in a covered area to protect from weather elements.

IRRIGATION AND DRAINAGE

I worked on setting up basic irrigation systems to ensure efficient water distribution. The practical aspect also involved understanding drainage methods to prevent waterlogging on the farm.

TYPES OF IRRIGATION

- **Surface Irrigation:** Water is distributed over the soil by gravity.
- **Sprinkler Irrigation:** Sprays water in a controlled manner, simulating rainfall.
- **Drip Irrigation:** Delivers water directly to the root zone through emitters.

COMPONENTS AND MATERIALS

- **Pipes:** PVC or aluminum pipes for water distribution.
- **Pumps:** Centrifugal and submersible pumps.
- **Valves:** Control the flow of water.
- **Filters:** Prevent blockages in the irrigation system.

Materials used during the irrigation practical

REPAIR OF DISC HARROW

I participated in a practical session focused on repairing a disc harrow, a crucial implement used in agricultural operations for soil preparation. The session began with an introduction to the components of the disc harrow, including the disc blades, frame, bearings, and axles.

MY PARTICIPATION

- **Inspection:** I assisted in examining the disc harrow for damages, identifying worn-out disc blades, loose bolts, and malfunctioning bearings.
- **Dismantling:** I participated in dismantling the damaged parts, using tools such as spanners, hammers, and wrenches.
- **Replacement and Repair:** I helped replace worn-out blades and lubricated the bearings to ensure smooth rotation.
- **Reassembly:** After repairs, I was involved in reassembling the parts, ensuring proper
- alignment and tightening of bolts.
- **Testing:** The repaired harrow was tested to confirm its functionality, and I contributed to making adjustments for optimal performance.

THE DISC HARROW MOUNTED TO A TRACOR AFTER THE REPAIR

OBSERVATION AND PARTICIPATION IN RICE PROCESSING

As part of my SIWES training, I participated in a practical session on rice processing. During the operation, I carefully observed the functioning of the processing machine, which included de-husking, polishing, and grading stages. I monitored the machine's performance to understand how each component contributed to producing high-quality rice.

After observing the operation, I actively participated in bagging the processed rice. I ensured that the rice was accurately measured and packaged into bags of the proper kilogram specification, maintaining precision and adherence to quality standards.

This activity provided me with valuable insights into rice processing techniques and allowed me to develop skills in quality control and packaging, which are essential in post-harvest agricultural operations.

Destoning Machine

CHAPTER FIVE
CONCLUSION AND RECOMMENDATIONS

Departments Worked In

During the SIWES program, the following departments were engaged:

- **Agricultural Department** – Learned about sugarcane planting, irrigation, pest control, and harvesting techniques.
- **Production Department** – Observed sugar extraction, juice purification, crystallization, and drying processes.
- **Quality Control** – Conducted tests on sugar samples to ensure compliance with standards.
- **Maintenance and Engineering** – Assisted in troubleshooting and maintaining industrial machinery.

SKILLS ACQUIRED

- Knowledge of mechanized farming operations and implement handling.
- Proficiency in using land survey instruments.
- Understanding of tractor functionality and maintenance.
- Practical experience in irrigation system design and implementation.

CHALLENGES FACED

- Limited access to advanced land survey tools.
- Mechanical breakdowns during tillage operations.
- Difficulty in sourcing spare parts for bulldozer maintenance.

SOLUTIONS AND RECOMMENDATIONS

- Regular maintenance of machines to minimize breakdowns
- Improved mechanization in sugarcane cultivation
- Government support for sustainable raw material supply
- Enhanced safety measures for work