

GNS 301

COMPENDIUM

LOGIC, PHILOSOPHY AND MORAL VALUES

&

MAN, SCIENCE AND TECHNOLOGY

FOREWORD

The challenges encountered by our colleagues and the perceived challenges to be encountered by subsequent levels coming up prompted us to bring in this initiative. Having discovered how wearisome it can be to read through the recommended textbook thoroughly, and also the varying nature of our notes across all faculties, we decided to compile both the textbook and class notes in one file which we call "**GNS 301 COMPENDIUM**". To further make it comprehensive, we added a topic to the **39** topics we already have which is "**BIO-SAFETY AND BIO-SECURITY**" to make it **40** topics as it was reportedly taught in some faculties. To make this project worthwhile, we constituted a seven (7) man working committee which comprised of bright minds from those faculties the course (GNS 301) emanated from (resident). After embarking on a 12 weeks intensive and careful compilation exercise, we were able to come up with this compendium aimed at augmenting the understanding of our colleagues in the course and consequently enhance our overall performance in the course. The seven (7) man committee behind this elaborate and at the same time, succinct work are:

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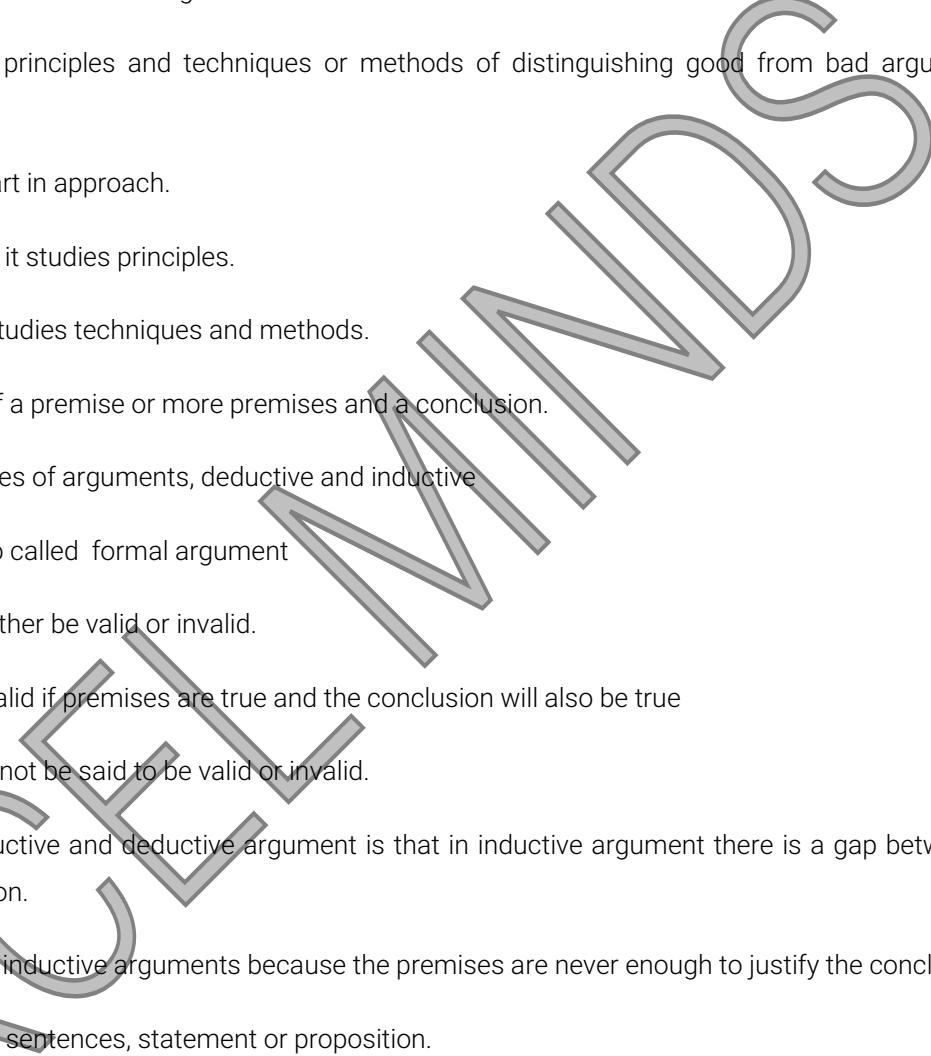
We would be very much open to feedbacks, suggestion and criticism via these lines:

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Thanks.

CHAPTER ONE

ELEMENTS OF LOGIC

- The discipline that studies reasoning is logic.
 - It is a truism that humans are rational being.
 - Logic is the study of the principles and techniques or methods of distinguishing good from bad argument or reasoning.
 - Logic is both science and art in approach.
 - Logic is a science because it studies principles.
 - Logic is an art because it studies techniques and methods.
 - An argument is made up of a premise or more premises and a conclusion.
 - There are basically two types of arguments, deductive and inductive
 - Deductive argument is also called formal argument
 - Deductive argument can either be valid or invalid.
 - A deductive argument is valid if premises are true and the conclusion will also be true
 - An inductive argument cannot be said to be valid or invalid.
 - The difference between inductive and deductive argument is that in inductive argument there is a gap between the premises and the conclusion.
 - Inductive leap is present in inductive arguments because the premises are never enough to justify the conclusion.
 - Arguments are made up of sentences, statement or proposition.
 - All constituents of an argument must be capable of being either true or false.
 - A relation is said to have characteristics which may be symmetrical, asymmetrical or non-symmetrical, transitive, intransitive or non-transitive and reflexive or non-reflexive.
 - A proposition is simple if it is not made up of other proposition.
 - A compound proposition is made up of other propositions.
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- In technical language;

Not is called negation

- o And in called conjunction
- o Either for is called disjunction
- o If/ then is called conditional
- o If and only if is called bi-conditional

- A singular proposition is most times particular about an individual, place, person or thing that has a certain property.
- A general proposition says more of some or all members of a class that they belong or do not belong to another class.
- A general proposition is also called a categorical proposition.
- A relation is symmetrical if it is such that if a person thing or place "A" has the relation to another person, place or thing "B", then "B" must have the same relation to "A".
- A relation is asymmetrical is it is such an entity where "A" has the relation to another entity "B", then "B" cannot have the same relation to "A".
- A relation is non – symmetrical is if is symmetrical or asymmetrical. That is, an entity "A" has relation to entity "B" then "B" may or may not have the relation "A"
- A relation is transitive entity A has relation to "B" and "B" has relations to entity "C" then "A" must have the same relation to entity "C".
- A relation is intransitive if entity "A" has relation to entity "B" and "B" has relation to entity "C" then "A" cannot have the same relation to entity "C".
- A relation is non - transitive if entity "A" has relation to entity "B" and "B" has relation to entity "C" than "A" may or may not have the same relation to "C".
- A relation is reflexive if it is such that entity "A" must have the relation to itself.
- A relation is irreflexive if it is such that an entity "A" cannot have the relation to itself.
- A relation is non – reflexive if it is such that an entity "A" may or may not have the relation to itself.
- There are four types of categorical propositions in standard forms which are:

A – All

E – No

I – Some

O – Some, not

- The categorical propositions can be shown in skeletal form as:

- A – **all** subject is predicate
- E – **no** subject is predicate
- I - **some** subject are predicate
- O – **some** subject are **not** predicate

- Every categorical proposition has quality which is either affirmative or negative.
- Every categorical proposition has a quantity which is either particular or universal
- Proposition:

- A is universal affirmative in nature
- E is universal negative
- I is particular negative
- O is particular negative

- Proposition A subject term is distributed while the predicate term is not distributed.
- Proposition E subject term is distributed and the predicate term is also distributed.
- Proposition I subject term is not distributed and the predicate term is also not distributed.
- Proposition O subject term is not distributed while the predicate term is distributed.
- A categorical syllogism is a deductive argument and can therefore be said to be valid or invalid.
- A categorical syllogism must contain three terms each which is used in the same sense throughout the argument.

CHAPTER TWO

INTRODUCTION TO AFRICAN PHILOSOPHY

- The earliest written records of how some thinkers of a particular society dealt with the problem of knowing how the world came into existence and how to explain the events and things in it is that of Greeks around 6th century BC.
- The views about human beings began in the ancient city of Athens and some towns and islands in Greek.
- One of the main features that distinguish human beings from other animals is that they express their thinking in words (human languages)
- The Greeks explained nature and human experience in religious terms.
- Thales from milieus was the first Greek thinker who broke away from mythical tradition and explained human experience in natural and rational terms.
- He proposed that "the magnet has a soul" (Thales) quoted by Aristotle.
- Socrates was primarily concerned with the good life and the just society.
- It was unwise to accept any law or principles without question- Socrates.
- ☒ The collection of the works of thinkers (Plato, Socrates, Aristotle and other Greek philosophers) is known as **ANCIENT GREEK PHILOSOPHY**
- Philosophy is a combination of two Greek words Sophia (wisdom) and philos (friend) and derived from "phillei" (to love)
- The origin of philosophy is the love of wisdom.
- Thomas Hobbes (1588 – 1679), Friedrich Hegel (1770 - 1831) and JEAN - JACQUES ROUSSEAU (1712- 1778).
- ☒ The above western thinkers express that **AFRICA IS A TIMELESS PLACE IN WHICH THERE ARE NO ART, LETTERS OR SOCIAL ORGANIZATION.**
- The direct question of the existence of African philosophy was not directly raised until the middle 20th century.
- Belgian Congo, Rev. Fr. Placide Tempels book, "philosophie bantou" (Bantu Philosophy) translated to English in 1945 raised the existence of African philosophy.
- Based on the existence of African philosophy, late Professor Henry Odera Oruka classified four schools of thought:

- Ethno – philosophy (works of anthropologists, sociologists, ethnographers and philosophers who present the collective world- views of African people as philosophy).
- Philosophic Sagacity (based on independent thinkers thoughts to characterize African philosophy rather than the authority of communal consensus).
- Nationalist – ideological philosophy (This is represented by the works of politicians like Kwame Nkrumah, Julius Nyerere etc). It is argued that a true and meaningful freedom must be accompanied by a true mental liberation.
- Professional philosophy: This is the work of many trained philosophers. To them, philosophy must have the same meaning in all cultures.

➤ Oruka says that this, strictly speaking is not philosophy, but philosophy only in a debased sense of the word.

DEFINITIONS AND THEORIES OF, AND DEVELOPMENT IN ETHICS

- Descriptive statement is one that gives information about how something or someone looks like.
- Evaluation statement is one that's used to judge the value on condition of someone/ something.
- The branch of philosophy that enables us to know the various uses of the term "good" and what "good" means is called ethics .
- Generally, the four (4) main branches of ethics are:
 - Meta-Ethics
 - Normative-Ethics
 - Applied Ethics
 - Value Theory
- Meta Ethics investigate where moral values language and principles come from and what they mean i.e, it is concerned with what is morality rather than what is moral.
- Normative Ethics is concerned about the moral standards that regulate right and wrong conduct.

- Applied Ethics is the branch of ethics that seeks to apply philosophical tools to examine specific controversial issues.
- Value Theory is concerned with the valuation or worth of ethical conduct.
- Ethical judgment can be true or false on the basis of :
 - Ethical/moral subjectivism: Maintains that moral judgements are expression of preference or personal opinion.
 - Ethical/moral realist: They believe that moral judgement can be true/false
- Ethics is one of the branches of philosophy, other branches includes epistemology, metaphysics, logic and aesthetics etc but this are the core branches, of philosophy
- Epistemology is the theory of being or reality
- Logic is the act or science of reasoning
- Aesthetics is the theory of beauty, value
- Metaphysic is concerned with the basic courses and the nature of things
- Metaphysics includes ontology, cosmology cosmogony.
- Aesthetics and ethics are two branches of aniology
- Aniology is the study of nature, types and criteria of values and value judgment.
- Ethics can be defined as a branch of philosophy, concerned with the rule by which good or bad human conduct, rightness or wrongs of his actions, decisions, polices etc can be evaluated or assessed.
- Pataleon Iroegnu (2005:21) defines ethics as the science and art of proper behaviour. i.e the science of good and evil.
- Anthony O. Echekwube (Ibid, 29) defines ethics as the branch of philosophy that studies the action of the human person relative to right or wrong.
- The term "Ethics" is also used in three (3) different but related ways.
 1. Signifying a general pattern of "way of life" eng Buddhist or Christian ethnics.
 2. Signifying a set of rules of conduct/ moral code. E.g professional
 3. Signifying an inquiry about ways of life and rule of conduct e.g i.e ethics is branch of philosophy that is frequently

given name of meta – ethics

- Melvin Rader stated ethics to be a critical study of the principles or standards for conducting the experiment of living
- Some facts about ethics are:
 - Ethics may be seen as a regulatory mechanism in the day- to- day human interaction.
 - Ethics tries to set standard of acceptable and harmonious behaviour among people.
 - It states why some actions are said to be right or wrong
 - It states why some actions are worth doing and why others ought to be avoided
- Joseph I. Omoregbe (1989) defines ethics as the branch of philosophy that deals with the morality of human actions i.e the norms of human behaviour
- Ethics, is ultimately related to human beings and is intended to be a guide to human conduct no matter how it is defined by philosophers and non – philosophers.
- Human beings are said to be rational moral agents since the definitions of ethics points to them only without mentioning other animals.
- Rational moral agents excludes three groups of humans:
 - The moral minors (the infants) who does not understand what it means to say something is good or bad
- Humans suffering from insanity whose actions are not subject to moral appraisal.
- The senile (whose actions may not be disceptible to moral approbation or disapprobation) i.e people in their old age or people with a physiological reason behind their rationalism. E.g Echolaia.
- The best way to test human conduct while discussing ethics as a branch of philosophy is to see how some ethical theories construe how man ought to act.
- Some ethical theories are
 - The utility theory (utilitarianism): enjoins us to promote the maximum net good (happiness) of human beings i.e promotion of the happiness of vast majority of people.
 - The contractarian theories: seeks to promote cooperative ventures or endeavours i.e it recognizes the fact that no man is an island of knowledge that the action of an individual can have a great impact on

others.

- Ethical Egoist (Egoism): depicts that an individual is willing to join the type of discussion only if his personal interest will not be in jeopardy
 - Ethical relativist (relativism): believes there is no single principle or rule of conduct that is common to all cultures and people the world. i.e what is said to be morally good in a culture may be an abomination in another.
- In discussing the morally wrong issues in ethics, reference will ultimately be made to the question of value and justification.
- Not all classes of people may be said to be "rational" similarly, not all actions are object or subject of moral evaluation.

CHAPTER FOUR & EIGHT

PHILOSOPHY: DEFINITIONS, SCOPE AND BRANCHES

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MAIN SCHOOLS OF THOUGHT IN EPISTEMOLOGY (SKEPTICISM, RATIONALISM AND EMPIRICISM)

- Philosophy is an inquiry into the ultimate nature of reality.
- Philosophy is derived from two Greek words "Phillo" meaning love and "Sophia" meaning wisdom or knowledge. Philosophy means love of wisdom
- Wisdom is the acquisition of rational knowledge of the reality, essence and truth of things in existence, their causes and principle.
- It is human culture and man's concept of reality that determines the philosophy of the people.
- For Plato and Aristotle, philosophy begins in wonder, wonder about the universe, its contents and our place in it.
- The branches of philosophy are Metaphysics, Epistemology, Ethics, Logic, Aesthetics and philosophy of infrastructure.
- The word philosophy was first used by the Greeks particularly Plato.
- Philosophy is essentially concerned with wisdom of life.
- Philosophy can be seen as both as an academic discipline and as an intellectual enterprise, which are the formal and informal meaning of philosophy respectively.

➤ Metaphysics is derived from two Greek words “Meta” which means after or beyond and “physika” which means within the confines of nature or physical. Etymologically, metaphysics means beyond the physical.

➤ Metaphysics is defined as a branch of philosophy that studies reality.

➤ Metaphysics is subdivided into **ontology** and **cosmology**

➤ Ontology deal with the theory and nature of being and existence.

➤ Cosmology is the study of origin and nature of the universe.

➤ The two broad schools of thought in metaphysics are **idealism** and **materialism**.

➤ Idealism holds that the only thing that is real is ideas. Idealism can be taken to be that reality exists mainly as spirit and that whatever exists is known through mind or ideas.

➤ Materialism holds that reality is matter; matter therefore, is the elementary stuff or the primary raw material of the world.

➤ Epistemology is derived from two Greek words “Epistene” meaning knowledge and “logos” meaning theory. Etymologically it is the theory of knowledge.

➤ Epistemology is defined as the branch of philosophy which studies the nature, origin, the foundation, the method, the validity, the extent and the limits of human knowledge.

➤ The three major schools of epistemology are **rationalism**, **empiricism** and **skepticism**.

➤ Rationalism is the philosophical doctrine that reason plays a primary role in the acquisition of knowledge.

➤ Aesthetics was introduced by the German Philosopher Gottlieb Baugaten

➤ Philosophy is seen as a mother discipline or an all embracing area of study.

➤ Skepticism is an epistemological doctrine that **denies** the possibility of reliable and certain knowledge.

➤ The Sceptics doubt if the human mind can know anything for sure

➤ Homo Mensura means man is the measure of all things. It was postulated by **Protagoras**

➤ Georgias argued that nothing really exists

➤ Ethics is the study of human conduct and how mankind ought to behave. It is also a branch of philosophy that deals with morality of human conduct.

➤ Ethics deals with judgment as to the rightness or wrongness approval or disapproval, virtuous or vicious of our

actions.

- Logic is the aspect of philosophy that deals with fundamental lanes of thinking and reasoning.
- Aesthetics is derived from the Greek work aesthetikos which means perceptive. Aesthetics is the philosophical study of art and the experience of beauty and ugliness.
- Philosophy of infrastructure of any discipline deals with the general character, theories, problems and presupposition of such discipline.
- Philosophy means hikmah or falsafah in Arab or Islamic culture.
- Epistemology is a theory of knowledge.
- Timon doubted if honey is sweet.
- According to the skeptics knowledge is unattainable
- Rationalism is the doctrine that reason alone lead us to the attainment of true knowledge of reality
- Empiricism holds that knowledge of sense perception is the ultimate kind of knowledge
- Plato, like his master Socrates, rejects the relativism and scepticism of the sophists.
- Empiricism is a rival theory of rationalism – (Locke's epistemology)
- Ideas can be simple or complex. We have primary and secondary qualities
- David Hume posits that the content of the mind is "impression" and "idea".
- Hume opined that in the relation ideas, we have two kinds which are natural relations and philosophical relations
- Hume challenged the assumption of a necessary connection between a cause and its effect. He perceived no necessary connection.
- In a nutshell, we need skepticism, rationalism (reason) and empiricism (knowledge acquisition) as they have contributed greatly to the problem of knowledge acquisition.

CHAPTER FIVE

INTRODUCTION TO SOCIO POLITICAL PHILOSOPHY

- The political and social institutions and customs developed by the ancient people merely reflect the primitive beliefs about the nature of human, divinity, and the external world prevailing among them at the time.
- Socio – political philosophy like all aspects of human experience is conditioned by environment and by the scope and limitation of individual thinking.
- Socio – political philosophy is concerned with the study of the facts about social relations generally and the interdependence between these relations.
- Social and political philosophy is also a descriptive and normative discipline that is concerned with the ideas of defining the ideal society or state.
- Social and political philosophy deals with ideal standards and form of the government.
- Unlike political science, the socio – political philosophy sets standards of judgement and defines constructive purposes for the use of public power.
- Political philosophy is interested in trying to answer all questions concerning the aims of government as well as other governmental activities

Socio- political ideas

1. Plato

- In his famous work, the republic tried to propose an ideal form of government whose validity will be useful to all human society.
- He believed justice is the basis of the human society
- He tried to find remedies for prevalent political injustice as well as the post classic attempt to moralize political life.
- He divided the society into the guardian, the soldiers and artisans. On the basis of their education.
- He believed the guardian to be the philosopher king
- He maintained that power should be rested in the philosophy in order to attain an ideal society.
- He has been accused of fostering an aristocratic theory of social relations in which is seen as endowed to govern (philosopher king) by the people.
- Plato's republic or ideas society can be referred to as a utopia.

2. Aristotle

- He sees the state in terms of city, city state, which is a form of natural civilized life, social and political and the best medium in which human potentials can be achieved.
 - He defined human as a “political animal” and distinguish human from other animals by their natural ability of speech and power of moral judgment.
 - He believes humans are the best animals but when separated from law and justice are the worst of all. Since injustice in the most dangerous
 - He believed the aim of the city state is in the good interest of people, at the highest.
 - He also analyses the different kind of city – states.
 - He said they are bounds, like animal, he considered a balanced “mixed” constitutions the best because it reflects the idea of justice and fair dealing which compensates human in a conservative social order.
 - He argued that a popular ruler attains power by bribing the electorate and wasting accumulated wealth.
 - He detests the tyranny i.e the arbitrary power of an individual ruler.
 - He accepts a conservative and hierarchic social order
 - He states that public power should aim at promoting good life and that only through the rule of law and justice and fair dealing which compensates human in a conservative social order.
 - He argued that popular ruler attains power by bribing the doctorate and wasting accumulated wealth.
 - He detests the tyranny i.e the arbitrary power of an individual ruler.
 - He accepts a conservative and hierarchic social order
 - He states that public power should aim at promoting good life and that only though the rule of law and justice can the good life be attained.
- 3. Thomas Hobbes**
- He defines a free man as someone who is not hindered to do what he has a will to do i.e a nature and unrestricted right to pursue and posses the objects of his desires.
 - Contrary to Plato, Hobbes, felicity is a critical progress desire.
 - He believed and proved that no desired is inherently good or bad.
- 4. John Locke**

- His philosophy is based on the doctrine of natural right i.e men in the state of nature is both free and equal.
- His state of nature is not the state of war unlike Hobbes's.
- In his state of nature, humans have both right and responsibility for themselves and others.
- There can be war in the state of nature but in Locke's view, it is a temporary condition rather than a permanent state.
- In the state of nature, each human has the right to be the judge of his/ her own case.
- The actions of a human are influenced by his/her perceptions and sensations which sometimes fail, his/ her judgment is infallible in the state of nature.
- The lack of certainty in judgment and the absence of an impartial judge on earth and also sufficient executive power to restrain and deter, makes the ease and security enjoyed in the state of nature tenuous.
- Political power is given in trust rather than by authorization.
- The people are the ultimate repository of political power in a political system where political power is held by consent of the governed.

5. Jean-Jacques Rousseau

- He is not concerned with the question to which Hobbes and Locke attach much significance.
- He rejected the idea that any of the inequalities that existed in the state of nature are sufficient to legitimate the political authority of one person over another.
- He believed human in the state of nature is nothing more than a "stupid, short-sighted animal" ruled by instincts and not justice, with no view of morality or reason.
- He believed civil society is necessary not to ensure civil people but to transform the individual freedom but he does not equate freedom with independence in the state of nature.
- He stated that human can regain freedom through communitarians

6. Karl Marx

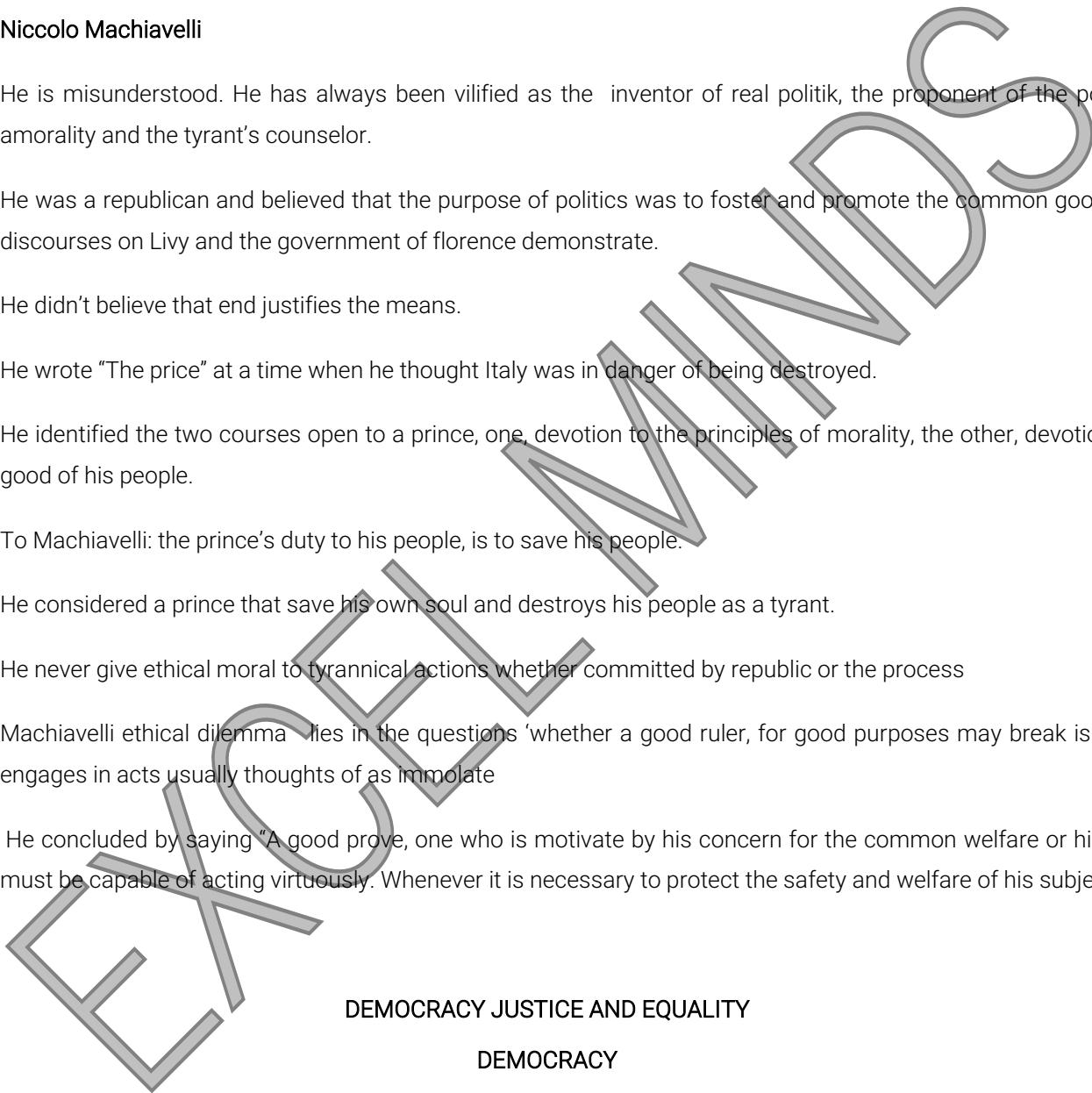
- He sees the state of nature as capitalism sowing the seeds of its own destruction.
- He wrote "the history of all societies hitherto existing has been the history of class struggles" i.e the material

means of production of every society results in one class gaining supervisors over others.

- Marx refers the state being an independent power, standing over and against civic society as the “parasitic state” or “Bonapartism”.
- He coined the term “Bonapartism” while observing the events leading to the 18th Brumaire in France.

7. Niccolo Machiavelli

- He is misunderstood. He has always been vilified as the inventor of real politik, the proponent of the politics of amorality and the tyrant's counselor.
- He was a republican and believed that the purpose of politics was to foster and promote the common good, as his discourses on Livy and the government of florence demonstrate.
- He didn't believe that end justifies the means.
- He wrote “The price” at a time when he thought Italy was in danger of being destroyed.
- He identified the two courses open to a prince, one, devotion to the principles of morality, the other, devotion to the good of his people.
- To Machiavelli: the prince's duty to his people, is to save his people.
- He considered a prince that save his own soul and destroys his people as a tyrant.
- He never give ethical moral to tyrannical actions whether committed by republic or the process
- Machiavelli ethical dilemma lies in the questions 'whether a good ruler, for good purposes may break is word or engages in acts usually thoughts of as immolate'
- He concluded by saying “A good prove, one who is motivate by his concern for the common welfare or his people must be capable of acting virtuously. Whenever it is necessary to protect the safety and welfare of his subject.



- It has its origin in two Greek words, 'demon's and 'kratios' which means the rule of the people
- David Held (1995) also referred to it as a government by elected representatives who understate to represent the interests of the citizens within a delimited territory, while upholding the rule of law.

- Democracy is a form of government that allow for representation where representatives are expected to act in the expressed wishes of the people justice.
 - Cephalic, a pupil of Socrates in the work of plato (the republic) defines justice as honesty in word and ideas i.e fulfilling of one's promise and keeping one's words and deeds.
 - Justice also upholds the equality of human: that all human are equal before God the creation
 - Justice mean a proper balance between competing claims
 - According to Louis Pojman, Justice is the constant and perpetual will to give every human his/her due i.e Justice entails that there must be respect for one another and that everyone is expected to live lawfully.
 - Justice is also a web that holds any society together.
 - According to David Hume, justice is a conventional device for preserving social order by setting disputes between individuals making incompatible claims on relatively abundant but nevertheless scarce resources.
 - Hume's view can generally be stated in terms of the these that justice has to do with the distribution of scarce resources
 - Justice has to do with the distribution of scarce resources.
 - Justice also arouses the need to re-examine our attitude towards the very existence of human as well as of human community, societies and people.
 - Thomas Pazhayampallil says justice is the fundamental principles of sentience and co-existence of human as well as of human communities, societies and people.
- Equality**
- It has been considered as a constitutive feature of justice.
 - It can be used in the same sense both to describe and prescribe.
 - Descriptive use of equality equates two individuals to be the same.
 - Prescriptive we of equality is present when a prescriptive standard is applied i.e a norm or rule. E.g people ought to be equal before the law.
 - The prescriptive assertions contains two complements, is the descriptive component, concerned with the identification of those people to which the rule or norm applies (2) the comparative standards, containing something normative.

- Sociological and economic analyses of equality pose the question of how inequities can be determined and measure and what their causes and effect are.
- Social and political philosophy is in general concerned with the following questions: what kind of equality? If any should be offered, to whom and when?

CHAPTER SIX

DEFINITION OF KNOWLEDGE

- The first definition of knowledge given by theaetetus is that knowledge is what can be taught.
- The Socrates rejected this definition on the ground that it is only about a particular kind of knowledge not about knowledge in general.
- knowledge
- The implication of the definition of knowledge by theaetetus is that two individuals may perceive the same thing different and also that the future is not within our perception.
- Also, human memory will be useless if perception is knowledge because when we remember, there is no object or event to perceive.
- If perception is knowledge, human knowledge will be limited to physical things alone.
- Knowledge to socrates is a function of the soul rather than our sense.
- Theaetetus is a book written by Plato.
- For the socrates, knowledge is reasoning about perception (theaetetus 186d)
- “The soul coordinates our perception. It is in the wise”;
- Socrates can be categorized as a moderate rationalist.
- Scepticism is the bane of epistemology.
- Knowledge can be defined as “true judgment” (Theaetetus 187b) if a man judges truly a state of affairs, then he knows.

- To the Socrates, knowledge is not true judgment because they believe someone can give rightly and yet may not know. Hence they believe it takes showing how the true opinion is arrived at, for it to be considered as knowledge.
- The book theaetetus is written by plato in which he cross – examines student of philosophy (Theaetetus) who is acknowledged by his teacher Theodorus as an intelligent fellow.
- When the knower is able to give an account for what he knows, he is knowledgeable (Theaetetus 202c).
- The socrates and theaetetus agree that "knowledge" is true judgment plus account" (Theaetetus 202d).
- The socrates later disagrees with the definition of knowledge in the theaetetus 202d. According to them, giving account necessitates that the account itself must be known.
- The Socrates and Theatetus therefore reached a confusion that knowledge is true judgement plus account but each account will need a justification (Theaetetus 210b)
- Traditional epistemology takes this definition in the Theaetetus 210b as the best, but tries to prevent the infinite regress by saying there are some beliefs that need no justification.
- Traditional epistemology fails to tell us how those beliefs acquire such status.

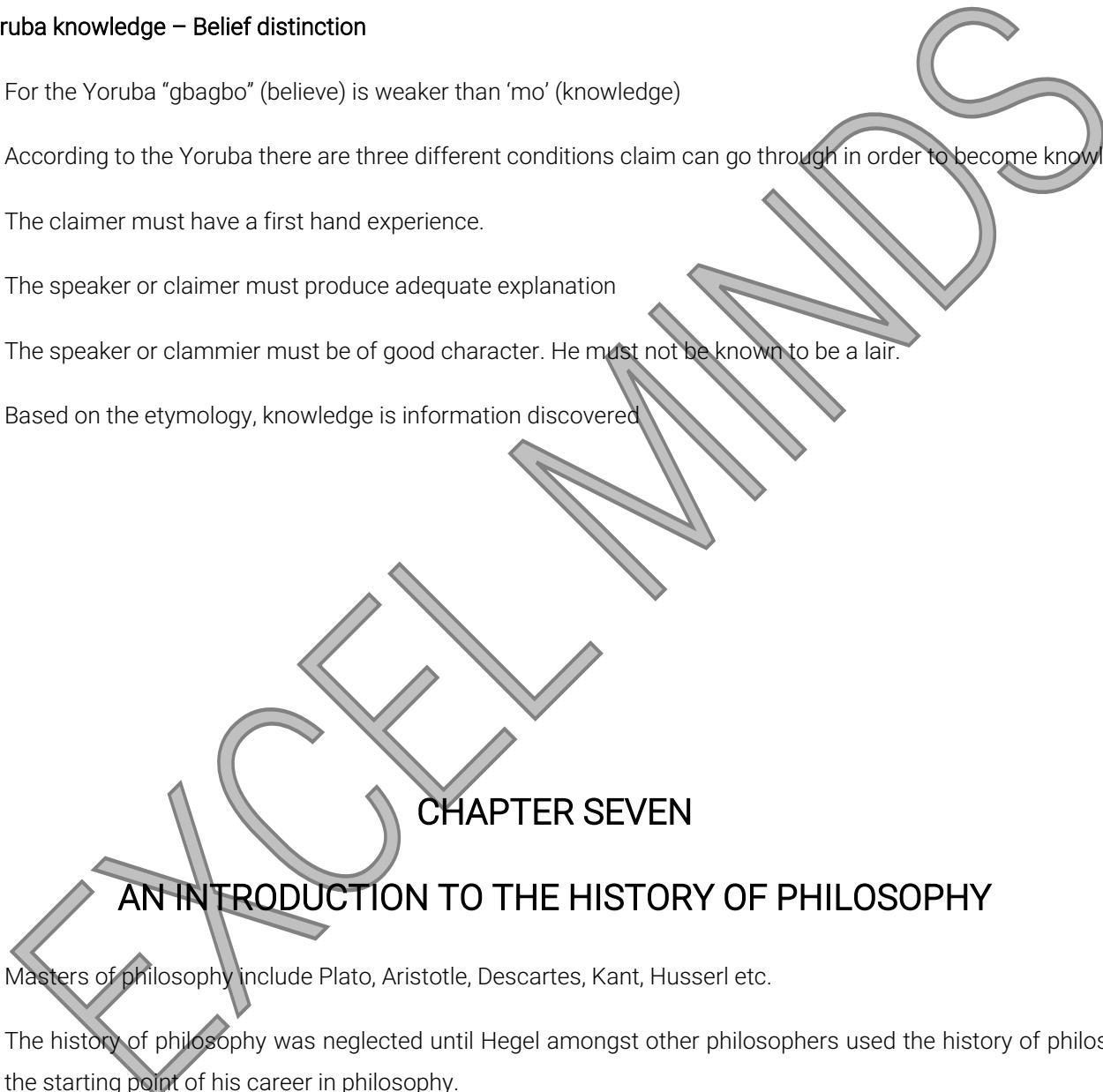
Gettier Analysis of justified True Belief (1963)

- Edmund Gettier analysis is an attempt to show that justified true belief is a necessity but not a sufficient condition for knowledge.
- From his analysis it can be concluded there are three conditions for knowledge:
 - i. Belief
 - ii. Truth belief
 - iii. Justification of belief
- Some philosophers called the 4th conditionalists have tried to add another condition to justifying true belief.
- According to Michael Clark (Analysis vol 24) the believers ground for believing a claim should not include any false beliefs.
- Clark's position has been criticized for being too strong, such that it will be impossible for any of us to know anything for certain (Pollock, 1986).

- Jonathan Dancy (1985) says there should not be within the system of belief certain 'truth' which can destroy the believers justification, this approach is called defeasibility theory.
- The third approach (the reliability theory) says knowledge is justified true belief derived from a reliable method.
- The Fourth approach says justified belief is knowledge if it is based on "conclusive reason".

Yoruba knowledge – Belief distinction

- For the Yoruba "gbagbo" (believe) is weaker than 'mo' (knowledge)
- According to the Yoruba there are three different conditions claim can go through in order to become knowledge.
- The claimer must have a first hand experience.
- The speaker or claimer must produce adequate explanation
- The speaker or clammier must be of good character. He must not be known to be a lair.
- Based on the etymology, knowledge is information discovered



- Masters of philosophy include Plato, Aristotle, Descartes, Kant, Husserl etc.
- The history of philosophy was neglected until Hegel amongst other philosophers used the history of philosophy as the starting point of his career in philosophy.
- The word philosophy was first used by the Greeks particularly Plato.
- There is the Thalesian bold speculation that water is the ultimate primal stuff of the universe.
- Philosophy has a history in both the Arabic culture and Islamic culture.

- Philosophy is translated to mean hikmah or falsafah by Arab or Islamic Philosophers
- Philosophy does not need its history once philosophers like W.V.O Quinne could almost, single handedly change the course of contemporary discussion in philosophy.
- The anti historical attitude is what is usually referred to as **ahistoricism**, which is the philosophical attitude that rejects completely the historical way of recollecting the past of philosophy. The contemporary representative of this position is analytic philosophy.
- The attitude of the analytic philosophy to the history of philosophy is as a result of the burden of epistemic justification placed on history.
- It could be claimed that this rejection of history, rest on the fundamental but incorrect position that the realm of time, cannot yield any reliable knowledge.
- This controversy started with the Greek philosophers, and was theoretically formulated by Plato in his book **Theatetus**.
- This theoretical formulation culminated in theory of the ideal world of form.
- We have the world of forms and world of physical according to Plato. World of Form is the original while the world of physical is the photocopy
- Frederick Copleston was able to document both the intra-cultural and the inter-cultural tendencies of the history of philosophy.
- The early Greeks we refer to as philosophers did not refer to themselves as philosophers; in fact, it is safe to refer to them as sages or more accurately as scholars
- Plato was the first to use the word "philosophy" interchangeably with "search for knowledge"
- Roman, Eastern and African had varying influence on western philosophy.
- The cultural philosophies of Europe include British, & French German etc.
- We can trace their periodic movement to Ancient, Medieval, Renaissance, Modern and Contemporary periods.
- Chinese philosophy period can be divided into three (3) which are classical age, the medieval age, and the modern age.
- The hypothetical periodisation in the history of African philosophy are Ancient period, Greek Period (600 BC to the birth of Christ), early Christian Period (1st-6th centuries AD), Islamic African Period (7th – 13th centuries AD) period of early European exploration and contacts with Africa (14th – 17th centuries), western colonial period (18th – 19th

centuries AD).

- Richard Rorty's most controversial book, **PHILOSOPHY AND THE MIRROR OF NATURE** is a classic example of a combative and disputative history of philosophy.
- Richard Rorty proffered possible methodologies that can be used in the process of writing the history of philosophy which are:
 - Rational reconstructions
 - Historical reconstructions
 - Geistesgeschichte as canon-formation
 - Doxography
 - Intellectual history

CHAPTER NINE

AFRICAN SOCIO POLITICAL PHILOSOPHY

- African socio - political philosophy came about due to colonialism ie when foreigners came to Africa and totally dominated every aspect of life, from commerce to leadership to education (Omoregbe J. 1999:40)
- A few Africans like Nnamdi Azikiwe, Obafemi Awolowo, Kwame Nkrumah, Julius Nyereere, Leopold Songhor, who had opportunity to study abroad then came back to their native lands to reclaim the African socio – political philosophy from the foreigners.

Kwame Nkrumah

- He was born on September 18, 1909
- He dominated the politics of his country from 1951 to 1966 when he headed the government of Gold coast, later to be renamed Ghana
- His rise to fame began when he was convicted and sentenced to 12 months imprisonment in 1950 for sedition against the British colonial government.
- While in prison, he was elected municipal member of Accra in the Gold coast legislative assembly.
- He was released from prison by the British governor "General Sir Charles Arden – Clarke" in 1951.

- He was also appointed the leader of government business in 1951.
- He was appointed prime minister in 1952.
- Nkrumah was appointed the first president and command in chief of the armed forces of Ghana when Ghana became republic in 1960 (July 1st).
- His political philosophy was termed consciencism.
- He believe that anything that separates mind and body create room for antagonism, conflict or contradiction.
- He accepts that interaction of mind and body is a reality.
- He holds on monism by claiming that everything was at bottom the same thing, provides the philosophical basis for egalitarianism i.e equality for all.
- He believed that if there is no dualism, there cannot be conflict or contradiction.
- He works out the basis of African socialism through what he termed ;categorical conversion; (mind – matter) Nkrumah consciencsim 1964:14)
- He deduced African concept of man from his humanist posture.
- He views African as a being that has dignity, integrity and respect.
- He logically derived African socialist r communist approach to life from humanism
- Recommended that the new African state should operate along the hire of a socialist program.
- He believes socialism is the only doctrine that approximates the humanist impulse of the African mind.
- He later denied existence of African socialism, and conceived scientific socialism as the only true socialism which are abiding and universal.
- He believes that the socialist countries of African may differ in the detail of their policies.
- Feudalism involves a deep explorative social stratification founded on the ownership of land.
- He believes feudalism existed in some parts of Africa before colorization.
- He is convinced that capitalism would be a betrayal of the personality and conscience of Africa, because capitalism created a bifurcation between mind and body which resulted in unhealthy dualism.
- He posits that the socialist programs he recommend is to be hinged upon a philosophical ideology, which terms "philosophical" consciencism"

- The philosophical conscientism is focused on what is been called the triadic formula and seeks an amalgam of
 - i. Traditional African humanism
 - ii. The euro - Christian influence
 - iii. Islamic value
- The euro – Christian and Islamic values were imported into traditional African society through colonialism.
- He believes that new African states will experience harmony if the positive values of the Islamic and euro – Christian traditions is admitted in the African principles to exclude all antagonistic tendencies.
- He believes that the total liberation and unification of Africa under an all – African socialist government must be the primary objective of all black revolutionist throughout the world.

Julius Nyerera -Ujamaa

- He was born at Butiama, a village near misoma in the shores of lake Victoria, Tanganyika in 1922.
- He studied in Edinburgh University and graduate as a master of Arts students in 1952
- He won the presidential election of Tanganyika in 1962 when Tanganyika became a republic.
- He was a signatory to the union of Tanganyika and Zambia
- He then became the president of the new United Republic Tanganyika and Zanzibar which was later renamed Tanzania.
- He formulated political philosophy during which he studied the relationship between human and society.
- According to him, human's existence in society involves an inevitable and inescapable conflict, a conflict of his/her own desires.
- He believed every individual wants two thing;
 - i. Freedom to pursue his/ her own interest and inclination
 - ii. Freedom from the effects of natural dangers

- He believes a man is surrendering certain freedom by joining a social group and as such, he believes there is no hope for stability or harmony within the group.
- For him, the ideal society is based on human equality and on a combination of freedom and unity of its members.
- In his view, the philosophical ideology that can ensure that an African society adheres to its basic purpose is existence Ujama which means family hood
- By Ujama, the single extended family unit is a commune, which when extended to the world as a whole mean brotherhood.
- Nyerere believes African societies can be liberated from their woes by imbibing the principles of Ujama which are self – reliance and self – liberation, devoid of colonial exploitation.
- He rejects capitalism arguing that it is alien to traditional African mind – set.
- He rejects capitalism and the blind competition, exploration and parasitism that go with it.
- He regards all men as his brethren as members of his extended family (Nyerere, J.K 1973:07)

Nnamdi Azikwe

- He is popularly known as Zik and he was not only a Nigerian politician but also a good philosopher.
 - He was part of the formative years of Nigerian democracy.
 - Zik harmonized the traditional Nigerian political system with the good aspects of capitalism, socialism and welfarism to arrive at "neo-welfarism".
 - "A neo-welfarist state will not be capitalist, socialist or welfarist in nature, but it will take ingredients from all."
 - He claimed in 1979 that some aspect of capitalism and socialism was predicted by our ancestors and worked for them.
- Neo-welfarism**
- It embraces belief in private enterprise, reinforced by state participation in the private sector and state collaboration in management.
 - The neo-welfarist state will operate an open door policy for free enterprise and unrestricted but regulated competition based on the constitution which is the fundamental law.
 - The neo-welfarist state shall have four arms of government, the electorate, the legislative, the executive and the judiciary.
 - The electorate will decide the legislative members.

- The legislative shall exact laws and check the activities of the executive.
- The judiciary has the power to review the activities of both legislative and executive.
- Both the legislature and executive have the power of appointing / dismissing judiciary members. (Omorgbe : 19)

Foreign Affairs

- The neo-welfarist state 6 private on which the foreign policy is based;
 - i. Pragmatic neutrality
 - ii. Good neighborliness positive reciprocity
 - iii. Search for world peace
 - iv. Zonal / continental cooperation and international fellowship basis on fair play
 - v. Legal equality
 - vi. Mutual respect
- In the state, there is upholding of fundamental human rights and the government is not above the law (Azikwe 1974)
- In neo – welfarist state of government world ensures equitable distribution of wealth and other things require in the society.
- "Employment is part of the government duties which must be sought for everyone capable (Akikwe, 1973)

Obafemi Awolowo

- In his time, he achieved more as a philosopher than as politicians.
- He stated that his own socialism is in – between capitalism and communism based on the principle that form each, according to his needs.
- The objectives of socialism according to Awolowo are
 - i. The abolition of rent, dividend of profit, interest and inheritance
 - ii. The legal elimination of retried class
 - iii. The recognition that all the able – bodied citizen of the are workers or labourers of various graduation and skills.
 - iv. Awolowo asserts that man's needs are superior over his / her wants and such needs are limited and should be regulated by the law.

CHAPTER TEN

SENTENTIAL, PREDICATE LOGIC AND TRUTH ANALYSIS

- Logic is the study of human thought and to determine if such thought is valid or invalid.
- The main concern of logic is to determine which arguments or argument forms are good and which are bad.
- Logic is a technique for determining and differentiating good argument from bad ones.
- A sentence is a group of words that express a logical meaning.
- A statement emphasizes on fact and the establishment of such fact.
- A proposition is a collection of *words* with a clear sense of precision and result oriented in nature.
- A priori proposition means that truth and falsity of any proposition does not need any experience or verification.
- A posteriori proposition, truth and falsity of proposition can only be known after experience and verification has taken place.
- An argument consists of sentences, statement or propositions with the structure of premise (s) and a conclusion.
- Prepositional logic is the use of symbols to represent propositions, terms and connectives.
- There are five basic logical connectives which are:
 - Negation, represented by \sim "not"
 - Material implication represented by \rightarrow "if" "then" "implies"
 - Disjunction, represented by \vee "either or"
 - Conjunction, represented by \wedge ". and" "but"
 - Bi-conditional represented by \equiv "if and only if"
- Truth table can be exhibited in terms of T's (for "true") and F's (for 'False')
- For negation: If a statement is true, than its negation will be false i.e

P	$\sim P$	Q	$\sim Q$
T	F	F	T
F	T	T	F

- A statement is said to be an implication if its antecedence is false and its consequence is true i.e $P \rightarrow Q$

P	Q	$P \rightarrow Q$
T	T	T
T	F	F
F	T	T
F	F	T

- A statement is said to be true in a Bi-Conditional when they are of the same values

P	Q	$P \equiv Q$
T	T	T
T	F	F
F	T	F
F	F	T

- A statement is said to be true in conjunction when both conjuncts are true and false in other cases

P	Q	$P \cdot Q$
T	T	T
T	F	F
F	T	F
F	F	F

- A statement is said to be true in a disjunction when at least one of the disjuncts is true:

P	Q	$P \vee Q$
T	T	T
T	F	T
F	T	T
F	F	F

CHAPTER ELEVEN

SOCIOLOGY OF RELIGION

- In recent times, it has been postulated that sociology is synonymous with socialism or social work.
- Sociology can be defined as the academic discipline concerned with the systematic study of human social relationships in the most general sense.
- From the human angle, sociology is concerned with the relationship that exists among human beings, in which some are regarded as subordinate and others, super ordinate

- Sociology is concerned with the relationship that exists between two or more people and the effects of the relationship on them and the society.
- Emile Durkheim defined religions as "That which deals with the scared, with things set apart and forbidden".
- Religion is regarded as the relationship between man an individual and the sacred entity to which he is aligned.
- If religion were limited to a relationship between men and God, then there would likely not be the need for sociology of religion as God is evidently outside the scope of society.
- If we accept that religion is one of the major facets of human life, which is institutionalized, in every society one is tempted to conclude that no society can exist without at least a semblance of religion.
- Religions have practices, beliefs and doctrines, and these could be institutionalized in which case, they constitute what we know as "organized religion"
- Organized religion composes of Judaism, Christianity, Islam, Buddhism etc.
- From sociological point of view, the interaction of such organizations (organized religion) necessarily attracts the particular interest of the society.
- Sociology of religion has a very theoretical tradition as renewed sociology theorists have contributed and committed a lot of effort to the subject.

Durkheim: Religion as Worship of Society

- In the period preceding World War I, Emile Durkheim wrote one of his most significant contributions to functionalist sociology; "**The Elementary Forms Of Religious Life**".
- In the book, he asked two questions, "**What is religion**"? And "What **are the functions of religion for human society**"?
- It struck Emile Durkheim that religions was very much a "**Social thing**"
- He began his analysis by interpreting the religious expenses of Australian Aborigines. He felt that he had arrived at an understanding of general phenomena that applied to other societies, including his own.
- Durkheim sees human experience as divided into two radically different sphere; "**The Sacred**" And "**The Profane**"
- The profane is the ordinary experiences in everyday life.
- The scared evokes awe and reverences
- Durkheim deems that religion's purpose is to maintain the radical segregation of the scared sphere from the profane through the practice of rituals.

- Durkheim considered the practice of the ritual cult to be of central importance.
- Durkheim felt that people everywhere worshipped the same object, although, they symbolized in very different terms.
- The object of reverence and awe is the "society". To Durkheim, **God is society**
- The worship of God is seen by Durkheim as the disguised worship of society. The great being upon which the individual rests.
- Durkheim believe that religion gives the believer a feeling of conform and dependence.

Mark: Religion as Ideology

- Marx's view on religion are commonly discussed in connection with a controversy between his followers and those of Weber concerning how much independent causal status to attribute to religion
- Marx is the champion of those who consider the only basic forces in society to be economic and technological.
- Marx sees religion as an "**effects**" of other factors Weber sees it more as a "**cause**" of other factors.
- Marx held that groups of people tend to adopt belief systems (or Ideologies) that can be used to justify the purist of their own economic advantages.
- To Marx, religion is just a doctrine, an "**Opiate**" lulling the masses into compliance and forestalling their revolution.
- Marxist sociologists have generally ignored the study of religion, regarding it as an unimportant factor of social life.

Weber: Religion as Source of Social Change

- It is against the background of this Marxist assumption that Weber's book, "The Protestant Ethic and The Spirit of Capitalism", stands out in such bold relief.
- The industrial revolution began shortly after the protestant reformation. He considered the possibility that the reformation somehow a precondition for the industrial revolution.
- Protestantism did not cause acquisitiveness but it did create a system of legitimate rational acquisitiveness.
- Protestantism contributed to the following effects:
 - Legitimation of interest on loans
 - Conception of secular work as "calling" by which God is served.
 - The anxiety that each person is foreordained to go either to heaven or hell.
- The Catholic Church had prohibited the Christian from lending money at interest, for this allowed a man to gain profit from the misfortune and needs of his fellows.

- Jews were allowed to accept interest.
- Protestantism taught that a person was to forego pleasures of the flesh and instead work industriously and prudently administer the profit of his labour, which are God's
- Finally, Protestantism (especially Calvinism) generated a terrible sense of loneliness and anxiety that man could either be saved or damned. No one is rest assured.
- By the time Protestantism had reached full swing, this chilling doctrine had been revised in a direction that was crucial for the development of capitalism.
- Money was seen as means of reducing person's anxious concern as to his state of grace. Conversely, a person's poverty was evidence that he was not applying himself with the proper moral fervor and was probably not worthy of salvation.
- Very early in the reformation, some leaders among which John Wesley foresaw the effects that Weber was to spell out later in retrospect.
- John Wesley wrote "I fear, whenever riches have increased, the essence of religion has decreased in the same proportion. Therefore, I do not see how it is possible in the nature of things, for any revival of true religion to continue for long".
- Methodism is a religion of the heart
- The ethic of world asceticism declined among the protestant over time, and modern Methodists are not recognizably different in character from members of other religious communities.
- Weber argued that the protestant ethic did much to produce industrial capitalism.
- Weber's book called "**Webber Thesis**" is the most criticized theory in the history of sociology.
- In Weber's thesis, he posited that the "protestant ethic" was partly responsible for the use of modern capitalism.
- Many sociologists view the gods or God as a product of the collective imagination of a society. God then is a mere "projection" and not a real being.
- French sociologists, Emile Durkheim emphasized that religious beliefs, contribute greatly to the cohesion and harmonious functioning of a society.
- Marx viewed society as being permeated by conflict and strife, and therefore religious belief was relegated to class conflict. For him, religion is the "**OPIUM**" of the people.
- Thus from the two appreciator above (Emile & Marx) one can conclude that the particular forms of sociological

theory of religion do often reflect the characteristics of particular forte of sociological theory.

- H.A Famer offers an objection to Durkheim theory of God as a symbolization of the power and authority of society.
- C.S Evans countered Marx's approach. Evans noted that abolitionists in 19th century America.
- ☒ Sociologist studies of religion provide a very positive understanding of both religion and the society and the way both influence each other.

Societal Institutions and Religion

- **Family - Parents:** The family is the first social institution that the individual encounters. The attitudes of parent and other family members can go a long way to determine the religious attitude of the individual, positively or negatively.
- **Educational institutions:** This goes a long way to influence religious attitudes of students. This is more so in religiously orientated schools, particularly where the teaching of religion and moral injunctions are stressed.
- **Social Groups And Contact Influence:** Aside from home and educational institutions the formation of religious attitudes in term of beliefs and religious functions and attendance can be developed through belonging to a particular group and other forte of social contact.
- **Evangelical and other meetings:** Quite a number of individuals have found the sources of their religious commitments through attendance of evangelical meetings.
- A religion that intends to live up to expectations, in the society should possess creative and progressive dynamic dispositions.
- Creativeness of a religion involves it being original pioneering and also exploring.
- Progressiveness implies that religion should strive to be on the move at all times.
- The roles of religion have cut across religious, services to the people, political, moral, social education and even economic roles.
- The ancient Greek word, as exemplified in classical political thinkers such as Plato and Aristotle, saw religion as being crucial to political life.
- From the time of Emperor Constantine of Rome, Christianity began to enjoy state pretension and gradually was turned to virtually state religion.
- In the middle centuries, catholic popes were not only religious leaders they also had enormous political powers.
- The 16th century reformation brought a different situation especially in England, during the time of Henry VIII who,

because of the Rome and established the Church of England which he controlled, thus uniting religious and political authorities under the English monarchy.

- By the 1500s, the English crown came to be established in England.
- Muhammad, the founder of Islam, combined political power with religious leadership.
- The Islamic religious could be considered as the only religion that conveniently combines politics with religious as exhibited by various Islamic nations in the world e.g Iran, Libya, south – African
- Religion is of importance in making unity, peace and stability present in the society.
- Unity, peace and stability can be achieved through:
 - Prayer services and other rituals
 - Concrete participation in the life of society
- Modern capitalism developed in the 7th century
- Religion plays a vital role in the continuation of social existence (Marriage) as can be seen in Islam (Polygamy legitimization) and Christianity.
- Religion plays different roles in the society among which are:
 - Religion is capable of offering amelioration for man in the society when confronted with disappointment and reconciliation with society when alienated from its goals and norms.
 - Religions offers man contact with ultimate reality through worship ceremonies and provides authoritative teaching of beliefs and values.
 - Religion socializes the norms and values of established societies, maintaining the dominance of group goals over individual wishes by reinforcing a society pattern of reward.
 - Religions may provide standards of value in terms of which institutionalized norms may be ritually examined and found seriously wanting
 - Religions performs important identity functions (Kingsley David)

Sociological Dimension of Traditional Religion

- Oracle the desire to seek out knowledge, in addition to the burning desire to know what the future has in store brought about oracle.

- Shrines – Skinner are places, dedicated to one god or the other. It could be both individual and society. They could be found in houses or grave sports of ancestors.
- Taboos- This is a word derived from the Polynesian tem, "tabu". It means forbidden.

CHAPTER TWELVE

SOME MEDIEVAL ISLAMIC PHILOSOPHERS

AL KINDI

- Al kindi (801-873AD) is generally regarded as the first Muslim philosopher and Arab Muslim to study science and philosophy.
- Al kindi hailed from al – kufah in the Arabian peninsula.
- Al kindi father (Ishaq ibn al-sababah) the "Governor" of al-kufah during the region of the Abbasid caliphs, al mahdi and al Rashid
- Al Kindi sojourn into philosophy began with the translation of the Plotinus 'Enneads' into Arabic, which he published under the title "THE THEOLOGY OF ARISTOTLE"
- Al kindi began the transmission of aspects of Greek philosophy into the Arab Muslim world.
- Al Kindi authored many works numbering about 270 but only compendiums of about 25 treatises have been found in Istanbul by Constance Ritter.
- Ibn al-Nadim classified al-Kindi writings into seventeen sub heads, viz; philosophical, logical, mathematics, globular, musical, astronomical, geometrical, spherical, medical, astrological, dialectical, psychological, spherical, causal (meteorological), dimensional, on first things, on the species of some metals, chemicals.
- According to al-kindi, "Philosophy is the knowledge of truth, something over and above experience".
- Al Kindi qualified God by term "truth", which is the objective of philosophy.
- Al kindi classified philosophy into two board divisions which are theoretical studies and practical studies.

AL FARABI

- Al Farabi was also one of the most outstanding and renowned medieval Muslim philosopher born in Turkestan (He was of Turkish origin) around 870AD

- Al Farabi is reputed to be the first Muslim philosopher to head a "school" and to become known as a "teacher"
- Al Farabi commentaries on Aristotle works confirmed the latter's authority in logic, metaphysics and physics.
- Al Farabi authored the "Enumeration of the sciences"
- Ibn khallikan (the biographer), made it known that al-farabi began writing of his books at the age of fifty (50) and died at the age of eighty(80)
- The major area of al-farabi's contribution to philosophy was logic; He devoted a considerable portion of his works to logic, particularly Aristotle's organon.
- Al farabi did not condemn the prophet as impostors but allot him like his master Plato.
- According to Al farabi there are two intellectuals in man which are the active intellect and passive intellect.
- Al farabi developed a classification of political regimes which are Virtuous city, Ignorant city and Errign city
- Al Farabi further sub-divided the citizens of the virtuous city into three classes

IBN SINA (980 – 1037 A.D)

- Ibn Sina was born in Persia in 980A.D and known to the western Europe as Avi Cenna
- Ibn Sina in his early life studied number of disciplines which included Arabic literature, logic, theology, mathematics, geometry, jurisprudence, medicine and philosophy.
- Ibn Sina most important surviving works include; **KITAB AL SHIFA, KITAB AL – NADJAT, ADANISHNAMA I'ALA' MANTIQ AL MASHIRKIYYIN & KITAB AL- ISHARAF WA'L' TANBIHAT.**
- Ibn Sina as a metaphysician acquired the title of "philosopher of being" but as a realist he acquired "philosopher of essence".
- According to Ibn sina first certitude apprehended by the human mind is that of being which is apprehended by means of sense of perceptions.
- The second certificate is that the being apprehended in man and every existing thing is not present there of necessity.
- Ibn sina's philosophy is a synthesis of Aristotelianism and Neoplatonism.
- According to Ibn sina, the only being is in God, God is not genus and being is not a genus
- Ibn sina succeeded in transmitting Greek philosophy to the Arab world.

IBN TURAYL

- Ibn Tufayl was born in the first decade of the 12th century in Grandix near Granada, Spain.
- Ibn Tufayl had become a “man of substance” by 1150 as he was then the secretary to the governor of Granada.
- Ibn Tufayl was appointed by the founder of the almohad dynasty (Abd al mumin) as the secretary to his son (Abu said) in 1154.
- Abu said was the governor of Ceuta and Algiers in 1154.
- Abu Yaqub died in 1184 and was succeeded by his son (Abu Yusuff), ibn Tufayl still remained as the honoured courtier and vizier.
- Ibn Tufayl major philosophical treatise was titled HAYY, THE SON OF YAQZAN
- Ibn Tufayl maintained that the highest end of man consists in contemplation rather than action.
- Hayy the son Yawzan, was very popular in 17th century in England while Jewish philosopher Moses Narboni wrote a commentary on it in 1349
- The Arabic original of Hayy the son of Yawzan was first translated by Edward Pococke in 1671 while the second edition came out in 1700.

IBN RUSHD (AVERROST 1126A – 1198A.D)

- Ibn Rushd was born in 1126 A.D
- Ibn Rushd was known to the medieval west as Averroes
- Ibn Rushd studied many disciplines which include Arabic language, literature, medicine, mathematics, dialectical theology, logic and philosophy etc.
- Ibn Rushd was appointed as judge in Seville in 1169 and later the chief justice of Cordova
- Ibn Rushd's philosophical career began to receive recognition in 1153 when he visited Marrakesh (Morocco).
- Ibn Rushd was in Marrakesh apparently in connection with plans of the Almohad's rulers to establish colleges at the time.
- Ibn Rushd was conferred with the title the “commentator of Aristotle”.
- Ibn Rushd died in Marrakesh on 9th of December 1198
- Ibn Rushd argued that philosophy is recommended by the “Quran”

- Like al-kindī, Ibn Rushd posited that “True knowledge is the knowledge of God”
- Ibn Rushd committed an error of appreciation which was to remain a blind spot with the historians of “Arab” thought.

CHAPTER THIRTEEN

THE JUDEO – CHRISTIAN RELIGION

- The term Christianity refers to what is considered in many areas of the world as the most widespread religion.
- The origin of Christianity goes back to the work of Jesus of Nazareth in Palestine in the first country AD.
- The word “charts” from Christianity is derived from the Greek word “Christianity is derived from the greet word “Christian” which is equivalent to “Messiah” in Hebrew.
- The English “messiah” comes from “Messiah”
- Christianity is a monotheistic faith, especially, distinguish from other faiths by the fact that they believe everything related to redemption is accomplished by Jesus of Nazareth
- A three – volume study of the bible has the following titles by Wilfred J. Harrington:
 - i. The record of revelation: The Bible
 - ii. The record of promise: old testament
 - iii. The record of fulfillment: the new testaments

Christianity of the Reformation

a) Background

- Christianity is a religion whose background is firmly hinged on the principles of election and messianism of Old Testament Judaism.
- According to this conviction of the background of Christianity the God, Yahweh, had at mount Sinai adopted the people of cored as his own people through a special covenant.
- The terms of this covenant
- The terms of this covenant are known today as the ten commandment or Decalogue
- Both dynasty and kingdom came to an end whom the Babylonians overran Judah in 56716BC
- The great significance of election s into specific offices and role among the Israelites is that it forms the backdrop of the Old Testament messianism.
- According to Christianity, Jesus of Nazareth is that exacted messiah son of David whose coming had been foretold by the prophets
- Judaism does not recognize Jesus as the messiah, and as such it was separated from Christianity

Origin of Christianity

- It started in the early 1st century B.C when the peasant future appeared in Galilee (Palestine) preaching about a

coming kingdom which is not of this world and the moral implication of this kingdom.

- According to the bible Jesus was born in the house of Joseph a descendant of David, by his wife Mary. Under a mysterious circumstances
- The public ministry of Jesus was relatively short, about three years.
- During his period, Jesus transverse the length and breadth Judea with his 12 Apostles, teaching the people about the coming kingdom of heaven.
- The coming kingdom is the messianic kingdom foretold by the prophets and expected by all Jews.
- The official Jewry faulted Jesus as regards his messiah claims ad had him executed by the Roman authorities.
- Jesus according to Mathew 28:19 – 20 and Mark 16:16-18 the gospel to all nations

Early Christianity

- Christianity began as a movement within Judaism
- The propagation of the Christian faith among the gentiles was initially carried out almost single-handedly by Apostle Paul. Hence is called "apostle of the Gentiles"
- The first three centuries were difficult centuries for the Christian religion.
- The introduction of Christianity in any community meant a change in mental attitude and a change in world view and in priorities.
- The church faced a lot of persecution until 313 A.D when Constantine the great, the Roman Emperor was converted and the church came under the protection of the state as a result introduction of Christianity which brings about change in world view and priorities.
- The unorthodox interpretations of Christianity i.e doctrines gives rise to heresies and schisms.

Denominationalization of Christianity

- One of the greatest sources of dissension was the papacy and its claim to absolute authority in doctrinal and even political and civil matters.
- The term "pope" from which the collective noun papacy is coined, is used for the bishop of Rome.
- The doctrinal systematization of primacy of Rome took place between 336 A.D (Pope Damasus) and 461AD (Pope Leo 1)
- The issue of primacy had split Christianity into two in the 11th century giving rise to Roman catholic church in the west and Orthodox churches in the East.
- The Luther's revolt can be said to have enhanced the present – day phenomena, where Christianity is made up of a multiplicity of denominations.
- Luther's revolt stems from the decadence and moral depravity existing in the church.
- Luther was Augustinian Monk, his revolt against church began in 1517 with his initial contention with Rome.
- Luther's successful revolt against the church became a catalyst for the breakaways of Christian churches e.g Lutheranism Germany, Anglicanism in England, Calvinism in Geneva etc

Christian doctrines

- It results from the unanimous interpretations of the apostolic teachings.

- The increases of the interpretations of doctrines led to schisms
- The Christian bible stands as the sources of Christians faith.

Belief about God

- The dynamism of the concept God by Christian goes back the Old Testament.
- The monotheistic Yahwism reveal to Moses on mount Sinai "stresses the fact that God essentially the creator, the owner of the universe.
- The old testament God manifests a number of attributes the most important of which are his transcendence and in personality.
- According Exodus 3:14 God as a person is the I am who I am.
- God spoke to Moses face to face as a man speaks to his friend (Ex. 33:1)
- That father - son relationship between Jesus and God became the Corner stone of the messianic mission of Jesus.
- This father – son relationship became the prototype for the relationship of Christians to God.

Belief about Christ

- Jesus Christ is incarnated as the son of God. Sent to procure salvation for mankind through his death and resurrection.
- The belief in Jesus makes the different christians and Judaism clear.
- It is believed that he will come again at the end of time as judge to the whole world.
- Jesus Christ had two natures, divine and human.

Holy Trinity

- It is conceived that the holy trinity consist of a three persons, God the father, God the son, and God the Holy spirit.
- The Christian God remains one undivided simple God, last having three persons.
- The problem here has been to affirm a monotheistic God within the content of Trinitarian theology.

The doctrine of man

- Human beings standard in utter dependency to God
- They are created in the image and likeness of God
- God created man with the possession of free will.
- It become free for humans to remain loyal to God given their free will ability.
- Adam and Eve were the first human Christianity recorded.
- The disobedience of Adam and Eve is accepted as the origin of sin.
- According to Augustine, humanity that since Adam and eve been under a course of peccatum originale (original sin) while had infected all human beings except Jesus.

Christian soteriology

- It appears that God in his infinite mercy resolved to reconcile man to himself.
- God reconciled man to himself by sending his son, Jesus Christ.
- This reconciliation was achieved by Jesus and has been described in many ways. According to Mathew 20:28, Christ have him life as ransom for many.

- For Anselm (1033-1109) Christ, on behalf of man through his death, made satisfaction for sin which God's justice demanded.

JUSTIFICATION

- Based Martin Luther, protestant theology has emphasized faith and grace as the basic if not the only ingredient for justification.
- Roman catholic Christianity insists an ethical and moral life is an indispensable element in individuals justification.
- Modern evangelical movement added that one needs to be "born – again" according to John 3:3,5 and the receiving holy spirit according to Acts 2:1-4 is important to be totally saved.

Christian worship.

- Christianity believe a community can be bound together by common worship of God
- The communal worship is embodied in the celebration of the sacraments.
- Sacrament have been identified as the external sign of inward grace
- The Roman catholic church recognizes seven sacraments, baptism, confirmation, the Eucharist, penance, extreme unction, holy order and matrimony
- The Eucharist is the primary sacrament and the centre of Christian worship and it is believed to have been instituted by Christ at the last supper.
- The sacrament celebrated by all Christians in one form or the other.
- Eucharistic meal is a meal doctrine of transubstantiation
- The protestant church rejects the doctrine of transubstantiation.
- Discussion on baptism centers on whether it should be by immersion or by aspersion and whether or not infant should receive it.

Doctrine of the last things

- Christian eschatology is informed by a number of factors of juristic, messianic, pronouncements of Jesus Christ the teaching of Paul and the vision of John the Apostle's documents in the book of revelation.
- According to Jesus in Mark, the world will be preceded by a series of moral, civic and natural catastrophes after which the Christ second coming will take place.
- Paul states that faithful Christians who had already died would resurrect and together with the living ones would join Jesus during rapture.
- The second coming of Christ will be preceded by moral doctrinal anarchy.
- John's book of revelation states that the returned Christ will rule with resurrected Christians for a thousand years before the final end times.
- According to Mark, all dead would reappear and present themselves before Christ to be judged by him in the end time.
- The good people/ Christians will be admitted to the kingdom of heaven while the wicked ones will be ousted into hell with Satan to be punished forever.

The church

- Various terms are used to refer to local in old testament some are Kraal Yahweh (Assembly of Yahweh), Qahal ha Edo him (Assembly of God) and Quhal am has Elohim (the assembly of the people of God)
- In Judaism, concept of Malkuth Shamaim (means the kingdom of heaven).
- The new term church has come to supersedes the earlier Israelites etymologies
- A church is used as the translation of the Greek ekklesia, but different from it.
- Church originated from the Byzantine Greek "Karika" meaning "belonging to the Lord"
- Ekklesia literally means "those summoned together"
- Ekklesia is the Greek translation of the Hebrew "qahal"
- It is believed in holy catholic church that the communion of saints is one of the integral component of the Christian faith
- As a mystical entity, the church is a spiritual organization incorporating the saints of God both dead and living. Christian is the head of the church and the saints the body of the church
- Denominationalism in Christianity is behind the lack of consensus as regards the nature of the church.
- Dies Irae according to latin theologians means "Day of anger".

CHAPTER FOURTEEN

INTRODUCTION TO ISLAMIC LAW IN NIGERIA

- Islamic Law is one of the sources of law in Nigeria
- Islamic Law is otherwise known as "Shariah law"
- "Shariah" can be construed in both linguistic and legal senses.
- In its linguistic sense, shariah means the path that leads to the spring where drinking water is fetched.
- In its legal sense, shariah means the ordinances i.e rules and regulations, ordained by Allah (God) for his creatures.
- From jurisprudential point of view, law is construed either from positivistic sense or natural school of thought.
- According to John Austin (A proponent of positivism), law is that rule which is made by man and is backed up by sanction.
- According to Thomas Aquinas (Natural school of thought) law is divisible into "LEX ETERNA" (external law): LEX DIVINA (DIVINE LAW): LEX HUMANA (HUMAN LAW) and LEX NATURALIS (natural law)
- Shariah is the path to be followed and canon law of Islam.
- Sources of Islamic law: Principal / primary sources and secondary sources.

- Principal/ primary sources includes; the Qur'an and the sunnah
- Secondary sources includes; Ijma, Qiyas, Ijtihad, Istihsan, Istishab and Urf.
- The first and chief primary sources of shariah (Islamic law) is the Holy Quran.
- Other names of the Quran are Al – Huda (The guidance for mankind); Al – Dhikr (Constant reminder); Al – Hikmah (divine words of wisdom) and Al – Furqon (the criteria to choose between the truth and the falsehood) .
- Jurists have recorded about 500 verses which have legal provisions.
- Quran is divide into 114 chapters and contains 86,430 words(Wikipedia; 77,430 words) and 327,293,320,015 letters of the alphabets.
- Quran has a total number of 6666 verses (Wikipedia; 6236 verses) and divided into 30 convenient parts (JUZ) and is further divided into 60 sub- parts (HIZB).
- The Quran was revealed in piecemeal within a period of 22 years, 2 months and 22 days.
- The first revelation of the Quran began on the 15th night of the month of Ramadan in the 41st year of the prophet's life in the cave of Hira. (Prophet Muhammad S.A.W).
- The last verse of the Quran was revealed on the 9th Dhul Hijjah in the 10th year of Hijra, the 63rd year of the prophet's life(prophet Muhammad S.A.W)
- The shortest chapter is suratul kawthar contains 3 verses.
- The longest chapter is suratul baqarah contains 286 verses
- The second chief source of Islamic law is the Sunnah
- There are about 4000 prophetic pronouncements.
- Sunnah is the sayings, deeds and the silent approvals of the Holy prophet of God.
- Sunnah is also known as Hadith and sometimes referred to as the "Hidden revelation" (Wahy Khafi).
- The six (6) books of hadith containing various tradition of the Holy prophet are:
 - The Sahih of AL – Bukhari (256 A.H = 870 A.D)
 - The Sahih of Muslim (261 A.H = 875 A.D)
 - The Sunan of Abu Daud (275 A.H = 888 A.D)

- The Sunan of Ibn Majah (279 A.H = 892 A.D)
 - The Jami of al – Tirmidhi (279 A.H = 892 A.D)
 - The Sunan of Al – Nasai (303 A.H = 915 A.D)
- Distinguishing authentic traditions from the weak ones; use the test of authenticity which are “ISNAD and MATN”.
- The Holy Quran advocates, in chapter 59 verse 7, the acceptance of Hadith as a sources of law in Islamic legal system.
- “Ijma” means the consensus of opinion of the jurist on various Islamic matters.
- “Ijma” as a source of law is backed up in the Holy Quran in chapter 4, verse 114.
- The Arabic language has 28 base letters and a few extra letters/representations.
- There are two broad kinds of IJMA;
- The first, being the consensus of the companions of the prophet in solving any problem after the death of the Holy prophet and there was no express provision of the Quran or Hadith (Sunnah) dealing with the issue.
- The second, being the consensus of the jurists in dealing with a problem on which the Quran and Sunnah are silent and there is no Ijma of the companions.
- Ijma could also be divided into 3 (three) categories namely;
- Verbal consensus of opinion (Ijma al – Qawl)
- Consensus of opinion on an action (Ijma al – fil)
- Silent consensus (Ijma al – sukut)
- IJMA could also be sub – divided into:
- Regular consensus of opinion (Ijma al azimah)
 - Irregular consensus of opinion (Ijma al Rukhsah)
- Qiyas means the individual juridical opinion of jurist derived from analogical deductions.
- Linguistically, Qiyas means comparison.
- The four components of Qiyas are;
- i. ASL – the root to which analogy is made i.e original provisions in the Quran and sunnah

- ii. FAR – the branch for which analogy is made i.e new matter for which solution is sought.
 - iii. ILLA – the basis or reason for which analogy is made
 - iv. HUKUM – the judgment to which analogy normally leads
- IJTIHAD means an extra effort or an exercise to arrive at the jurists own judgment, taken into consideration all the general knowledge of Islamic law possessed by him.
- The application of Islamic law in the geographical boundary called Nigeria dates back to 11th century, when in 1086 AD, the ruler of Kanem empire called Hume and also Abdul Jalil applied Islamic laws in his court.
- The various courts having jurisdiction over Islamic related matters are area courts, shariah court of appeal, the court of appeal and the supreme court.
- The area court edict in 1968 replaced the native courts with area courts.
- Appeals from the area courts go to either the sharia court of appeal or the high court of justice of the state.
- From 1979 to date, the jurisdiction of shariah courts of appeal has been restricted to the Muslim family law matters.
- In 1999, August 9, Zamfara state government reversed the trend when it enacted the sharia court law.
- In respect to the 1999 constitution of the federal republic of Nigeria; the sharia court of appeal of the state shall consist of:
- (a) A grand kadi of the shariah court of appeal
 - (b) Such number of kadis of the shariah court of appeal as may be prescribed by the house of assembly of the state.
- The appointment of a person to the office of a kadi of the Shariah court of appeal of a state shall be by the governor, on the recommendation of the national judicial council and confirmation by the state house of assembly.
- A person to be appointed to hold office of a kadi of the shariah court of appeal must be a legal practitioner and has been so qualified for not less than 10 years.
- In respect to the 1999 constitution of the federal republic of Nigeria; The sharia court of appeal of the federal capital tertiary (FCT) shall consist of;
- (a) A grand kadi, appointed by the president, on the recommendation of the national judicial council and confirmation by the senate.

- (b) Such number of kadis of sharia court of appeal as may be prescribed by an act of the national assembly
- Appeal on Islamic matters lies from the shariah court of appeal to the court of appeal.
- The court of appeal shall consist of a president and such number of justices of the court of appeal not less than forty – nine (49) of which not less than three (3) shall be learned in Islamic personal law and not less than three (3) shall be learned in customary law, as may be prescribed by an Act of the National Assembly.
- The supreme court of Nigeria is the final arbiter on disputes to which Islamic law is applicable.

CHAPTER FIFTEEN

SOCIAL RESPONSIBILITIES

- The concept of social responsibility or its allied concept refers to consideration of social effects.
- Social responsibility encourages enterprises to be more socially conscious and to adopt a higher level of management ethics.
- Social responsibility and social accountability can be used interchangeably.
- Social responsibility was the term used to assert or assign leadership responsibility of the businessman with respect to the support he gives to the society as a trustee of any business or religious organization.
- The traditional approach was dropped from earlier concentration on social responsibility of business men/ women, such that the greater emphasis was put on what business men/ women should be doing or might contribute outside of business hours or more importantly outside of their business.
- The concept social responsibility can be analyzed from the classical period to modern times.
- We have the classical position, non – classical view and the modern view.
- Classical position focuses on the profitability of the business and does not look beyond that.
- Neo – classical approach set limits to social responsibilities and makes business and businessmen fit themselves to social and community values.
- Modern view emphasizes on what business should or might do to tackle and solve problems of society, mostly social problems.
- The nature and methodology of social responsibility can be classified divided into two which are:
 - cases in social responsibility

- Impact of social responsibility
- Societal and ethical issues in social responsibility are closely related and similar in meaning and consequences.
- Social issues include:
- People oriented philosophy
 - Neglected majority
 - Ecology and environmental protection
- **PEOPLE ORIENTED PHILOSOPHY:** This involves inability of firms or organization to meet the needs of its human resources in order to meet its objectives.
- **NEGLECTED MAJORITY:** This emphasize on the inability of firms whose activities bring about negative externalities and their inability, preparedness, or negligence to cater it. (Negative externalities are negative effects of production activities on the part of industries to their stakeholders).
- **ECOLOGY AND ENVIRONMENTAL PROTECTION:** inability of firm to maintain an ecologically sound environment.
- Social responsibility can be evaluated using
- Cost benefits criteria
 - Share of national output
 - New development.
- We have gotten to a time when consumers are becoming activist, willing to take action against what they see as abuses in the business system.
- Ralph Nader was reported to have done more than anyone else to attract public attention to consumer complains.
- An excellent description of consumer rights was put forth by president John, K. Kennedy in 1962 where he outlined the following:
- The consumer has the right to safety
 - The consumer has the right to be informed

- The consumer has the right to choose
 - The consumer has the right to be heard
- The methodology and reasons for social responsibility in any society can be divided into two:
- Responsibility from social impact of the participants
 - Responsibility arising from the problem of the society itself.
- The two major reasons for social responsibilities in any system are:
- The impact of that institution on the society
 - The possibility of solving the problems of the society
- Peter Drunker opined that "impact is the business of management".
- Impact was considered a nuisance by "Peter Anuler"
- The necessary caution for managing impact is an essential component of "responsibility analysis" among which are :
- Social responsibility should be based on cost benefit criterion.
 - Conversion of possible negative impact to opportunities
 - Development of appropriate technology.
- Public relations function of management is concerned with the establishment of sound and mutually fruitful relations with the different 'public'
- Corporate image is that which the organization build up over a period of time in the minds of the community at large
- More publicity cannot do the trick things which are the "object" and the "mirror"
- A business has to take two major steps to develop the desired image through a PR programme. They are:
- Development of organizational policies and behaviour which can provided a solid pedestal for the organizational image to stand upon,
 - Communicating to the public's the organization services to the society through various media.
- We have the "three (3) cautionary rates of a business"- They are;

- Business irresponsibility
- Business of greed
- Business of incompetence
- Milton Friedman of Chicago have argued that business is an economic institution that should stick to its economic tasks.
- Ethics in social responsibility in plan terms implies being devoid of cheating, stealing, lying, bribery etc.
- Managers have an ethical responsibility to take an active and constructive role in their community.
- There are exceptions to ethical regulations among which are the:
 - Community managers
 - Leadership groups but not leaders
 - The leadership
 - Premium non nocere “above all not knowingly to do harm”

CHAPTER SIXTEEN

THE BEGINNING, GROWTH AND TRANSFORMATIONS OF SCIENCE

- Modern science in Europe began in a period of great upheaval.
- The protestant reformation, the discovery of the Americans by Christopher Columbus, the fall of Constantinople, the Spanish inquisition, and also the rediscovery of Aristotle in the twelfth and thirteenth centuries presaged large social / political change.
- Scientific doctrine became questionable in much the same way Martin Luther and John Calvin questioned religious doctrine.
- The works of scientists such as Ptolemy (astronomy), Galen (medicine), Aristotle (physics), Vesalius (human cadavers) all contributes to scientific discovery.
- The willingness to question previously held truths and search for new answers resulted in a period of major scientific advancement, known as the scientific revolution.

- Scientific Revolution begun in 1543, when De Revolutionibus was first printed.
- Nicolaus Copernicus an astronomer was the one that came up with book De Revolutionibus.
- The thesis of De Revolutionibus was that earth moved around the sun.
- The publication of the philosophiae naturae principia mathematica was done in 1687 by Isaac Newton
- In philosophy, major contributions were made by Francis Bacon, Sir Thomas Browne, Rene Descartes and Thomas Hobbes
- Other significant scientific advances were made during this time by **Galileo Galilei, Edmond Halley, Robert Hooke, Christiaan Huygens, Johannes Kepler, Gottfried Leibniz, and Blaise Pascal.**
- Those that engaged in Natural philosophy were known as Natural philosophers.
- Natural philosophy is an inquiry into the workings of the universe.
- Bertrand Russell's history of philosophy gives a good account of the historical development of natural philosophy
- Until the period of the scientific revolution, the utility of experiment was unproven.
- In prehistoric times, advice and knowledge was passed from generation to generation orally.
- The development of agriculture allowed for surplus of food and makes it possible for early civilizations to develop.
- Western Europe's knowledge was concentrated in monasteries.
- As a result of the loss of the western Roman Empire much of Europe lost contact with the knowledge of the past.
- The Byzantine Empire still held learning centers such as in Alexandria and Constantinople
- Nicolaus copernicus *revived* the heliocentric model of the solar system first devised by Aristarchus of Samos.
- Kepler in the early 17th century proposed that the planets follow elliptical orbits
- Galileo pioneered the use of experiment to validate physical theories.
- Newton's laws of motion lead to classical mechanics.
- Newton's law of Gravitation describes the fundamental force of gravity
- Beginning in 1900, Max Planck, Albert Einstein, Niels Bohr and other developed quantum theories to explain various anomalous experiment result.

- The theory of general relativity was proposed by Einstein in 1915
- In 1925, Werner Heisenberg and Erwin Schrödinger formulated quantum mechanics which explained the preceding quantum theories.
- The observation by Edwin Hubble in 1929 that the speed at which galaxies recede positively correlates with their distance, led to the understanding that the universe is expanding which led to the formulation of the **Big Bang** theory by George Gamow
- The invention of cyclotron was done by Earnest O Lawrence in the 1930s.
- Physics in the postwar period entered into a phase of what historians have called "Big science"
- The history of chemistry begins with the distinction of chemistry from alchemy by Robert Boyle.
- It can also be dated to Antoine Lavoisier's discovery of oxygen and the law of conservation of mass which refuted.
- Proof that all matter is made of atoms, which are the smallest indestructible part of matter was provided by John Dalton in 1803.
- John Dalton formulated the law of mass relationships.
- In 1869, Dmitry Mendeleev composed his periodic table of elements on the basis of Dalton's discoveries.
- The synthesis of Urea by Fredrich Wohler opened a new research fields in chemistry
- The later part of the nineteenth century saw the exploitation of the Earth's petrochemical, after the exhaustion of the oil supply from whaling.
- Linus Pauling authored the book "The nature of chemical bond" which used principles of quantum mechanics to deduce bond angles
- Miller - Urey experiment demonstrated in a simulation of primordial processes that basic constituents of DNA, simple amino acids, could themselves be built up from simpler molecules.
- Advances in astronomy and in optical systems in the 19th century resulted in the first observation of an asteroid (Ceres) in 1801.
- Neptune was discovered in 1846.
- George Gamow, Ralph Alpher and Robert Herman had calculated that there should be evidence for a big bang in the background temperature of the universe.

- The discovery of a 3 kelvin background hiss in Bell Labs radiotelescope by Arno Penzias and Robert Wilson formed the basis for number of result that helps determine the age of the earth.
- Supernova SN1987A was observed by astronomers on earth both visually and in a triumph for neutrino astronomy, by the solar neutrino detectors at Kamiokande.
- In 1847, Hungarian physician Ignac fulop Semmel Weis dramatically reduced the occurrence of puerperal fever.
- Semmelweis discovery predated the germ theory of diseases.
- Josepha Lister (1865) proved the principles of antisepsis (a septic techniques)
- Louis Pasteur was able to link micro organisms with diseases, revolutionizing medicine.
- Pasteur invented the process of pasteurization
- The British naturalist "Charles Darwin" propounded the theory of evolution by natural selection in his book on the origin of species in 1859.
- Gregor Mendel discovered the inheritance law in 1866 which was rediscovered in 1900.
- In 1953 James Watson and Francis Crick clarified the basic structure of DNA
- The DNA is the genetic material for expressing life in all its forms
- Based on Shenkua (Chinese polymath) observation of fossils in a geological stratum in a mountain hundreds of miles from the ocean, he deduced that land was formed by erosion of the mountains and by deposition of silt.
- In 1811, Georges Cuvier and Alexander Brongniart published their explanation of the antiquity of the earth, inspired by Cuvier's discovery of fossil elephant bones in Paris.
- Georges Cuvier and Alexander Brongniart formulated the principle f stratigraphic succession of the layer of the earth.
- Charles Lyell's principles of geology reiterated Hutton's Uniformitarianism which influenced Charles Darwin.
- Plate tectonic theory arose out of two separate geological observations; Seafloor spreading and continental drift.
- The word "mathematics" comes from Greek (Mathematikos) means "fonds of learning"
- The oldest mathematics text discovered so far is the Moscow papyrus which is an Egyptian Middle kingdom papyrus
- Thales used geometry to solve problems while Pythagoras stated the Pythagorean theorem.

- In China from the 12th century BC, the oldest mathematical work to survive the book burning in China is the I Ching.
- Before the earliest written records, paleontologists have discovered Ochre rocks in a cave in South Africa adorned with scratched geometric pattern dating back to more than 70,000 years.
- Predynastic Egyptians of the 5th millennium BC pictorially represented geometric spatial designs
- The Indus valley civilization in Pakistan North India Circa 3000Bc developed a system of uniform weights and measures.
- In Mesopotamia, more than 400 mathematics texts have been discovered, inscribed in cuneiform on clay tablets, most of which were written by the Babylonians
- The tablet Plimpton 322 contains numbers that seem to have been used to calculate Pythagorean triples.
- The earliest known mathematics in ancient India dates back to 3000BC with the Indus Valley civilization.
- One of the greatest writing in India was the Brahmi script with controversial discovery dates.
- Some scholars, such as Georg Buhler, date the Brahmi script was developed in 5th century BC, others from the Maurya Dynasty in the 4th century B.C some evidence dates it to 600 BC while some scholars even suggest 1000BC.
- The Yajur-Veda composed by 900BC, first explained the concept of numeric infinity.
- Yajnavalkya (Circa 900 – 600BC) computed the value of π to 2 decimal places. —
- Pingala invented the binary number system Fibonacci series and Pascal's triangle, and also used a dot to denote zero and described the formation of Matrix.
- Greek and Hellenistic – Mathematics dates from 550BC – 200BC
- Basic Greek mathematical numbers are proof for irrational numbers, discovery of Endoxus's method of exhaustion and the sieve of Eratosthenes discovery of prime numbers; development of a comprehensive theory of conics etc.
- Some say the greatest of Greek mathematicians was Archimedes of Syracuse.
- At the age of 75, while drawing mathematical formulars in the dust, Archimedes of Syracuse.
- At the age of 75, while drawing mathematical formular in the dust Archimedes of Syracuse was run through with a spear by a Roman soldier, because the Romans had absolutely no interest in mathematics
- Chinese also contributed to mathematics between 200B – 1200AD.
- Discoveries first made in China and only much later known in the west include negative numbers, the binomial

theorem , matrix methods for solving linear equations and the Chinese remainder theorem

- Classical India mathematics took holds between 200BC - 1600 AD
- They discovered transfinite numbers, set of theory, logarithms, fundamental laws of Indices, cubic equations, quadratic equations, sequences and progression, permutations and combination, Squaring and extracting, square roots and finite and infinite power
- European Renaissance mathematics discovery was between 120 – 1600AD.

CHAPTER SEVENTEEN

THE BASIC SCIENCE: ATOMS, MOLECULES AND COMPOUNDS

- The word science comes from a latin word "Scientia" meaning knowledge.
- "Science is a human activity by which knowledge of natural phenomena accumulates from an essentially rational approach to problems.
- Observation is the answer nature gives to a specific questions formulated as a planned experiment.
- Man's total experience of living involves complementary encounters with natural phenomena and questions of human values.
- The goal of chemical science is to discover the fundamental regularities by which matter in its multitude of aggregations, interacts with energy in its many forms.
- The primary activity of science is observation.
- The scientists codify his observations into laws.
- Laws are statements of the consistencies nature displays in the proprieties and function of a matter and energy.
- Laws reflect the conviction of the scientists.
- Atoms are the smallest and indivisible particles of an element.
- Scientific knowledge accrues from observation
- Division of a chalk to its smallest stage, in which it can no longer be divided simplifies the chalk has reached its atomic stage.

- The Greek philosopher; Democritus (-460-370 BC) envisioned small, indivisible particles as the constituents of matter. They are called Atoms.
- "Atoms" represent the Greek word for "indivisible".
- The British chemist; John Dalton (1766-1844) had the idea that atoms might have different characteristic weights, but he did not abandon the idea of a solid, uniform atom.

- Dalton went further to represent atoms of different elements with symbols.
- Dalton further went to develop an explanation of several known laws of chemistry, which became known as the "Atomic Theory"
- Dalton atomic theory states thus:

- i. That atom is the smallest indivisible particle of an element.
 - ii. That atom of the same elements is alike in all respects but is different from atoms of other elements.
 - iii. Oxygen atom is different from that of hydrogen atom or any other kind of atom.
 - iv. That compound substances are formed when atoms of more than one element combine.
- There are the basic laws of chemistry which the atomic theory explains:
 - Law of conservation of mass states that matter is neither created nor destroyed in the course of an ordinary reaction, but may be converted from one to another.
 - The law of constant composition states that a compound, regardless of its origin or method of preparation, always contains the same elements combined in the same proportion by mass.
 - The law of constant composition can be related to the third postulate of Dalton.
 - The third postulate of the theory led Dalton to formulate another of the basic laws of chemistry known as the **LAW OF MULTIPLE PROPORTION**.
 - The law of multiple proportion states that when two elements combine to form more than one compound, the masses of one element which combine with a fixed mass of the other element are in a ratio of small whole numbers.
 - Nearly one hundred years were to pass before the question of whether atoms can still be broken down into smaller particles was answered.

➤ The experimental evidence as to the divisibility of atoms was pioneered by three physicists who were working independently. Their names are:

i. J.J Thompson

ii. Ernest Rutherford

iii. Robert A. Millikan

➤ From their experiments, it was discovered that atoms are made of three sub- atomic particles. Namely:

i. Electrons

ii. Protons

iii. Neutrons

➤ J.J. Thompson discovered the presence of negatively charged particles in atoms, which he called **electron**.

➤ He also determined charge to mass ratio of the **electron**.

➤ Millikan determined the charge on the electron discovered by J.J Thompson through his oil drop experiment.

➤ Rutherford discovered the presence of positively charged particles in an atom, which he called **PROTON**.

➤ Rutherford was able to establish that an atom contains a tiny positively charged, massive centre called **ATOMIC NUCLEUS**

➤ **NEUTRONS** were discovered by "James Chadwick" who happens to be one of Rutherford's collaborators.

➤ A young Danish Physicist; **Niels Bohr** who came to work in Rutherford's laboratory developed a model. His model of atom was a rare imagination. He proposed that the electrons in an atom moved in circular orbits just as the moon or a man - placed satellite is in orbit around the earth.

➤ In the 1920s and 1930s, a number of mathematical descriptions emerged from the need to understand Bohr's Quantum model.

➤ Werner Heisenberg discovered that it was not possible to determine simultaneously both the position in space and momentum of an electron.

➤ Momentum is mass multiplied by speed ($M \cdot V$).

➤ The atoms of all elements are built up from the three sub - atomic particles (Protons, Neutrons, Electrons)

➤ The number of protons in the nucleus of an atom is a fundamental property of the corresponding element known as

its ATOMIC NUMBER (Z).

- The **MASS NUMBER** of an element is the number of proton, plus the number of neutrons.
- The number of proton must not necessarily be equal to the number of neutron.
- In a neutral atom, the number of proton must be equal to the number of electrons for it to be neutral.
- If it is not neutral, the atom will carry a charge known as **ION**.
- If the number of electrons is more than that of the proton, the atom will carry an overall negative charge, called **ANION**.
- If the number of electron is less than the proton, the atom will have an overall positive charge, which is called **CATION**
- The energy required to remove an electron from an atom to form a cation is called **IONISATION POTENTIAL**.
- The farther away an electron is from the nucleus, the easier it is to remove, and the lower the ionization potential.
- Atoms of the same element with different masses are called **ISOTOPES**.
- All the isotopes of one particular element have the same atomic number because they have the same number of protons, but they have different mass numbers because they have different numbers of neutrons.
- **MOLECULES** are the smallest part of an element which can exist alone under ordinary conditions.
- Molecules can be regarded as small group of atoms held together by relatively strong forces called chemical bonds.
- **COMPOUND MOLECULAR SUBSTANCE** and **ELEMENTARY MOLECULAR SUBSTANCE** are the two types of **MOLECULES**
- Compound molecular substance is formed between two or more atoms of different elements.
- Elementary molecular substances are formed between two or more atoms of the same element.
- Compounds are substances formed when two or more elements are chemically joined.
- With more information to the structure of matters, some of Dalton's theory was modified and or totally discarded.
- The statement that atom is indivisible was discarded with the discovery of sub – atomic particles.
- The statement that atoms of the same element are alike in all respects was also proved wrong by the **Isotopes Phenomenon**.

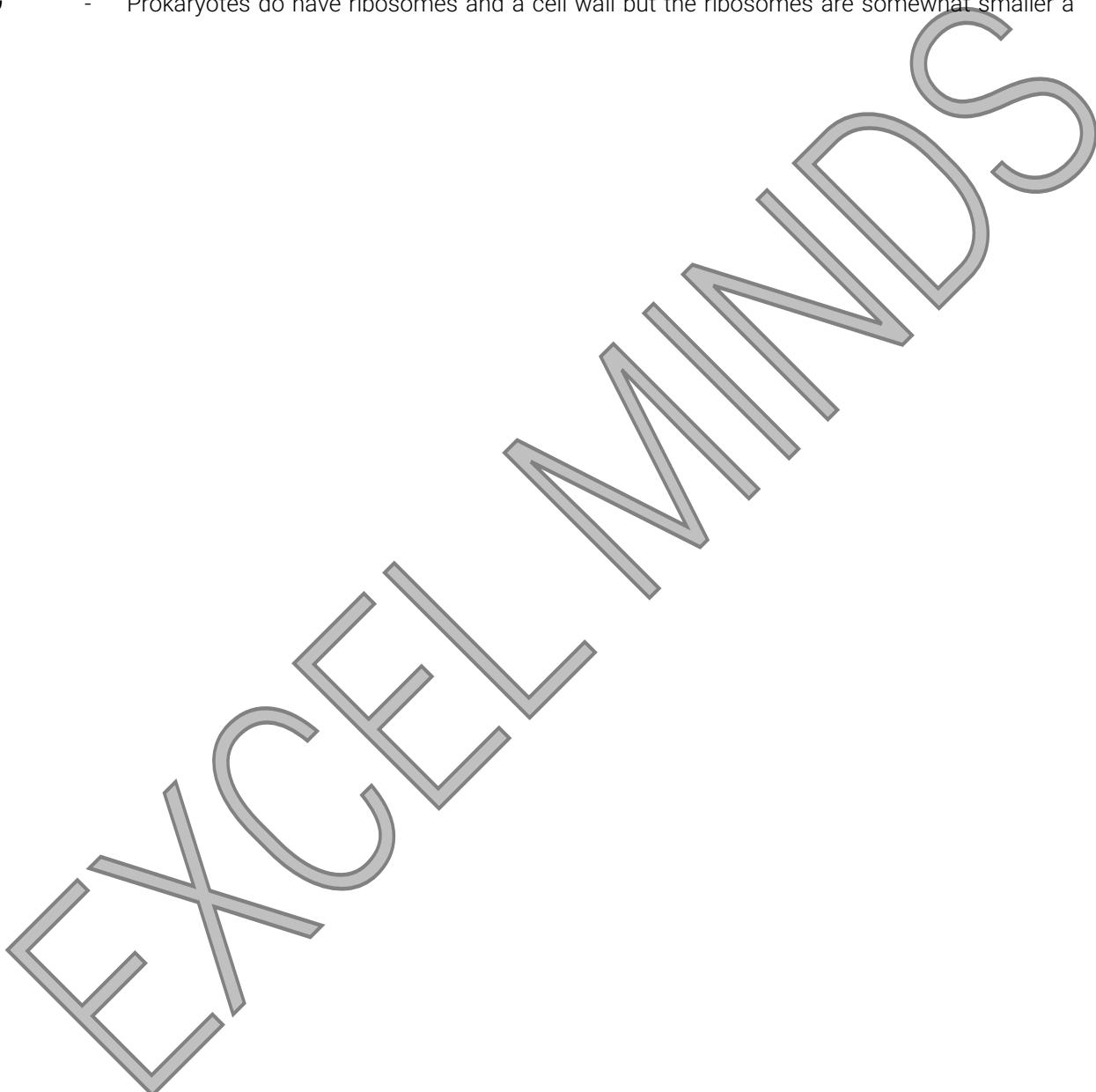
CHAPTER EIGHTEEN

CHEMISTRY OF LIFE

- Prior to the development of the compound microscope by Jenson in 1590 and use by Leuwenhoek between 1650 to 1700, no observer recorded any comments on the nature of the substance to which the property of being alive is now attributed
- Leuwenhoek concluded that there exists a living substance which he described as living Jelly which be associated with animate objects.
- In 1665, Robert Hooke coined the term cells, for the box like structure he formed in the sections of plant material
- In 1835, 170 years later, Dujardin, French students of microscopic animals named their body "sarcode" and described it as "a substance raised translucent, homogenous, elastic and contractile".
- In 1838, Malthias Schielden and Theodor Schwann (Botanist and Zoologist enlarged on a "cell theory" previously conceived by Turpin in 1826. This theory states:
 1. That the cells are the fundamental unit of life and
 2. That all organisms are made-up of or more cells.
- Also it was added that cells arises only division of other cells (pre existing cells)
 - Cells vary considerably in size, most plants and animals are every small between 5 and 40nm in diameter. Most cells can be seen only with the aid of microscope such as electron microscope and light microscope.
 - Many organisms are unicellular (made up of one cell while some are multi cellular (composed of many cells).
 - Organelles are structures within a cell that takes part in carrying out the cells life functions.
 - All cells are made up of three universal component:

- Cytoplasm
 - Plasma membrane and
 - A nucleus
- A cell can be defined as an object that possesses at least two (2) major components of the machinery of life. They are:
1. The information machinery: Stores, distributes, and get rid of wastes and also reproduce the information that control the process of life
 2. Energy transduction machinery: Changes energy from one form to another stores it and distributes it to run the processes of life.
- There are some organelles that are unique to plant tissues such as carbohydrate-rich cell wall, plasmodesmata chloroplasts and large vacuoles.
 - The cell wall is a thick polysaccharide. The plant cells have their walls fused tighter by a layers called middle lamella, the cell wall serves both as a protective and supportive functions for the plant. It also aids regulation of materials in and out of the cell.
 - Plasmodesmata: These are interrupting cytoplasmic bridges. The channels serve in intercellular circulation of materials.
 - Chloroplast: The process termed photosynthesis (using light to produce energy) is carried out in this organelle. The outer membrane is smooth and continuous, the inner is an extensive parallel infolding called lamellae, with a matrix called the stroma.
 - Vacoules – the Vacoule membrane is called tonoplast. It holds stored food, anthocyanin pigments, salts and other substance inside the vacuole. It segregates toxic substance from the rest of the cell.
 - Lysosome: first discovered in rat liver cells in 1952. It is a membrane bound sac full of hydrolytic enzymes that is often involved in degradation of intracellular structure and substances.
 - Lysosome is the suicide bag of the cell
 - Centrioles: Two centrioles are present outside the nucleus in most eukaryotes. They are cylindrical in shape made up of groups of microtubules with 3 microtubules in each group. The centriole gives rise to basal body.
 - There are 2 basic type of cells "prokaryotic and eukaryotic cells"
 - Eukaryotic cells contain membrane bound organelles that are not found in prokaryotic cells.

- Prokaryotic cells do not contain membrane bound organelles and most carry out all the essential life processes without them.
- Prokaryotes are mainly the bacteria and archaea, while the protists (unicellular) and multicellular organisms such as plants, fungi and animals are eukaryotes
- E G - Prokaryotes do have ribosomes and a cell wall but the ribosomes are somewhat smaller a



EXCEL
MANND'S

- Endoplasmic reticulum function in membrane synthesis and also for the synthesis of protein and lipids for cell organelles and for exportation
 - Function in detoxification reaction
 - Golgi apparatus / complex is a network of flattened membranes and vesicles responsible for the secretion to the external environment of variety of protein synthesis on the ER.
 - The functions are modification and sorting of protein for incorporation into organelles.
 - Lysosome enzymes are able to split molecules into simple low molecular weight compounds, which can be utilized by metabolic pathways of the cell.
 - It catalysis the hydrolytic cleavage of C-O, C-N, C-S, O-P bonds in proteins, lipids and carbohydrate.
 - Peroxisomes is small organelle ($0.3\text{-}1.5\mu\text{m}$ in diameter)
 - It protects itself from the toxicity of H_2O_2 (Hydrogen peroxide) by utilizing it and converting it to water and oxygen.
 - It also aids oxidative reactions molecular O_2 .
 - Cytosol being the least strucyure is where most of the multiplicity of chemical reactions of metabolism occur
 - The microtubules and microfilaments help to cause cytoplasmic streaming and cell movement
 - They may account for the various contraction of muscle cells
 - The eukaryotic cell is made up of membrane bound nucleus, endoplasmic reticulum, golgi complex, lysosome, mitochondria, vacuoles which are all absent in eukaryotes
 - The prokaryotes and eukaryotes both contain plasma membrane, ribosomes, cell wall(some cases) and chromosomes
- BIOMOLECULES**
- Biomolecules are simple organic compounds from which living organisms are constructed which are present as an essential components of life
 - Biomolecules includes carbohydrates, proteins, enzymes, fatty acids, nucleic acids, histones, chlorophyll, hemoglobin.
 - Polymers are large organic molecules of cells associated with cell structure and are composed of

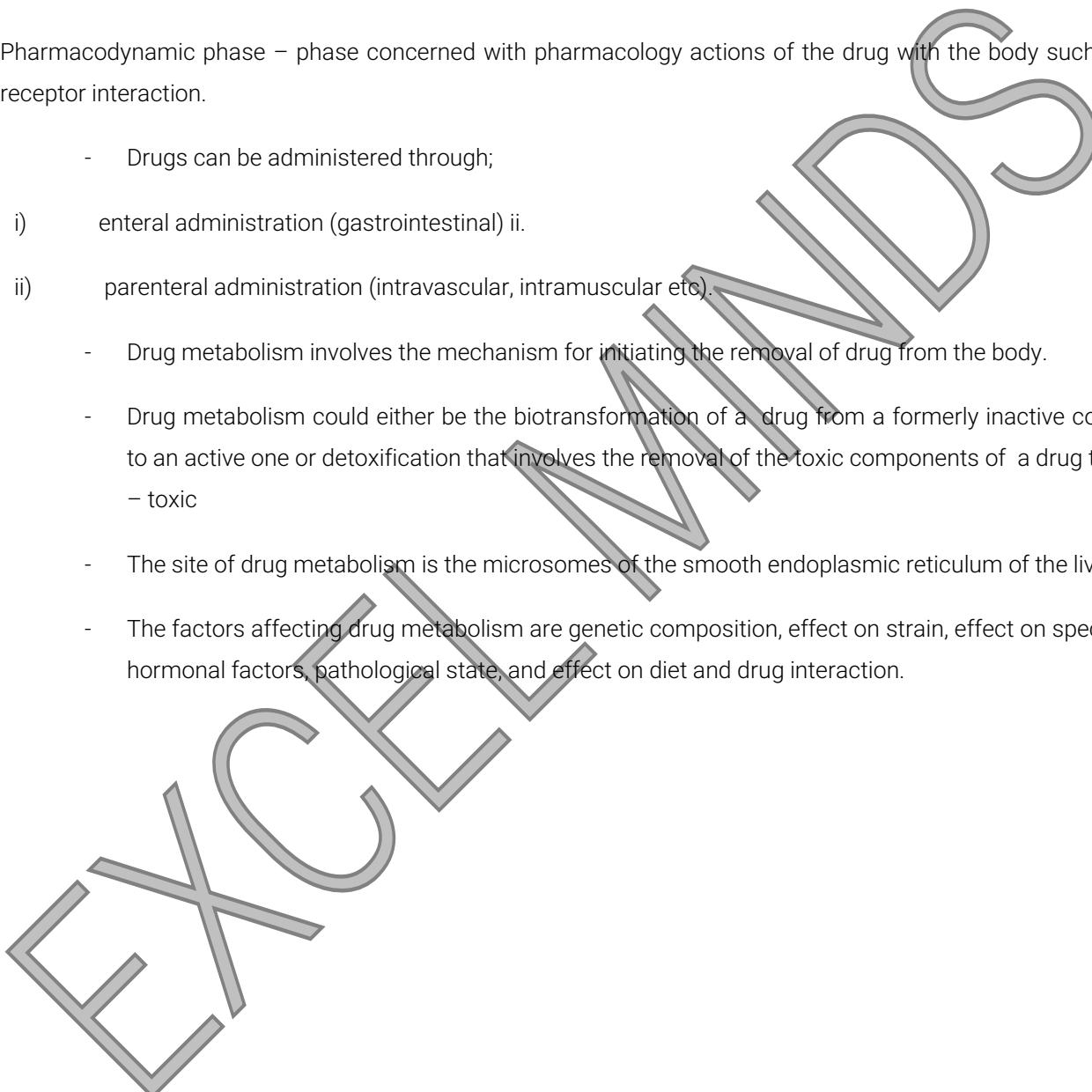
smaller yet similar individual units called monomers.

- Amino acids are the monomers of proteins
- Nucleotides are the monomers of nucleic acids
- Monosaccharides are the monomers of complex carbohydrates
- Carbohydrate general formula is $C_n(H_2O)_n$
- They are also called saccharose
- The most important and abundant example is glucose, where n is 6 C₆H₁₂O₆
- Carbohydrates may be defined as carbonyl derivatives of polyhydric alcohols
- The smallest carbohydrates are called monosaccharides, which can be linked to produce more complex molecules called polysaccharides
- The monosaccharides are aldehydes or ketones depending on whether the carbonyl (CHO) is at carbon 1 or at carbon 2 and they are normally called aldoses and ketoses respectively.
- Disaccharides are usually composed of two molecules of hexose-monosaccharides.
- The most frequently encountered disaccharides are lactose, sucrose and maltose which have the same molecular formula. C₁₂H₂₂O₁₁.
- They are formed by the union of two monosaccharides with the elimination of water.
- Polysaccharides consist of many units of monosaccharides linked together to produce high molecular weight compound that ranges in size from 10,000 to 4,000,000.
- Examples of polysaccharides are starch, pectin, cellulose, glycogen and dextran.
- Lipids are a very diverse group of organic compounds.
- They are generally classified as esters of fatty acids, that are soluble in non polar solvents but insoluble in water
- Lipids can be classified as Acylglycerols, phospholipids sphingolipids, steroids and terpenoids, waxes, fatty acid derivatives
- Acylglycerols are fatty acids ester of alcohol glycerol.
- Phospholipids possess one two acyl groups and phosphodiester group on the third hydroxyl

- Sphingolipids are complex lipids containing as their backbone sphingosine or a related base.
- Steroids and terpenoids are derivatives of the saturated tetracyclic hydrocarbon (per hydrocyclo pentano phenanthrene ring).
- Waxes are water – soluble, solid esters of higher fatty acids with long chain fatty alcohols.
- Prostaglandins are a family of fatty acid derivatives which have a variety of biological activities of hormonal or regulatory nature.
- Nucleic acids are components of all living cells as well as cellular viruses, which can be DNA and RNA.
- Each type is made up of classes of nitrogenous bases called purines and pyrimidines plus pentose phosphates.
- Adenine, Guanine, cytosine and Thymine are found in DNA.
- Adenine, Guanine, cytosine and uracil are the nitrogenous bases found in RNA.
- Proteins are high molecular weight polymers, consisting of amino acids linked by peptide bonds.
- Proteins can either be simple or conjugated proteins.
- Based on their structure, there are four levels – primary structure, secondary structure, tertiary structure and quaternary structure.
- Enzymes are organic catalysts that speed up chemical reactions.
- Enzymes are classified into 6 major groups which are oxidoreductases, transferases, hydrolases, lyases, isomerases and ligases.
- Enzyme concentration, substrate concentration, temperature, pH and inhibitors are all factors affecting enzyme activity.
- Genes are the genetic materials in most forms of life.
- DNA can be reproduced by replication, DNA can be changed to RNA by Transcription, which RNA changes to protein through translation.
- The specific action of genes is to control specificity in protein synthesis.
- Carbohydrates, lipids, and the carbon skeletons of amino acids, all serve as fuels for human metabolism.
- Drugs are exogenous compounds, which are administered to the body for their therapeutic use.

pharmacological effects.

- Drug action has been conveniently divided into phase. That is:
- Pharmaceutical phase – formulation of blood
- Pharmacokinetic phase – distribution via blood
- Pharmacodynamic phase – phase concerned with pharmacology actions of the drug with the body such as drug receptor interaction.
 - Drugs can be administered through;
 - i) enteral administration (gastrointestinal) ii.
 - ii) parenteral administration (intravascular, intramuscular etc).
 - Drug metabolism involves the mechanism for initiating the removal of drug from the body.
 - Drug metabolism could either be the biotransformation of a drug from a formerly inactive compound to an active one or detoxification that involves the removal of the toxic components of a drug to a non-toxic
 - The site of drug metabolism is the microsomes of the smooth endoplasmic reticulum of the liver.
 - The factors affecting drug metabolism are genetic composition, effect on strain, effect on species, age, hormonal factors, pathological state, and effect on diet and drug interaction.



CHAPTER NINETEEN

NUTRIENTS: THE IMPORTANT VEHICLE IN HUMAN BIOCHEMISTRY AND PHYSIOLOGY

- Nutrient is a source of nourishment that is needed to keep a living thing alive and to help it grow.

- Nutrition is the process by which these nutrients are received by living things.
- Diet is explained to be the kinds/combinations of food and drinks consumed by an individual on a more or less regular basis.
- Food is any ingested substance that is capable of being assimilated and utilized for supporting growth, maintaining body functions, repairing cells and tissues and satisfying energy requirements of man.
- Nutrients are released by digestion and are absorbed from the small intestine into the blood stream from where they are transported to the site where they are required.
- Growth is defined as the increase in the number and or size of the cells in the organs of the body.
- Growth occur in three phases, namely:
 - i. Rapid cell multiplication
 - ii. Slow cell multiplication with increase in cell size
 - iii. Increase in cell size only.
- Food nutrients include; carbohydrate, lipids, protein, minerals, vitamins and water.
- Carbohydrate foods include cereals, like rice, maize and millets.
- Carbohydrates can be classified based on their **COMPLEXITY** and **DIGESTIBILITY**.
- Based on complexity, they are classified into:
 - Monosaccharide
 - Disaccharide
 - Polysaccharide
- Monosaccharide are simple sugars, disaccharides are carbohydrates with two sugar units while polysaccharide contains more than two sugar units.
- Based on digestibility they can be classified into **AVAILABLE** and **UNAVAILABLE**.
- Available carbohydrates are digestible, absorbable and are nutritionally utilizable.
- Unavailable carbohydrates are referred to as **DIETARY FIBRE** or **ROUGHAGES** and constitute the fraction of unhydrolyzable carbohydrates by the endogenous secretions of the digestive tract.

- Lipids are group of chemical substances insoluble in water but soluble in organic solvent. They are also called **FAT**.
- Classification of **LIPIDS** include; Fatty acids, Acylglycerol Glycerolipids, Sterols, Cutin and Waxes.
- Lipids can also be classified as **simple** or **derived** lipids.
- The major role of lipids is **storage, metabolic** and **structural**.
- In animals, lipids are stored in the adipose tissue.
- Long chain fatty acids occur in animal lipids and most vegetable oil, while the extra long chained fatty acids are found in fishes.
- Too much saturated lipids and cholesterol in the diets constitute ill health to the body.
- High level of cholesterol in the blood is an indicator to the development of heart diseases e.g stroke.
- **PROTEINS** are complex nitrogenous organic compounds present in plant and animal foods. They are made up of amino acids joined together by **PEPTIDE BOND**.
- There are about 20 amino acids in nature. 8 of which are essential and the remaining 12, unessential. For a growing child, essential amino acids is 10.
- Animal protein is complete protein because they contain all the amino acids required by the body.
- Plant proteins lack one or more of the essential amino acids.
- When protein is deficient in the diet, it manifest a disease referred to as **KWASHIORKOR**
- Symptoms of kwashiorkor include Oedema, wasting of muscles, retarded growth & possession of small weight for age.
- Vitamins are essential dietary compound because the body cannot synthesize sufficient amounts and has to rely on exogenous sources for its supply.
- Vitamins are classified into **FAT SOLUBLE & WATER SOLUBLE**
- Minerals are inorganic constituents of foods.
- Minerals are classified into **MACRO – MINERAL** or **MICRO – MINERAL**.
- Macro mineral include; Nitrogen, calcium, Chlorine, Magnesium, Phosphorus, Potassium, Sodium and Sulphur
- Micro minerals or trace elements include Cobact, Chromium, Copper, Flouride, Iron, Iodine, Manganese, Molybdenum, Zinc and Selenium.

- Minerals are required for the maintenance of the body system, for formation of haemoglobin of red blood cell and as anti – oxidant.
- Water is a universal solvent, used by the body for digestion, transportation of nutrients to tissues and disposal of waste products.
- Nutrient needs of individuals are influenced by age, sex and health status of the individual.
- Protein requirement is defined as the amount of protein needed to maintain nitrogen balance. It is a condition when nitrogen intake is equal to nitrogen excreted
- The infants require an adequate intake of calories and essential nutrients for rapid growth.
- Breast milk has been reported to contain carbohydrate like oligosaccharides, high quality proteins, enzymes of importance and colostrums
- Nutrient requirements for adolescents include; thiamin, riboflavin, niacin, pantothenic acid, protein, pyridoxine, potassium, folate, vitamin B12, Zinc, Iron, vitamin C, copper, phosphorus, manganese, calcium, vitamin A & D.
- Nutrient requirements for the aged includes; reduction in their caloric intake, high quality protein, limited fat in the diet with complex carbohydrate, no soft drinks, adequate vitamins & minerals and adequate water.
- Nutrients requirements in disease state include vegetables fruits, quality protein, complex carbohydrates, water, vitamins A,E, B12 etc.
- Nutrients are made available to different organs in the body after digestion and are then absorbed by different organs of need.
- Lipids are stored in adipose tissue as **TRIACYL-YCEROLS** in animals
- Concludingly, nutrients have to be guided jealously for their optimal availability to the body through processing. We shouldn't forget that food is the medicine of life, for good food gives a healthy life.

CHAPTER TWENTY

BIOLOGICAL ENVIRONMENTS

- Today's system of classification is based on that devised by Carl von Linne
- He published the classification of plants and animals in 1753 and 1758 respectively.

- His methods classification was based on natural relationship and structural similarities behaviour organisms (Homology) .
- The smallest unit of classification is called the species
- Same species can interbreed.
- Others include genus / genera / closely related group of species? Genera are grouped together to form family, family to form orders, order to form classes, classes to form division (in plants) or phyla (in animals). Division or phyla are grouped into kingdom
- Ecology is the study of the relationship between organisms in their external environment
- The biosphere is the totality of habitats
- Different types of communalities are called biomes
- In Africa the main biomes are the tropical rainforest Savannah desert, afro alpine and swamp.
- Each Biome has a typical collection of plants and animals species peculiar to itself.
- Several factors affect the habitat (living address of an organism)
- They are generally biotic (effects of living entity i.e plants and animals) and abiotic (physical) the non living component.
- The abiotic factors are of three types:
 - Climatic factors such as temperature, rainfall, humidity, wind, light and water movement
 - The second one is the edaphic factors (those associated with soil), such as its chemical, physical, moisture content and thickness properties of the soil.
 - The third is the topographical factors, which are those caused by the structure of the earth's surface and include the effects of mountain river, hills and valleys.
- The arthropods were able to survive and reproduce without surface water by reproducing through the process of passing their sperm to the female in packet or injection.
- The female used the sperms to fertilize the eggs while they are still alive in her body and she covered the eggs in protective coat , and land them near to some food.
- Grasses belongs to a group of fruiting plants called monocotyledons because they has only one seed leaf or

cotyledon in their embryo

- In contrast we have dicotyledons that have two seed leafs.
- Phytoplanktons are the simplest plant called algae, they swallow the sunlight using bacteria and now use their sunlight to make food and get energy.
- Amphibians are animals that can live in water and on land. Their swim bladders evolved into lungs which they used to breath in air.
- They are the vertebrate which emerged from the water and became land animals around 350 million years.
- Most amphibians if not all, reproduces in the water,
- Anthropods are animals with jointed legs and bodies covered by hard skin (exoskeleton) made of protein;
- They are the commonest animals then, and remained so ever since then
- They first appeared around 570 million years ago during the cambrian period
- Because they belong to the group of animals called prostomia, to what the annelid worms also belong, we assume the arthropods evolved from annelids or shared a common ancestor with them.
- To grow, arthropods had to shed their hard skin, pump themselves with air or water and grow another's skin
- The birds are the closest relatives to the dinosaurs
- The first known bird, archaeopteryx appeared about 150 million years ago.
- They evolved into the birds called enantiornithes that lasted from around 70 million years before becoming extinct and being replaced by orinthonrae, the group which include modern birds which is believed to have appeared around 65 million years ago
- The newly discovered Chinese dinosaur caudipteryx zoui lived in the cretaceous period 120 million years ago.
- After mass extinction of 250 million ago, one group of reptiles called dinosaurs started to dominate all others. Their names means terrible lizard.
- They were the commonest vertebrates for the next 150 million years.
- Flat worms ancestry is form early form of jelly fish (they might have appeared first around 570 million years ago.

- Their organs such as a stomach-like sac evolved from tissues in jelly fish and the flatworms crawl forward and evolved sensors for smell and touch at their front end
- They are bilaterally symmetrical
- Approximately, 13,000 species of flatworms are found on earth today.
- They are grouped into five classes,

1. Flukes (Trematoda)
2. Tape worms (cestoda)
3. Planarias (turbulleria)
4. Monogenea (mostly parasite) and aspidocotylea

Bacteria and diseases

- Disease of human such as actinomycosis, Anthrax, brucellosis, cholera, diphtheria, dysentery, gastroenteritis, meningitis, pneumonia. Septicemia, shigellosis, syphilis, tetanus, tuberculosis, trachoma and may others are caused by bacteria.
- Bacteria can bring some benefits too
- The first bacteria all appeared on earth 3.5 billion years ago
- One of bacteria is called a bacterium.
- Bacteria are unicellular (one cell each).
- They can be round (cocci), rod like (bacillus) or curved (vibrio, spirochete)
- Bacteria are prokaryotes (no membrane bounded organelles)
- Many bacteria can produce spores when times are hard. Spores contain almost no water or protein but still contain all the genes of the bacterium
- They carry out the major nutrient cycling e.g. nitrogen, sulphur and carbon
- They are beneficial such that they are nitrogen fixers, decomposers, fermentative ability, used in biotechnology for protein manufacturing.

- Fungi

- Fungi are the main decomposers of dead matters. They are eukaryotic
 - The fungi evolved a special way of living together
 - Early fungi seem to have left no fossil, but the guess is that they first appeared around 1 billion years ago.
 - Bacteria which can photosynthesize in that they get their energy from sunlight are also called cyanobacteria and sometime wrongly called blue-green algae.
 - Eukaryotes are organisms with embrace bounded organelles. They are higher organisms which can be un-cellular but mostly multicellular
 - Vertebrates are the bone-containing organisms (back-bone)
 - Bone is made up of a protein (collagen holding a network of mineral crystals made of calcium phosphate and carbonate).
 - The first fish appeared about 500 million years ago. The bonyfish evolved from the jawless fish about 450 million years ago and other fishes evolved at different times.
 - Insect are arthropods which first appeared about 380 million years ago
 - They differ from other arthropods in that they have 3 pairs of leg and most insects have wings.
 - The insect body is divided into three region the head, throat and the abdomen.
- ¶ Heredity and variation**
- In a group of individuals of any species, variation is apparent – each individual different from their parents via the sex cells
 - The hereditary material (DNA passes on the information ensuring that that a mating between two fishes produce fish and not a frog).
 - All living things including man vary in many little ways so no two people are exactly the same.
 - Variation can either be morphological or physiological
 - Morphological variations include size, shape, structure, behaviour, reproduction and lifespan. These variations occur between and within group of organism.
 - The physiological variations occur from within the body e.g the ability to roll the tongue, also some people are enable to task certain substances.

- Blood

- Blood is a liquid carrying food and oxygen around the body of many called animals, and carries away waste products such as CO₂.
- All the major groups of animals higher than jellyfish have blood
- Protozoans and early multicellular animals have no blood and give and take substances with the environment by simple diffusion.
- The blood of small worms and mollusks has no oxygen – binding substance.
- Hemocyanin, a copper – containing protein chemically unlike hemoglobin, is found in some crabs and other lower animals
- Hemoglobin is blue in colour when bound to oxygen and colourless without it
- Hemoglobin is contained exclusively with the red cells (erythrocyte) of the blood
- There is also variation in blood grouping. Many types of protein substances called antigens may be present in the surface of red blood cell.
- Two of these antigens are called A and B
- Group A red cells contain A antigen
- Group B red cells contain B antigen
- Group AB red cells contain A and B Antigens
- Group O red cells contain neither A nor B antigens
- Blood is also grouped depending on the presence of rhesus factors (Rh factor) discovered in rhesus monkeys, which is either positive or negative
- Skin colour variation is one major characteristic by which man has been classified into race.
 - Caucasoid – light skinned, variable eye and hair colour of European origin
 - Mongoloid – yellowish - brown skin with dark eyes e.g Chinese
 - Negroid – dark brown to black skin with dark eyes e.g African origin
- There are also finger prints variation which might be arches, loops, whorls and compound

- The normal hemoglobin found in humans is hemoglobin A (HBA). Individual with HBS would have sickle – cell anemia.
- The sickled cells are fragile and short lived. Usually destroyed before their normal 120 days lifespan.
- There are some hereditary diseases such as diabetes, haemophilia, colour blindness etc
- The principles of heredity has been applied in plants selection, improved plants productivity improved resistance in plants
- There are certain genetic diseases, mutation are inherited. In humans genetic disease include, cystic fibrosis, sickle cell anemia and Tay – sachs disease

Science And The Environment

- Pollution is an undesirable change in the physical, chemical or biological characteristics of air
- There are three main group of pollutants
 1. Biodegradable pollutants
 2. Non degradable pollutants
 3. Poisons
- We have air pollutant such as burning of fuel, carbon monoxide, lead, nitrogen (No₂)
- Examples of water pollutants are sewage and waste dump, industrial and agricultural waste, oil and other petroleum products.
- Examples of land pollutants include household, industrial and agricultural wastes are dumped indiscriminately.
- The atmosphere is an ocean of air that encircles the earth to a height of about 80km
- It weights over five quadrillion tons and exerts a force of 1.03 kilograms for square centimeter at sea level.
- The atmosphere is composed mainly of two complementary gases: nitrogen and oxygen. About 78% is nitrogen composition and 21% oxygen.
- The remaining 1% is comprised of such gases as argon , water vapour, CO₂, Neon, helium, krypton, hydrogen, xenon and ozone.
- A man – made chemical pollutant is the chlorofluorocarbons (CFCs)
- The term biological environment refers to all life forms and the environment in which they exist

- There are 3 forms of life on earth, animal, plant and microorganisms

The surface area of the earth is animals 357 million square km and of these about one fifth representing 29% of the total each surface is kind, 71% of being water

NCRI – National Cereal Research Institute (1898)

IITA – International Institute of Tropical Agriculture (1967)

FIIRO – Federal Institute of Industrial Research, Oshodi

CRIN – Cocoa Research Institute of Nigeria.

ILCA – International Livestock Center for Africa

CHAPTER TWENTY ONE ECOLOGY OF MAN

- Prior to the invention of agriculture, the world population, which was practically dependent on hunting and gathering for daily subsistence was stable at around 5 million people.
- When hunting and gathering gave way to farming, population levels rose, first to 250 million at the time of the birth of Jesus Christ and later to 500 million by the middle ages.
- The current phase of explosive growth started with the industrial revolution in the eighteenth century (18th).
- The world population reached 1000 million in 1930, 3000 million in 1960, 4000 million in 1975, and 5000 million in 1987.
- Today, the human population is above 6000 million (John Gribbin and Kelly M. 1989).
- The tremendous rise in population in the last few centuries has also increased the scale of environmental problems.
- These various problems are caused by an increasing degree of accumulation of poorly degraded substances in the natural cycles and their reservoirs (Langeweg F.C 1985).
- Though there is an evidence of downward trend of individual pollution effects, the increase in population makes nonsense of this reduction (Langeweg F.C 1985).

- Supplementary technology is often used to overcome environmental problems. This in most cases is always effective in the short term, and often time leads to problems being deferred
- Man is part of the eco system of the earth. His survival depends on the survival of hundreds of thousands of species of plants and animals.
- The impact of man recently is more felt in the area of deforestation, transportation, industrialization, agriculture, mining, e.t.c.
- Forest in West African is losing 36,000 km sq a year according to the World Bank.
- Tropical forest contains about 80 percent of all plant (animal species).
- The greatest impact of man on the environment today arises from the industrialization processes of the world that started in the eighteenth century.
- Pollution is the undesirable change in the physical and biological component of the environment.
- Causes of pollution can be attributed to include industrialization, agriculture, transportation, mining and burning as well as waste management.
- Forms of pollution include water, land, air and noise pollution.
- The effect and intensity of each form of pollution depends largely on their input into the natural cycles.
- The analysis of the nature of these cycles demonstrates that five spatial scales can be distinguished in which specific matter and energy flows occur.
- These scales are local, regional, fluvial, continental and global scales (Langeweg F.C 1985).
- The local level comprises the built environment within which man spends a large part of his time.
- On a Fluvial scale, transport via surface water is the carrier of two kinds of problem for the river basins and the contagious epicontinental seas.
- On continental scale, the circulation of air in the boundary layers is decisive for the dispersion of substances from within a few days to several weeks at most.
- On the global scale, the circulation in the higher layer of the atmosphere leads worldwide to the mixing of addictions to the atmosphere within one or two years.
- Air pollution is the addition of unwanted airborne matter, which changes the atmospheric air composition. Possibly harming life and altering materials (Tune et al 1972).

- The major classes of gaseous pollutant of high values are carbon dioxide, nitrogen oxides and oxidants as well as compounds that contain carbon, hydrogen and oxygen.
- Under carbon dioxides, we have carbon dioxide (CO_2) and carbon monoxide (CO).
- Carbon oxide is a normal component of air and a part of carbon cycle of the biosphere, therefore, it is not ordinarily considered to be a pollutant
- Carbon Monoxide (Co) is not a component of normal air but a product of the incomplete combustion of carbon or carbon compound.
- The gas, though colourless, odourless and non – irritant is very toxic.
- Methane CH_4 contains carbon and hydrogen, and like CO_2 , is emitted to the atmosphere by natural as well as manmade processes.
- The important oxides are SO_2 and SO_3 . But based on harmful effect rating on man and the difficulties involved in preventing its discharge into the atmosphere, SO_2 is probably the most significant single air pollutant.
- Nitrogen oxides are emitted from combustion plants and from motor vehicles dispersed widely, especially from mobile sources.
- Ozone occurs to some extent in normal air. In higher concentration, it is a toxic substance.
- O_3 is a very reactive gas and is considered to be one of the most powerful oxidizing agents
- CO_2 , CH_4 , and Nitrogen Oxide are all naturally occurring gasses whose abundance in the atmosphere is being increased by various human activities.
- CFC means **Chloro fluorocarbons**
- Thomas Midgely of General motors developed CFC in 1930 (ECE, 1985).
- VOC means **Volatile Organic Substance**.
- Nitrogen Oxides can be represented with **Nox**
- The first use of coal began in the 14th century
- Various effects have been identified with air pollution namely:
 - Visibility reduction and other atmospheric effect
 - Effects on vegetation

- Effects on man and animal
 - Effects on materials
 - Effects on environment and eco system
- Global warming is a by- product of green house effects
- The green house is a glass roofed structure in which plants are grown.
- The ozone layer is also known as Ozone screen, it is made up of tri-oxygen which are built up from oxygen.
- When two atoms of oxygen (o) combine together, they form di-oxygen (O_2), three atoms; tri – oxygen or ozone (O_3)
- Water pollution is the addition of undesirable foreign matters, which deteriorate the quality of the water (Turk et al 1972).
- Water is the universal liquid medium for living matters and is therefore uniquely prone to pollution by organisms (Turk et al 1972).
- Foreign substances in water are best classified according to the size of their particles.
- These classes include suspended, colloidal and dissolved particles (Turk et al, 1972)
- Suspended particles are usually the largest with a diameter of about 1 micrometer.
- The colloidal particles are so small that their settling rate is insignificant (Turk et al (1972)).
- The dissolved matter does not usually settle out, and is often not retained by filters. It does not make water cloudy even when viewed at right angles to a light beam (Turk et al 1972)
- Many micro – organism are water borne. They cause diseases like typhoid, fever, cholera, dysentery, infectious hepatitis etc.
- The average microbial population in a normal human is perhaps 10 trillion, almost a slimy cupful in volume (Langeweg, 1985)
- Sources of water pollution includes industrial wastes, agricultural wastes, and domestic wastes (Turk et al, 1972)
- Waste implies unwanted or unusable material, substances or by products.
- Sources of wastes include the industrial, the household and the agricultural.
- There are two kinds of pathway (disposal) for solid waste materials. They are:
- Recycling into other processes

- Depositing at a location

- Aside from the recycling method, land disposal and incineration are other methods of waste management.

CHAPTER TWENTY TWO

ENVIRONMENT AND HEALTH

- To WHO defines health as a state of complete physical, mental and social well being and not merely the absence of disease or infirmity.
- Health is a state conditioned by a variety of factors ranging from the genetic, the social and the emotional, to the natural and man-made environment.
- The human environment has two elements which are the **natural** and the **man – made**.
- These elements impact on human health in two (2) ways, which are through “physical and chemical agents” and through “pathogenic agents”.
- Infant and child mortality rates have declined steadily in the last two decades and life expectancy has increased from an average of 56.7 years in 1970-75 to an average of 61.5 years in 1985-90 (WHO 1992).
- Infectious and parasitic diseases are still by far the leading cause of mortality in developing countries.
- The green house effect could trigger new epidemics of tropical diseases in regions that are at present free of them.
- Stratospheric ozone depletion is likely to lead to skin cancer.
- Cardiovascular diseases are the leading cause of death in developed countries.
- In developing countries, the commonest diseases are water – related. 80% of illness is attributed to unsafe and inadequate water supplies.
- Diarrhoeal diseases are the leading cause of death in infants and childhood.
- HIV infection and AIDS were unknown before 1980
- HIV is the causative agent of AIDS.
- The rise of cardiovascular diseases in Eastern Europe contrasts with the trend in infant mortality, which has declined steadily in both Eastern & Western Europe.

- The general decline in stomach cancer is almost certainly related to dietary habits and changes in food preparation or preservation techniques.
- Tobacco smoking is the most important cause of lung cancer. 80-90% of lung cancer and 30% of all cancer deaths are attributed to tobacco smoking.
- Pollutants include sulphur dioxide, particulates, carbon monoxide, lead, mercury and organochlorine pesticides.
- In poorer regions developing countries, under – nutrition is a major factor increasing vulnerability to infectious and parasitic diseases.
- In developed countries, obesity and high intake of saturated animal fats are believed to be linked to the high incidence of cardiovascular diseases.
- Certain biochemical abnormalities are environmentally induced while some could be inherited
- Exposure to low doses of lead in childhood has been associated with long term impairment in the functioning of the Central Nervous System (Needham et al, 1990)
- The links between access to and malnutrition are particularly well established (Norse, 1985).
- An area in Punjab was reported to have 545 of the children of landless labourers moderately or severely malnourished compared to 39% of the children of the land owners (Levinson, 1974).
- In Bangladesh, both food and nutrient intake appear to be directly related to land holding with the landless consuming only around 80% of the calories and protein consumed by those possessing more than 1.2 hectares of land (FAQ, 1982).
- The World Bank notes that incomes in rural households vary substantially according to the season (World Bank 1990).
- In the Gambia, adult weight fluctuated as much as 4.5 kilograms within one year.
- In northeast Ghana, losses of 6% of body weight were recorded.
- In Africa, women produce about 60% of the food for household consumption and provide 80% of agricultural labour (ILO 1989).
- The health vulnerability of rural farm women is aggravated by the fuel wood crisis.
- The burning of both biomass and fossil fuels are major sources of air pollution within houses.
- The most important health effects of air pollution are respiratory and range from acute infections (particularly in children)

- It is estimated that 700 million women and their children are at risk of developing such serious respiratory diseases.
- Forests in developing countries often serve as food banks especially for poor members of local communities
- Forest provides resources that fill in seasonal shortfalls of food and income as well as providing seasonally crucial agricultural inputs that helps in reducing risks and lessening the impacts of drought and other emergencies (FAO, 1989).
- Studies have shown that the consumption of varieties of indigenous plants was crucial to the survival of many Sudanese during the 1985 – 86 famine.
- Water is essential for human health, well being and development.
- Of all the diseases associated with irrigation schistosomiasis is perhaps the best documented.
- Other diseases aggravated by irrigation schemes are onchocerciasis (river blindness) which is endemic in some parts of Africa, latin America and Yemen.
- The Diama dam was completed in august 1986.
- Disease surveillance began in May 1987.
- The first cases of schistosoma mansoni infection were reported in early 1988. In the last quarter of 1998, 71.5% of 2086 passive stools examination were positive (Tava et al 1990).
- Before the construction of the Diama dam, Biomphalaria Pfeifferi, the snail vector for S. Mansoni, was sparsely present and often not found in the Senegal river basin when looked for.
- Pesticides cause most health concern. The main hazard being acute poisoning.
- Regarding pesticides, WHO estimate that some three million people world wide suffer annually from single, short term exposure with 220,000 deaths.
- In 1986, in Sri Lanka as a whole, 57% of admissions of cases of poisoning and 66% of deaths by poisoning were due to pesticide and 66% of deaths by poisoning were due to pesticide poisoning.
- In 1986, pesticide poisoning was the sixth leading cause of death in government hospitals.
- Food crops are often directly contaminated by pesticides.
- It has been estimated that 90% of human pesticide intake has occurred through the food chain (WRI, 1988).
- Aflatoxin, Mycotoxins and hepatitis B are all serious threats to human health (UNEP, 1986).

- Epidemiological studies have shown that the odds against child survival and longevity are greater for those city dwellers that are severely exposed to malnutrition, inadequate shelter, poor sanitation, pollution, poor transportation and the psychological and social stresses resulting from socio-economic deprivation (WHO, 1991).
- The multi factorial nature of poverty is well illustrated in a 1986 – 87 study of an urban slum in Bangladeshi (Pryer, 1989, 1990)
- A study showed that infant deaths were especially high near a water course called the Moniho Arroyo, where 52.9% of the deaths were attributed to intestinal disease as compared to 15.9% in the more distant sector.
- Radon emissions pose a serious health hazard, particularly in our tight buildings as the concentration of radon indoors was found to be six times higher than the concentration outdoors. (Nazaroff and Teichman, 1990).
- It should be noted that no insect causes disease directly but can be a carrier of disease causing organisms. The insects of such are known as vectors.
- Example of such is that mosquito does not causes malaria but plasmodium especially in the mosquitoes that causes malaria.
- Migration from rural areas is often driven by landlessness, poverty and homelessness.
- The main pathways for contamination/transmission of harmful chemical, physical and biological agents are through air, water, wastes and contaminated foods.
- The effects of sulphur dioxide on health increase as a result of the presence of particulates while exposure to radon increases the risk of cancer for smokers.
- In 1984, WHO/ UNEP established the 'Human Exposure Assessment Locations (**HEALS**) programmes in order to monitor total human exposure to pollutants and assess the combined risk from air, food and water pollutant.
- Only between 30 – 70% of solid wastes are currently collected in cites in developing countries
- Diseases vectors proliferate on waste and in a situation where human excreta are added to Garbage, increase health risks considerably.
- In 1987, 241 people were injured and two died when an abandoned radio – active cancer – treatment device was discovered among rubbish in Goiania, Brazil and the materials neutral reutilized.
- The working environment is that part of the human environment in which people spend their working hours every day.
- Occupational safety deals with the physical, chemical and biological hazards and mental stresses

present in the working environment and their prevention and control.

- In 1975, the Director General of ILO presented a report entitled "Making work more human". This resulted in the "International programme for the improvement of working conditions and environment" (PIACT).
- It has been estimated that there are about 32.7 million occupational injuries and 146, 000 deaths at the workplace every year (WHO 1990).
- In 1984, an estimated 3 to 4 million children in the USA had blood lead levels (BLLs) greater than or equal to 15 ug/dl (CDC, 1991).
- In those countries that have introduced unleaded gasoline, BLLs have dropped markedly.

CHAPTER TWENTY THREE

CLONING IN THE CONTEXT OF BIOTECHNOLOGY

- A clone is a large population of identical bacteria or cells that arise from a common ancestor.
- The study of cell genomes in molecular biology provides a library of basis of survival of parasites, transcriptional regulation of enzymes etc.
- Biotechnology is subjecting living cells to manipulation. It is a technique that uses living organisms or part of an organism to make or develop microorganisms for specific uses.
- Thus, biotechnology is the application of scientific and engineering principles to the process of material by biological agents to provide goods and services.
- It is also defined as the integrated use of molecular genetics, biochemistry, microbiology and process technology with aim of supplying goods and services
- An internationally accepted definition of biotechnology is that given by Bull Holt and Lilly (1982) which describes it as the application of scientific and engineering principles to the processing of material by biological agents to provide goods and services.
- Biotechnology is nothing new, as mankind have been using it contents without full consciousness of its procedures and concept.
- However, the term biotechnology dates from times where biological process came to be understood and used

consciously from **1940** onwards.

- Basic techniques of biotechnology are fermentation, enzymes technology, cell and tissues culture and generic engineering.
- Some techniques such as cell fusion, recombinant DNA technology immunization of enzymes and cells and genetic engineering are considered "modern biotechnology".
- Biotechnology has proven useful in solving world pertinent issues such as fertility problems, immunological issues, crop yield etc.
- In fertility, artificial insemination (using the sperm of another man to fertilize the egg of a woman artificially without sex enables the woman to conceive), more so, test tube baby process is also another mechanism used to tackle fertility issues.
- The uses of biotechnology are as follows:
 - a. Production of microorganisms that will literally eat toxic waste and also microbes that will promotes faster and higher quality growth in farm stock.
 - b. Availability of organically engineered substitute for oil products
 - c. Fighting diseases such as herpes and cancer
- The most important event that brings about development of biotechnology is in molecular genetics and cellular biology respectively.
- In molecular genetics, the discovery of the types II endonucleases which cut the DNA molecule of specific base sequences in *Homophilus Influenza* can be considered as the being steps of the work on gene cloning and genetic engineering.
- Genetics is the science that studies all aspect of inherited characteristics
- Genetic engineering is the application of the knowledge obtained from genetic investigations to the solution of such problems as infirmity disease / food production waste disposal and improvement of species.
- Biotechnology can be divided into two:
 - (a) Traditional biotechnology which involves the manipulation of biological objects with knowledge of the underlying scientific processing.
 - (b) Modern biotechnology which is further divided into nucleic acid and non – nucleic acid biotechnology.

- Nucleic acid biotechnology involves the manipulation of nucleic acid
- Non nucleic acid biotechnology are where the specific processes are well understood, but no manipulation of nucleus acid is involved.
- The nucleic acids, DNA, and PNA (deoxyribonucleic acid and ribonucleic acid respectively) are the macromolecules involved in the storage and transfer of genetic information. Nucleic acid biotechnology can be divided two
 1. Genetic engineering
 2. Gene therapy
- In genetic engineering, genetic information which is in the sequences of bases in the DNA is transferred, expressed and manipulated most times with microbes to produce copies or remodify for man's use.
- DNA is transcribed to RNA which is the translated on arbosome to give amino acids which link up to form proteins.
- A single amino acid is produced from triplet of RNA nucleotides or codon
- There are 64 possible codons, 61 of the codons codes for amino acid while 3 are stop codons which terminates the process of protein synthesis.
- All biological entities be it plants animals, or microorganisms are therefore controlled by their genetic make up which are lodged in genes.
- It is transferring of genes from a clone to a recipient cell and the expression of the character of the gene's properly in the recipient cell that is known as "genetic engineering".
- Examples include human protein of therapeutic importance such as Insulin produced in the pancreas of man, which its deficiency causes diabetes and the usage of insulin from farm animals for treating the disease is time consuming, costly and also couple with complication. Advent of biotechnology has made the transfer of the gene for insulin production into microbes possible and as such numerous quantity of insulin can be produced.
- Other examples includes human growth hormone, human interferon tissues plasminogen activator, vaccines with usage of microorganisms in a much more cheaper and effective way.

GENE THERAPY

- The number of inheritable diseases is growing and the ideas cross that the disorder can be corrected by introducing the appropriate gene.

- Examples of gene therapy includes introduction of foreign DNA into bone marrow cells by calcium phosphate medication and also introduction of foreign cells using a virus vector.
- Plasmids are small circular duplex DNA found in the cytoplasm of most bacteria species.
- Each plasmid may contain anywhere from 2,000 to 100,000 bases
- Plasmids have two (2) remarkable usefulness in genetic manipulation.
- They can pass from one cell to another and indeed from one species of bacterial to another.
- Examples salmonella typhimurium cell can acquire permanent resistance to certain antibiotics such as penicillin, when they are mixed with a strain of E-coli that is resistant to penicillin
- The gene for penicillin resistance, called an R-factor is present in a plasmid of E-coli which can be transmitted from E-coli to S. typhimurium cells
- Secondly foreign genes can be sliced into plasmids quite easily and may then be carried by "PASSENGER" into E. coli cells and become part of the host cell.
- The cDNA can be incorporated into a plasmid by giving it the appropriate "tails", or cohesive ends.
- This is best done by adding to the opposite 3' end of the 2 strand of the duplex (DNA a series of the deoxyribonucleotide residue of simple type).
- The above phenomena in the 2 earlier bullets is regarded as the construction of gene bearing vector.
- Therefore, the loaded plasmids can then be inserted into the E.coli chromosome.
- The efficiency of plasmid entry can be increased by addition of Ca 2 to detect those E. Coli cells contain the recombinant genes
- The process is growing colonies of microbes (E.coli) on an agar plate, extract DNA of each cell colony, then determine which colony contains DNA that hybridizes with the radioactive cDNA originally prepared from the isolated mRNA.
- The clone containing recombinant plasmids is now grown for many generations on large scale.
- Such a recombinant DNA, carrying unrelated genes from 2 different species is called a DNA chimera
- The reverse type of recombination has also been carried out. Bacteria genes have been inserted into the genome of some eukaryotic cells.
- The cloning of recombinant genes and their expression in the form of protein products by E. coli or yeast cells

can be grown in enormous amount which may make commercial production many practically useful proteins.

- Recombinant DNA research may have many practical applications.
- Cell cloning is the formulation of a group of genetically identical cells/ all arising from a single cell.
- Molecular or gene cloning is the formulation of many identical gene copies replicated from a single gene introduced into a host cell.
- cDNA mean complementary DNA
- The uses of genetic engineering are
 - (a) Production of industrial microorganisms
 - (b) For agricultural purposes
 - (c) Gene therapy
 - (d) Production of synthetic vaccines
 - (e) Production of hormones and enzymes
- Cloning are medically important in the following context:
 - (a) It offer a rational approach to understanding the molecular basis of a number of diseases e.g sickle cell disease, familial - hypercholesterolemia
 - (b) Using recombinant DNA, human proteins can be produced in abundance for therapy e.g insulin
 - (c) Proteins for vaccines and for diagnostic tests can be gotten
 - (d) Remarkable advances in forensic medicine
 - (e) Gene therapy for sickle cell diseases, the thalassemias, adenosine deaminase deficiency and other diseases may be devised.

CHAPTER TWENTY FOUR

MAN, HEALTH AND DISEASE

- In the natural environment many animal species, including man are free living while many others maintain some form.
- Homospecific associations involve members of the same specimens e.g herds, colonies and flocks.
- Heterospecific associations are of particular interest because they involve member of different species.
- Heterospecific associations in which animals are literally living together are collectively known as symbiosis.
- Symbiosis implies no mutual or unilateral benefits, or metabolic dependency, merely living together. The study of this phenomena is known as symbiology
- Different categories of symbiosis have been recognized depending on the type or degree of intimacy of the associations e.g phoresis , commensalism, mutualism and parasitism.
- In phoretic relationship, the phoretic benefits by being carried about on the body of the host thus obtaining food and access to adequate oxygen supply.
- In commensalism, the smaller one called the commensal benefits from the host, a larger organism, by feeding on the host's food. e.g Entamoeba gingivalis and Trichomonas tenax which live as commensals in the human mouth.
- Mutualism is an association in which the symbionts, called mutualists benefit from the association. The symbionts are metabolically dependent on one another and cannot survive apart or live independently
- The most complex of this association is parasitism. Parasitism is symbiosis, known as the parasite is metabolically dependent on the larger one known as the host.
- In parasitism, there is an intrinsic ability of the parasites to do harm to or inflict some form of injury on its host.

Health Status Of Man

- Health is defined by the WHO as a state of complete physical, mental and social well being and not merely absence of diseases or infirmity.
- Parasitic diseases probably contribute most to the retardation socio – economic development

Diseases and related terminologies

- Diseases are caused as a result of damage done to the body by parasites with specific symptoms.
- Epidemiology is the body of knowledge concerning diseases in human population or communities rather than in the individual

- Exposure may occur from one or more of the following sources contaminated soil or water, food containing immature infective stage of the parasitic.
- Soil polluted with human excrete is commonly responsible for exposure to infection with Ascaris lumbricoides, Trichuris trichura, Ancylostoma duodenale, Necator americanus, Strongyloides, stercoralis.
- Water may contain viable cysts of parasitic amoeba eg Entamoeba histolytica, Intestinal flagellates e.g Girdia lamblia, Taenia solium eggs
- Fresh waters fishes constitute the source for the fish tapeworm (Diphyllobothrium lactum)
- Blood sucking insects (arthropods) transmit malaria parasites, leishmaniasis, trypanosomes, filarial worms, viruses, rickettsias, bacteria and spirochetes.
- Dogs are the direct sources for human infestation with the hydrated cysts of Echinococcus granulosus, as well as cutaneous larva migrans due to Toxocara canis, while herbivorous animals commonly constitute the source for human infection write tricho-strongylus spp.
- Auto infection accounts for some of these parasites and for some reinfections with Strongyloides stercoralis
- The most common route of invasion is through the mouth. This is a form of active infection.
- Passive infection is when the organisms are introduced into the body as a contaminant. Injections or blood transfusions have been the vehicle for spread of diseases such as hepatitis B and AIDS.
- Improvement in environmental sanitation and informative absent sources of infection of most diseases will greatly enhance the health status of man.

CHAPTER TWENTY FIVE

HIV / AIDS (SLIM DISEASE)

- Human Immunodeficiency Virus (HIV) causes acquired immunodeficiency syndrome (AIDS).
- AIDS was first discovered as a clinical entity in 1981 and the causative viruses (HIV) was first isolated in 1983.
- There are two types of HIV. **HIV – 1** is found in all part of the world while **HIV – 2** is seen more in West Africa, with fever patients in North America, Europe and central Africa.
- HIV can be transmitted through an infected blood through blood transfusion.

- However, transmission of HIV through blood transfusion is rare and not so common because blood is normally screened for HIV before transfusion.
- The use of contaminated sharp objects such as needles with syringe, middle sticks, blades or knives can transmit the virus
- Splash of infected blood or fluid into the eye or delivery of babies with bear hand (that has injury) can spread the virus.
- Sexual contact is the main mode of HIV transmission throughout the world either homosexually or heterosexually
- Heterosexual (man and woman) spread is more than those of homosexual (2 men)
- Male to female transmission is more effective than female to male transmission because the surface area of the mucous membrane exposed during intercourse is larger in the female than in the male.
- Concurrent infection with another sexually transmitted infection can increase the risk of transmitting the virus.
- HIV can also be transmitted from mother to her baby (perinatal transmission).
- Perinatal transmission can be through:
 - The placenta during pregnancy called intrauterine transmission ,
 - During delivery of her baby (puerperal) and
 - During breast feeding (Postnatal transmission).
- It is not easy to know if a baby has HIV infection until the baby is between 2 and 18 month
- The window period is the time from point of infection to when the body produced measurable amount of antibody, usually 12 weeks.
- During the window period, the patient appear normal and has no complaints with laboratory also showing negative.
- HIV cannot pass though unbroken skin and is not spread through casual contact
- HIV is not transmitted by mosquitoes or other blood sucking insects. The virus is not present in sweat and there is no risk of contacting the virus from air infected athlete during sporting activities if he/ she is not injured.
- In Nigeria, HIV prevalence rate was 5.4% in 1999.
- People aged 15-24 have highest rates infection with female to male rate of 2:1 in this age group.

- Factors leading to the spread in young people are unprotected sexual intercourse, the use of alcohol and other drugs that impact judgment and sharing of needle to inject intravenous drugs.
- Other factors for infection are poverty, loss of family system, migration into urban areas, poor access to information on HIV/AIDS, and lack of health and social services
- The average time between HIV infection and the development of AIDS is ten years but this can be shortened.
- HIV infected women become less fertile and the longer the HIV progresses the less they are likely to get pregnant.
- HIV attack cell in the body with special receptor known as the CD4 antigen (CD is cluster of differentiation).
- CD 4 T cell count is used as a marker for HIV disease status and that normal count is between 600 and 1,500 cells per mm³. In patients with HIV diseases the count is usually below 200 cells per mm³.
- The major signs of AIDS are weight loss of 10% (body weight), chronic diarrhea for more than one month, prolonged fever for more than one month, etc.
- The presence of cryptococcal meningitis generalized Kaposi's sarcoma is enough to confirm AIDS.
- Tuberculosis is very common with infected patients.
- Enzyme linked immunoabsorbent assay test (ELISA) can be used to test for HIV but it is not really reliable. The western blot test or immunoassay is preferable and confirmatory

CHAPTER TWENTY SIX

HIV / AIDS AND ITS BIOLOGICAL IMPORTANCE

- The virus belong to a family of retroviruses distinguished from other RNA viruses by their ability to replicate through a DNA intermediate using an enzyme, reverse transcriptase
- HIV are further classified as lentiviruses, a name derived from the latin word lento, meaning slow, due to their slowly progressive criminal effect
- HIV- 1 is believed to have originated from a simian immunodeficiency virus (SIV) carried by chimpanzees which does not cause disease in them
- The SIV MAC was first identified from a Rhesus monkey in 1985.
- The HIV virion contains a protease reverse, transcriptase and integrase enzymes required for viral replication.
- Te HIV – 1 has a RNA genome consisting of 9 genes, flanked by the LTRs, these genes are named as follows:

gap, pol, env, tat, rev, rif, VPV VP and nef.

- The macrophages, dendritic cells and the CD 4 – T – cells are vulnerable to HIV infection because they express CD4, which the virus uses as a receptor.
- The life cycle of HIV n human cells involves five (5) stages
- At stage 1, the virus particle binds to CD4 on a cell surface by using the envelope protein gap 120. The CD4 binding is altered so that it binds to a specific chemokine co – recent (CCRS and CXCR4) on the T-cell
- At stage 2 the binding releases gp 41, which then causes, fusion of the viral envelope with the plasma membrane and the release of the viral genome into the cytoplasm
- At stage 3, the reverse transcriptase copies viral RNA genome into double, standard DNA which is integrated into the host DNA system to form provirus.
- A stage 4, the T-cell activation induces transportation of provirus and translation of viral protein.
- Lastly, stage 5 the viral particles are assembled and bud from the cell acquiring their lipid envelopes and glycoprotein in the process.
- Perinatal transmission is approximately 25% in Africa.
- Immediately after the infection, a person can either be asymptomatic or experience a transient flu like illness.
- When the virus becomes abundant in the peripheral blood, symptoms become more frequent as the CD4 – T cell count falls
- CD4 T cell counts below 280 cells perm of a patient is diagnosed with AIDS
- Over 30.6 million of the world population by WHO at the years of 1997 are the number of adults and children living with HIV / AIDS
- In Nigeria, available evidence indicated an increasing and prevalence of HIV/ AIDS.
- The result of national survey shows that the prevalence of HIV in Nigeria increased from 1.8% in 1991 to 5.8% in 2001, and that nearly 3.5 million Nigeria are infected with the virus in 2002
- In order to create awareness, a national action committee on AIDS (NACA) was set up in 2000, and since then NACA had been implementing a 3 years HIV/AIDS emergency action plan (HEAP)
- The WHO in 2004, reported the one - third of the estimated 40 million people living with HIV/AIDs are infected with tuberculosis and are likely to be 5 -10 times more affected than those who are not infected.

- In the absence of specific intervention the estimated rate of the mother to child transmission (MTCT) ranges from 14 – 25% in developed countries and 13% to 42% in the developing countries.
- Measures put in place to reduce transmission from HIV – infected women to their infants include specific interventions such as the use of anti- retroviral treatment or prophylaxis, safer delivery practices, and infant feeding counselling and support
- Globally about 700,000 children become newly infected with HIV 2003 mainly as a result of MTCT
- Example is HIV NET 012 regimen which has moderate efficacy (47%) for the prevention of peripartum HIV transmission when given to the mother at onset of labour and to the infant within 72 hours of birth
- Since 1995, drugs became available that can substantially curtail the progression of the disease by reducing the viral load and increasing CD4 counts
- The fact is that none of the drugs can be ascertain of total cure even if it is, it must be taken for a long time which is extremely expensive.
- The government should pump in money to researchers in the field of virology in the nation so as to devise new model of handling the virus

CHAPTER TWENTY SEVEN

IMPACT OF PHYSICS ON HUMANITY

- Physics is known as natural philosophy
- ☒ Physics is the philosophy of all the inanimate or physical part of the universe
- ☒ Motor vehicle is invented on the principle of laws of motion, force and transformation of energy.
- ☒ The Third law of Sir Isaac Newton is the law of action and reaction
- ☒ The forward or backward motion of the vehicle is brought about when the revolution of the population of transferred to that of the tyres.
- ☒ The rocket is acted on by a continuous force derived from the chamber.
- ☒ The thrust of the rocket is equal to force with which the exhaust escapes.
- ☒ This is clearly based on Newton 3rd law of action and reaction being equal and opposite.

- ☒ The moon led to the invention of artificial satellites of the earth called "**Geosynchronous**"
- ☒ Radio signals travel either on ground or are reflected through the part of the atmosphere (from 50 kilometers upward).
- ☒ The computer is essentially made up of the input device (the most common which is monitor), the CPU and output or printers.
- ☒ The CPU is made up of integrated circuits (I.C) and other electronic components.
- ☒ Integrated circuit (I.C) is a single package that houses a complete circuit.
- ☒ The printer uses the principles of optics and heat.
- ☒ The operation of INTERNET (International network of computers) is based on the fact that electromagnetic radiation (EMR) requires no medium for propagation, they travel at about 300 million meters or 300,000 km in one second.
- ☒ The telephone mouth piece convert audible sound of electrical signals while the ear piece converts the electrical signals back to audible sound.



CHAPTER TWENTY EIGHT

TECHNOLOGY: MAINTENANCE, ELECTRIFICATION AND SOLAR ENERGY

- Technology is the ability to develop the modality, procedure and process to use what is available in terms of raw materials to produce what is needed in air spheres of human needs.

- Science is the study of the earth.
- A nation is said to be developed when it has a technological base.
- A nation can be developed industrially with the aid of technology through:
 - The use of existing technologies
 - Introduction of new ideas and designs
 - Development of own technology.
- Project that have suffered abandonment in Nigeria include; Ajaokuta steel complex, Itakpe Iron company, Aluminum smelter company, fertilizer manufacturing co., Iwoyin paper mill, bitumen company etc.
- Technology can be transferred, adapted and further developed through them being applied to concrete problems.
- Engineering focuses on the performance of systems with the main purpose of facilitating effects.
- University engineering or technological education is therefore a process of bringing together, people of diverse backgrounds and exposing them systematically to a variety of contingencies that approximate and possibly stimulate situations that are likely to be encountered after graduation.
- There is apathy between universities, research institutes and industries as most problems are still being exported to other countries for solutions.
- Maintenance of engineering systems aims at guaranteeing high operation reliability, prolonging life span of machines, ensuring personal safety of the system and its operators saving cost and achieving efficient performance.
- An engineering system is an assembly of two subunits or functions which are:
 - System maintenance
 - Equipment maintenance
- System maintenance involves all the programmes designed to make the entire system as a whole work.
- Equipment maintenance are programmes designed to ensure that individual parts or units works as planned.
- There are four types of maintenance, which are; routine, preventive, corrective (breakdown) and refurbishing maintenance.

- Routine maintenance involves daily check of relevant components. Frequency varies from hourly to daily.
- Preventive maintenance is occasionally carried out. It involves periodical checks of relevant components. Varies from weekly to monthly.
- Corrective maintenance is carried out when a system breaks down or is about to break down. Also known as breakdown maintenance.
- Refurbishing is carried out when the overall system needs over – hauling. The equipment concerned is completely dismantled and the worn parts replaced or reconditioned.
- The history of electricity in Nigeria dated back to 1895 when preliminary investigation and planning were carried out by public works department.
- Electron is the negative charge of an atom
- Proton is the positive charge of an atom
- Electricity was first produced in Lagos in 1896 with a total installed capacity of 60kw, generated at the frequency of 80H2 by a single phase generator.
- The first power station was sited at the present electricity headquarters in Marina, Lagos.
- Electricity current is the flow of electron which is the negative charge of an atom.
- Proton is the positive charge in the nucleus of an atom.
- The integrated power system may be broken into Generation, Transmission and Distribution of load.
- Thermal power stations can be found in Lagos, Sapele, Ughelli, Afam, Akwa and Ugbelli.
- Natural gas which is the main ingredient available in bulk supply in Sapele, Effurun, Aladja, Ugbelli, Port Harcourt, Owerri, Eket and Calabar
- The coal oriented thermal which was serving Lagos and its environment in the 1950s and 1970s but which has been shut down, is now at Ijora.
- Solar energy is obtained from the sun rays
- Solar energy is the world's most abundant and permanent source of energy.
- The amount of solar energy intercepted by the surface of the earth every minute is greater than the energy utilization, by the entire mankind in 1 year.

- The major technologies of solar energy conversion are thermal conversion, comprising of flat plate or concentrating collectors, fluid systems, materials and storage.
- Photovoltaic thermal hybrid solar collector (PVT) are systems that convert solar radiation into thermal and electricity energy.
- A flat plate collector normally consists of one or two transparent covers which transmit incident solar energy to a blackened metal absorber plate and fluid passage.
- For the offsun utilization of solar systems, storage can be in the form of sensible heat, latent heat, biomass, as well as in the form of potential energy.
- Sensible heat storage is made up of water, oil, iron as well as stone.
- Latent heat uses syntetic salts for its storage.
- The management of electricity generation in Nigeria varies from the establishment of **ELECTRICITY CORPORATION OF NIGERIA** (E.C.N 1950) to **NIGER DAMS AUTHORITY** (N.D.A 1962) to **NATIONAL ELECTRICITY POWER AUTHORITY** (NEPA, 1972) and now, **POWER HOLDING COMPANY OF NIGERIA** (PHCN, 2005).
- The PHCN was unbundled into 18 companies;
 - 6 Generating Companies (20% owned by federal government)
 - 1 Transmission Company (Transmission Company of Nigeria).
 - 11 Distribution Company (40% owned by government).

CHAPTER TWENTY NINE

THE EARTH AS THE HOME OF MAN

- The surrounding of the earth is the space.
- The word 'UNIVERSE' or "COSMOS" refers to a limitless space
- The sun is 109 times the size of the earth
- The sun has a diameter of 15,756 km.
- The solar system is bigger than the sun 4232times.

- The solar system is a family of one star (the sun) (an average star) and nine planets running round the sun.
- Within one galaxy, there are millions and millions of suns/stars.
- A galaxy is a large group of suns, gas, planets, meteors, asteroids etc. rotating round a central nucleus.
- With every galaxy, we have red star (old and cold) and blue star (young and hot).
- The average distance between the one sun and the other within the galaxy is about 60 million km.
- Speed of light – 300, 000 km for second.
- Light travels 9,600,000,000,000 km per year
- There are billions of galactic clusters and super clusters.
- The clusters are described like bunch of bananas.
- The planets arrangement, starting with the nearest to the sun: mercury, venus, Earth, mars, Jupiter, Saturn, Uranus, Neptune and Pluto.
- The planets spin round the sun in elliptical orbits.
- Forty moons, thousands of asteroids and millions of meteorites spin around the planets.
- The distances of planets from the sun ranges from 57,900,000 km *(mercury) to 5,900,000,000 km (Pluto).
- It takes mercury less than 3 months (0.24) to complete one revolution around the sun (one year).
- A year on Pluto is an equivalent of 247,700 years on the earth.
- Jupiter is the biggest of all planets, about 9 times the size of the earth, and has the fastest rotation.
- Earth resides in the milky – way galaxy.
- Jupiter has the fastest rotation. It is completed in just about 9 hours 52.5 minutes.
- One day on Jupiter is completed in just 9 hours 52.5 mins.
- One day on Venus is 243 days on earth (about 8 months)
- For mass, Jupiter is 3.8 times the earth.
- Saturn, Uranus and Neptune are about 95, 15 and 17 times the size of the earth respectively.
- The earth is bigger than Venus, Pluto, mars and mercury by 1.2, 5, 9.4 and 18 times respectively. Jupiter has the

longest equatorial diameter of 143,000 km

- Pluto has the smallest measuring 2,700km
- The earth has the heights density of 5.52 (water=1), mercury 5.46, Venus 5.23, mars 3.93 and the lowest is Saturn 0.69 quite higher than water.
- Jupiter and Saturn have 15 moons each
- Uranus has 5 moons, mars and Neptune has 2 moon each while earth and Pluto one moon each.
- There are smaller bodies like asteroids and meteors within the solar system.
- Asteroids are bigger than meteors.
- Galaxy is clusters of different stars.
- Shooting stars is the falling meteorite which is quite observable in the night.
- The irregular visitors to our solar system are the comets
- A particular comet named Halley comes only once in 75 years.
- The last time 'comet' visited the earth was 1987.
- The sun has a diameter of 1,394,000km
- Our Milky Way 16 flying towards the Andromeda galaxy at a great speed of 290km per second.
- The sun has a surface temperature of about 6000°C .
- The earth was formed based on gradual process of condensation and accretion forms the earth.
- It was estimated that between 3.7 and 2.2 billion years ago, the surface of the earth cooled.
- The earth's atmosphere is said to extend as far as 10,000 km into space.
- The earth constitute mainly of nitrogen 78% oxygen 21%, argon 0.93%, carbon dioxide 0.03% ad thin traces of others like neon, helium, hydrogen methane etc.
- The first layer of the earth is the lithosphere about 50 – 100 km thick.
- Beneath the layer is the rocky mantle, which constitutes about 80% of the earth volume and thickness of about 1688 kms.
- The basic eight chemical elements within the crust by weight are oxygen 46.60%, silicon 27.2% Aluminum 8.13%,

iron 5.00%, calcium 3.63%, sodium 2.83%, potassium 2.59%, magnesium 2.10%.

➤ The earth is spherical in form of travels in a nearly circular path around the sun.

➤ The size of the earth is described as follows:

- Along the middle 12,756kms
- North to South Pole slightly less by 43kms. i.e. polar axis 12,714 kms.
- East – west direction circles are called latitudes,
- Total surface area of the earth is $509,504,203.4\text{km}^2$ while volume $1,081,422,000\text{km}^3$.
- The earth is spinning in the west to east direction i.e. eastward rotation (24 hours rotation).
- The journey of the earth around the sun is termed "EARTH REVOLUTION OR REVOLUTION".
- One revaluation is completed $365 \frac{1}{4}$ days (a year).
- The path the earth takes is called its orbit.
- The orbit is elliptical around the sun.
- The farthest point to the sun along the orbit is 152 million kms, called APHELION, which occurs in July 4.
- The closest point to the sun, called PERIHELION along the orbit, about 147 million kms, which occurs in Jan 3.
- The speed of the earth along orbit is 107,280 km/hr.
- The spherical earth is not standing erect on its orbital plane but is slightly bent by $23 \frac{1}{2}^\circ$.
- The tilt and revolution around the sun produce the seasons, the solstices and the equinoxes.
- Equinoxes occur at March 21 and September 23 when there is equal length of day and night.
- The summer solstice occurs in June 21 when the longest day is experienced in the northern hemisphere and the longest night in the southern hemisphere.
- The winter solstice occurs in December 22, northern hemisphere experience the longest night and the south experience the longest day.
- Man's home address in the physical realm is planet earth (unit), solar system (department), galaxy

(faculty) and Milky Way (Universe).

- The earth is spinning in the west to east direction giving the abnormal expression "eastward rotation of the earth".
- The gigantic universe is characterized by motions, vibrations, expansions and contractions ruled by order, energy and divine intelligence.

CHAPTER THIRTY

NATURAL AND MAN INDUCED DISASTERS

- A disaster is an unfortunate event, a great and sudden misfortune or calamity.
- A hazard is define as anything or event that might cause an accident or create danger.
- A hazard has the potential of becoming a disaster if and only if, is subjected to certain condition.
- IDNDR – International decade for natural disaster reduction (1990 – 1991) (Jan – Dec respectively).
- The cause of a disaster may be natural or man – made
- A natural hazard is a geophysical or biologic phenomena or event that is dangerous and likely to cause damage or death.
- Theology of natural disasters:
 - 1. Disasters of geologic origin – earthquake, landslide, Volcanic, eruption, avalanche, tsunami and soil erosion
 - 2. Disasters of hydro meteorological origin – fog, heat waves, cold waves, blizzard, drought and desertification
- Disasters of biological origin such as pests, locusts and diseases.
- Major natural hazard in Nigeria – rainstorms, floods, drought, soil erosion, dust storms, acid rain, desertification, harmattan haze, air and water pollution.
- Volcaniceruptions occurs when a hot molten substance usually referred to as 'MAGMA' forces its way to the surface of the earth through a vent in the earth crust.

- Eruptions of mount pelee on the island of Martinique in the Philippines occurred in 1902, eruption of mount vesuvins in Italy was also accompanied with a lot of destruction.
- Earthquakes have been described as a government of the earth crust which originates naturally believes the earth surface and sometimes causes a permanent change of level at the surface.
- Earthquake in Tokyo occurred 1st of September, 1923.
- Earthquake is known as GREAT KANTO QUAKE" now in Japan.
- Aridity is a natural state.
- Drought occur when water demand of crops are not met by falling precipitation and soil moisture/
- Man earthquake regions of the world, have active volcanoes in their midst.
- Desertification is an extension of desert conditions.
- Flood refers to any overland flow of water over an area or street sufficient to cause significant property damage, traffic obstructions, nuisance and health hazards.
- hurricane was derived from Hurricane (THE GOD OF EVIL OF THE CARIB PEOPLE OF THE CARIBBEAN)
- Hurricane was himself inspired by the Malayan god who destroyed humans with great storms and floods.
- Hurricane - inland flooding
- Tornadoes are longer and much larger lasting hurricane.
- The occurrence of tornadoes is proceeded by hot sultry and oppressive air
- Natural disasters are largely caused by factors that are completely outside man's control.
- Man – induced disaster are attributable to a number of anthropogenic factors such as technological failure, unsustainable environmental practices etc. and also fire hazards, crashes, oil spillages are man induced disasters.
- In 1952, minimata Bay, Japan rewarded a discharge of mercury (Heavy metal).
- In 1984, in Bhopal India, there was a leakage of 40 tons of gas used to manufacture pesticides.
- In 1986, there was a nuclear power plant accident in chernobyl,Ukraine.
- In 1988, a consignment of nuclear waste from Italy was dumped at Koko, Edo State.
- In 1980s in Ibadan there was an indiscriminate discharges of battery waste.

- In Jan, 1984, cyclone domain struck Mozambique
- China and India lead in rating of catastrophic losses of life in weather related event.
- WMO – World Meteorological Organization
- IAHS International Association of hydrological sciences.
- Strategies for disaster management: hazard production hazard and risk assessment and disaster mitigation.
- WMO was found on 23rd of March, 1950.
- International methodological organization (I.M.O) was founded in Vienna, 1873
- International Strategy for Disaster Reduction (ISDR) released IDNDR
- FEPA – Federal Environmental Protection Agency
- LSEEPA: Lagos State Environmental protection Agency
- NEMA – National Emergency Management Agency (NEMA)
- NERA – National emergency Relief Agency in 1976
- NEMA – Replaced MERA in 1999.
- ☒ NASRDA – National Space Research and Development Agency

CHAPTER THIRTY ONE

AGRICULTURAL DEVELOPMENT IN NIGERIA

- Agriculture is no doubt the most important economic activity in the world.
- Agriculture engages about two third of the world population.
- Agricultural as an economic activity is very crucial for any developing nation
- Despite the rapid expansion of petroleum industry, Agriculture remains the king of the Nigeria economy.
- As at 1970 Agriculture sector was providing a whopping 72 percent of Nigeria export earnings.

- As at 1970 Agriculture sector was providing a whopping 72 percent of Nigeria export earning
- In 1985, its contribution to GDP has dwindled to 26.4%, it was able to gainfully employ 58% of the labour force unlike the oil industry, Which only engage a more population of 0.4%.
- The neglect thereafter of the agriculture sector for the easy petrol dollar brought a very sharp decrease of only 6.4% of export earnings.
- Agriculture could be practiced at subsistence level whereby the farmer produces for his own basis requirement.
- Agriculture could also be practiced at commercial level whereby all the products are meant for sale.
- Generally, the main Agricultural systems are viz: shifting cultivation (Bush fallowing, Terrace farming, irrigated cultivation, plantation, permanent/ sedentary mixed farming).
- Shifting cultivation / Bush fallowing involves a use of a piece of land for about two or three years than abandoned to allow for repusitment.
- Terrace farming is a simple rotation of corps to minimize depletion of fertility and the planning and protection trees to provide supplementary animal and human food.
- Irrigated cultivation includes the common watering with cans or calabash, preservation of seasonal flooding. The modern irrigation techniques involve sophisticated surface sprinklers etc.
- Permanent/ sedentary mixed farming occur where people can no longer shift because vacant land no longer exist in sufficient quantity for new settlers, another improved agricultural techniques became important to sustain yield.
- Plantation is the cultivation of large farms.
- All the systems are functions of ecological and human factor.
- Environmental factors always influence the type of system being adopted.
- Inspite of oil booms and inconsistent policies, Agriculture remain the greatest employer of labour, the supplier of food and a significant contributor to the national GDP
- Agriculture is greatly influenced by such factors such as land farms, climatic, soil, production, distribution and socio cultural evolution of people.
- Pastoralism involves the grazing of animals which can provides food, raw materials or carriage (Onyemelukwe and Flani 1985 P. 134)

- There is a symbolic relationship between crop and animal farming; the crops provide food for the animals and not infrequently.
- In developing countries, the forest is the main sources of energy for cooking; wood for building houses and other items such as boats, household furniture and carts.
- In the early period, the rate of forest re-growth outstrips the ratio of use of man. But currently, the rate of depletion is quite faster than re-growth.
- Broadly, Nigeria forest could be classified into the woodland s and the forest. The savanna is about four – fifths of the country and is the main sources of wood for fuel and poles. The remaining one fifth consists of rain forest, which supply timber.
- In Nigeria, the predominant mode of fish production is the peasant artisanal fish mongering in inland rivers, Creeks and coastal waters CBN / NISER (1991).
- The strong influence of the physical environment on agricultural system is well illustrated by the crop zones of Nigeria.
- In Map 1 is the ten basis crop region of Nigeria which Hamson church (1980), derived from the 1950: 51 sample census of agriculture.
- The detail presented by Hamson was modified by Alao (1988) and the political boundary is updated by this author.
- There are zones 1 to zones 10
- Zone 1 stretches through Edo, Delta, Enugu, Anambra, Cross River etc. this region produces yam, cassava and maize for subsistence and internal exchange.
- Zone 2 which is the cocoa region occupies the south west zone (Oyo, Osun, Ondo and Ogun state).
- Zone 3 has mixed export crops and (root) food crop region spanning western Ogun, Southern Oyo, Edo, Anambra, Enugu, and Cross River etc. Oil Palm, Citrus and Cocoa are produced there.
- There are other zones from zone 4 to zone 10
- The agricultural sectors is an area where there have been more policy changes than any other aspect of our national development
- Policy changes occur in the pre-independence days and post independence days.
- Policies established during the pre-independence era are

- ✓ Research stations at Moor plantation and Samaru
- ✓ Farm settlements
- ✓ Commodity boards
- Policies created during the post independence era ful 1970s are

National accelerated food Production project (NAFPP)

- ✓ Research institutions
- ✓ River Basin Development authorities
- ✓ Agricultural Development Project
- ✓ NACB
- ✓ Agricultural Credit Guaranteed scheme
- ✓ Operation Feed the Nation

- Other policies crated in the late 1970s – 1980s include:

- ✓ Agricultural parastatals
- ✓ Green revolution
- ✓ Back to the land
- ✓ Structural Adjustment Programme (SAP) – package

CHAPTER THIRTY TWO

AGRO ENVIRONMENTAL DRYNESS

- The philosophy of agro - environmental dryness can be deduced from environmental degradation threatening the arid, semi – arid and sub – humid regions
- It reflects human and natural processes characterized by extremes heat, low relative humidity, high/mild wind velocity, inadequate rainfall and extreme dryness of vegetation.
- 300 years ago, agriculturists in extremely dry places, practiced, "RUN OFF AGRICULTURE".

- Run – off agriculture is a process of collecting rainfall from catchments areas and then channeled to fields to provide enough moisture for crops to thrive in a hostile environment.
- This method (run off agriculture) was widely used in Middle East, North Africa, China, India, Northwest and the American southwest.
- Drought is a period of dehydration that seriously distrusts the normal conditions of an environment.
- When there is a prolonged dry weather, generally, when preparation is less than 75% of the average annual amount is known as "drought"
- Drought can be classified into:
 - i. Meteorological Drought: Drought that exist due to low rainfall.
 - ii. Hydrological Drought: Drought that exist as a result of deeper water table arising from low stream flow.
 - iii. Agricultural Drought: This is a sporadic condition whereby rainfalls at wrong time usually referred to as ill – termed rains.
- When a serious and prolonged draught causes irreversible environmental damage, this is known as DESICCATION,
- Desiccation is caused by climatic and edaphic factors.
- Desiccation is much more destructive than drought because of its long – term effects.
- If desiccation is not properly managed, it can lead to a trauma known as DESERTIFICATION.
- Desertification is also dry land degradation or the poorly managed desiccation which is caused by man's abuses or improper management of prolonged drought conditions.
- Desertification is also characterized with hot, warm and dry winds.
- The northeast trade wind known as harmattan is the dry wind that blows from the Sahara desert.
- Sirocco is the hot dry wind and more feasible in North African countries.
- Chinnock is the dry and warm wind found in mountainous areas of African.
- Khamsina is the dry wind that originates from the Sahara desert.
- OASIS is referred to as the only fertile place with water and trees in a desert.
- Deforestation is also popularly known as DEVEGETATION.

- Devegetaiton has two functional components.
- One is mass destruction and more or less total removal of plant cover
- The other is serious large scale alteration of species composition.
- Devegetation has brought in its wake a host of other environmental problems such as accelerated soil, erosion, flooding, decline in soil fertility and siltation of water bodies.
- Aridity is a geographical concept used to describe all forms of environmental dryness from the demography to the biophysical nature or condition.
- The affected regions are sub – divided into arid, semi – arid and sub – humid zones basedon their intensity.
- Impact of dryness can be classified into four:
 - i. Human migration which can be temporary, patterned or climate induced emigration.
 - ii. Loss of bio village
 - iii. Food crisis
 - iv. Increase in susceptibility to disease
- Integrated resources should be used to control degradation of the resource base.
- Integrated crop management (ICM) should be used to improve deserted soils' conditions.
- Integrated pest management (IPM) is indirectly important to reduce inorganic fertilizers and pesticides to improve vegetation and soil nutrients status.

CHAPTER THIRTY THREE

ENVIRONMENTAL POLLUTION

- Environment means the surrounding conditions which influence the growth and development of living organism.
- Three(3) main physical components of the environment are:
 - The biosphere (represents the land)
 - The hydrosphere (represent the water)
 - The atmosphere (represent the air)
- Environmental pollution may be defined as the undesirable changes in the physical, chemical and biological characteristics of the air, water and land (i.e. the environment) that can be harmful to the health and survival of human and other living organisms.
- Environmental pollution may be grouped into; land, water, air, noise and nuclear energy irradiation.
- Major factors associated with the accelerating pace of water pollution are urbanization, deform, carton, damming rivers, destruction of wetlands, mining and industrial development etc.
- Agricultural production increased globally by 19% between 1975 and 1984.
- Major air pollutants are carbon monoxide, hydrocarbons sulphur oxide, nitrogen oxide and particulates.
- Sources of air pollutants include; National sources, transportation sources, domestic sources and agricultural activity sources
- Diseases like branches and lung cancer are fallouts of air pollution.
- The major ozone depleting substances noted are the so-called "green house gases" (carbon dioxide, carbon monoxide, nitrous oxide, methane etc).
- Noise is an unwanted sound which disappears when the source is turned off.
- Radioactive materials and wastes produce dangerous radiations which are highly toxic.
- High level radiation could result in cancer, leukemia and damage to body organs.
- Low level radiation could result in mutation
- Most eradicative pollutants reach the environment form nuclear power reactors and improper disposal of radioactive waste materials.

CHAPTER THIRTY FOUR

ENVIRONMENTAL RESOURCES MANAGEMENT

- The earth is the only planet known to have the right temperature and the right atmosphere to support our kind of life.
- Plants are also known as "flora" while humans; "fauna"
- Environment can be defined as the aggregate of all the external conditions and influence affecting the life and development of an organism.
- Scientifically, environment is defined as the totality of our surrounding, with physical, chemical and biotic components which are as a dynamic state of interplay.
- Environmental assets provide three (3) main types service:
 - Provides raw materials and inputs
 - Serves as sink to absorb and recycle waste
 - Provides generalized services ranging from simple amenities to irreplaceable life support function.
- We should consider environment in its totality as both natural and built, technological and social, economic and political, cultural and historical, lastly, as having moral and aesthetic value.
- Natural resources may be defined as anything offered by nature that is perceived as useful and beneficial to the development of mankind.
- Natural resource management is the ways and means of which we can explore and exploit the natural resources that form the base components of the environment.
- Environment resources management is therefore "an approach to environmental stewardship which integrates ecology, policy making, planning and social development.
- Natural resources can be classified into:
 - Organic

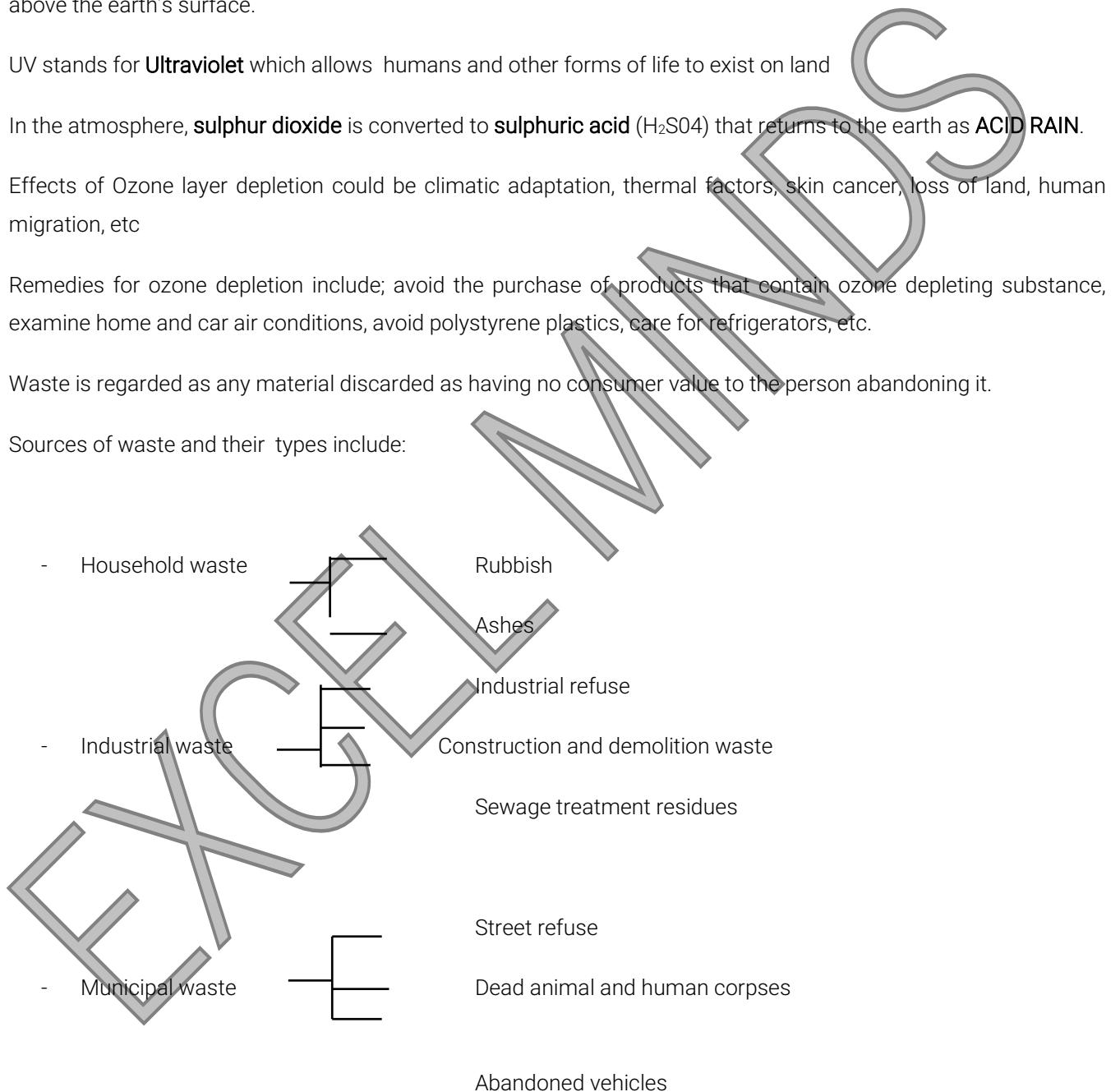
- Inorganic
- Inexhaustible
- Exhaustible
- Renewable
- Non renewable
- Quantity
- Quality
- latent resources

- Organic resources are things that have life in them and can reproduce and subsequently die naturally or be caused to die.
- Inorganic resources are non living /inanimate things
- Inexhaustible resources: are natural resources which continue to exist no matter how much they have been utilized.
- Exhaustible resources are resources that can finish or can face total extinction if they are recklessly utilized.
- Renewable resources are resources that can procreate, reproduce and multiply either sexually or asexually.
- Non – renewable resources are resources that can undergo final consumption once they are put into effective usage.
- Quantity resources are resources that are difficult to measure. It is not easy to measure forest resources, animals in the forest, etc.
- Quality resources are resources that sustain life. They are land, water, air. They require environmental quality.
- Latent resources are resources that remain hidden as a result of ignorance, lack of technological knowhow and lack of capital to embark on scientific research and exploitation.
- Environmental management has a lot of problem facing it which includes complexity of environmental problem, infancy of environmental planning, difficulty in effecting lifestyle changes, etc.
- Bio – diversity is the variety and variability among living organisms and the ecological complexes in which they occur.
- The basic levels at which variety and variability among living organism is recognized are Genetic, Species and

Ecosystem diversity.

- Genetic diversity is the variability in the genetic makeup among individuals within single species.
- Species diversity is the variety of the species or types of organism in different parts of the planet. Such as grassland, forest, oceans and desert.
- Ecological diversity is the variety of forest, deserts, oceans, grasslands, rivers, lakes and other biological communities that interact with one another and the various ecological processes.
- Threats to biodiversity include; inappropriate agriculture methods, debt burden, over harvesting, political instability, encroachment etc.
- To ensure complete security of diverse Flora (plants) and Fauna (human) we must inventorise, identify and rehabilitate all unwanted and endangered species of fauna and Flora and ecosystems, etc.
- To also manage bio - diversity we must create an environmental policy conducive to land use system that conserve bio diversity.
- Pollution means to make dirty, destroy the purity or sanctity of the environment with filthy waste from industries, factories and agricultural run off.
- There are two categories of polluting materials:
 - Bio - degradable pollutants or non persistent pollutants
 - Non - degradable pollutants (compounds)
- Bio - degradable pollutant are pollutants that are broken down completely or reduced to acceptable levels by natural processes.
- Non - degradable pollutants are broken down by natural processes. They include toxic elements, lead and mercury.
- Types of pollution include water, radiation, chemical, soil, noise, traffic, land and agricultural.
- Causes or sources of pollution include domestic sewage, agricultural chemical, petroleum urbanization, thermal/waste heat, etc
- Effects of pollution are grouped into; Health effects, Nuisance effect and Danger to Structure.
- Health effects includes loss of hearing, psychological disorders and physiological disorders
- Nuisance effect includes communication, sleep disturbances and general nervous breakdown due to anxieties.

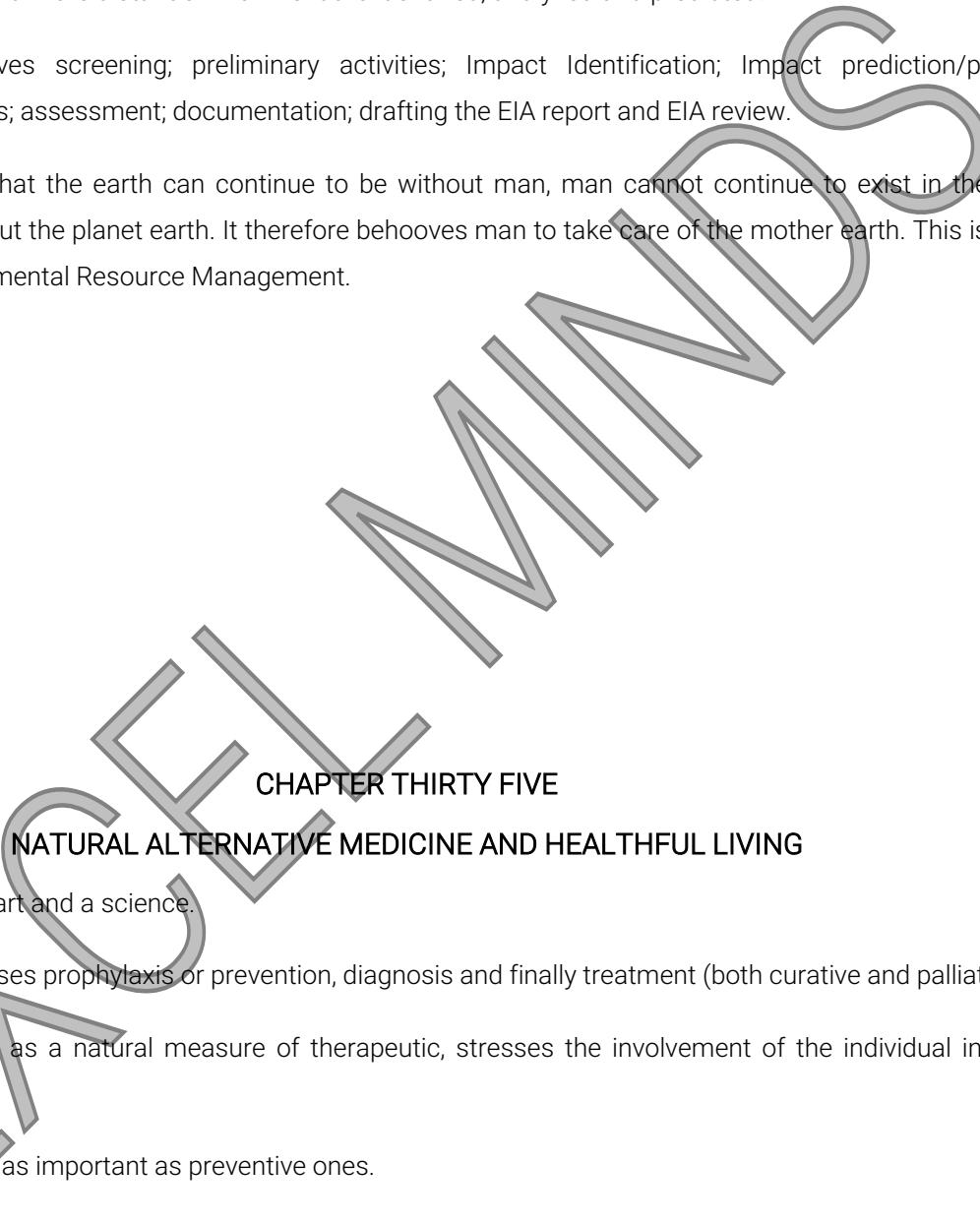
- Danger to structure include crack in the wall building, degradation to building foundation, collapse of structures etc
- The atmosphere is that thin envelop of life sustaining gases surrounding the earth, divided into several spherical layers.
- About 95% of the earth air mass is found in the inner most layer called the troposphere extending about 17km above the earth's surface.
- UV stands for **Ultraviolet** which allows humans and other forms of life to exist on land
- In the atmosphere, **sulphur dioxide** is converted to **sulphuric acid** (H_2SO_4) that returns to the earth as **ACID RAIN**.
- Effects of Ozone layer depletion could be climatic adaptation, thermal factors, skin cancer, loss of land, human migration, etc
- Remedies for ozone depletion include; avoid the purchase of products that contain ozone depleting substance, examine home and car air conditions, avoid polystyrene plastics, care for refrigerators, etc.
- Waste is regarded as any material discarded as having no consumer value to the person abandoning it.
- Sources of waste and their types include:



- Management of solid wastes can be categorized as sanitary landfills, incineration, composting, recycling, source

reduction, recovery and re-use.

- The Environmental Impact Assessment (EIA) framework for environmental management and protection was introduced in the United States of America in 1969.
- EIA is a study whereby the potential physical, biological, economic and social impacts of a proposed development on the immediate and more distant environment are identified, analyzed and predicted.
- EIA process involves screening; preliminary activities; Impact Identification; Impact prediction/projection; mitigation measures; assessment; documentation; drafting the EIA report and EIA review.
- It must be stated that the earth can continue to be without man, man cannot continue to exist in the present physical form without the planet earth. It therefore behoves man to take care of the mother earth. This is the very essence of Environmental Resource Management.



CHAPTER THIRTY FIVE

NATURAL ALTERNATIVE MEDICINE AND HEALTHFUL LIVING

- Medicine is both an art and a science.
- Medicine encompasses prophylaxis or prevention, diagnosis and finally treatment (both curative and palliative)
- Preventive medicine as a natural measure of therapeutic, stresses the involvement of the individual in his own health care.
- Curative medicine is as important as preventive ones.
- The natural art of therapeutics is not a new approach in the field of medicine, rather it is as old as people been the inhabitants of this planet.
- Preventive and curative approaches used by man to keep him healthy are sometimes called "primitive" measures
- Therapeutic drugs are usually much more expensive than preventative measures.

➤ Types of natural therapeutics include;

- Allopathy “substitutive therapy” auxotherapy which is a therapeutic system in which disease is treated by producing a morbid reaction of another kind or in another part.
- Naturopathy is a system of therapeutics in which neither surgical nor medicinal agents are used with dependence placed only on natural forces.
- Naprapathy which is based on the theory that morbid symptoms are dependent upon strained or contracted ligaments in the spine, thorax or pelvis.
- Chiropractic is a philosophic system of mechanical therapeutics that attribute disease to vertebral subluxations.
- Homeopathy; developed by Samuel Hahnemann where he posited that large doses of certain drugs given to healthy persons will produce certain conditions which, when occurring spontaneously as symptoms of a disease, are relieved by the same drug in small doses.
- Osteopathy – A school of medicine that posits that the normal body when in “correct adjustment” is a vital machine capable of making its own remedies against infections and other toxic conditions.
- “Folk medicine” which is treatment of ailments in the home based upon experience and knowledge handed over from generation to generation.
- Acupuncture is an ancient medical system of therapy using puncture by fine needles.
- Preventive medicine which is a branch of medical science concerned with the prevention of diseases.
- Curative medicine which is a special type of medicine, designed for the restoration of health.
- Podiatry Medical Treatments are specialty that includes the diagnosis, surgical, mechanical, physical and adjunctive treatment of diseases, injuries and defects of the human foot.

- Hakin Hakin is a physician without a formal education or degree. He combines herbal medicine, homeopathy, naturopathy, chiropractic and others.
- The medicinal value of food is in the nutrition derived from the necessary nutrients in natural state.
- All vitamins are organic molecules.

EXCERPTS FROM THE NOTE

- Medicinal plants are plants that contain properties that are called "Active principles or component" which have the activities responsible for prevention of illness/diseases in man and animals
- Active principles or components are usual metabolic products of the plants.
- Active principles can be "nutritional in value" or "medicinal in value".
- Nutritional in value comprises of carbohydrate, protein, vitamins, minerals, salts etc.
- Medicinal in value are those whose effects are secondary. i.e when they are present in the body, they prevent diseases, but if otherwise, the disease comes out. Examples are: alkaloids, flavonoids, steroids, anthocyanins, tannins etc.
- The collection of medicinal plants involves time of the day, the environment (soil and weather) and the parts needed.
- Most plants contain high amount of active principles between 8am – 12 noon, because once it is sunny, they lose water to the atmosphere.
- Excess Alkaline is harmful to the plant. The more acidic the soil is, the more alkaline the plant will be.
- Some plants produce active principles only during the sunny weather, dry weather or sunny season. Examples include Thyme (Aromatherapy/Essential oils)
- The part of a plant ranges from the leaf, the stem, the bark, root, flower, fruit, seed etc.
- Alternative medicines are produced through local means. The most popular method is the "herbal Teas". Other methods include, powders, syrup, etc.
- There are three (3) kinds of herbal tea. They are:
 - Infusion
 - Decoctions
 - Cold extracts
- Decoction is the boiling of the plants e.g "Agbo"
- The cold extract is usually prepared at the room temperature.
- The major challenge of traditional medicine is that there is no specific dosage.
- There are four different types of vitamins sold as "natural" these are:
 - An extract of food concentrated so that vitamin is higher than original food.

- Highly concentrated crystals or purified vitamins altered somewhat but extracted from foods.
- Synthetic vitamins for which the starting materials are natural materials.
- If a natural base such as yeast is included, the addition of synthetic vitamins may not prevent the product from being called **NATURAL**.

CHAPTER THIRTY SIX

HEALTH AND SAFETY: GENERAL HAZARD PREVENTION AND FIRST AID

- We have **The Health And Safety At Work Act** of 1974,
- Hazard is synonymous with danger, risk, peril, exposure, vulnerability or susceptibility.
- Chemical hazards are dangers which results from wrong disposal of unwanted or used chemicals,
- Biological hazards are diseases which may be transmitted from animals to man, or man to animals through acquired infections.
- Artificial respiration should be given in the case of electrical shock.
- The old British standard colour code for 3 core flexible cords was:
 - Earth: Green or Green / yellow
 - Live: Red
 - Neutral: Black
- A new colour code came on 1/July/1970;
 - Earth: Green or Green / yellow
 - Live : Red
 - Neutral: Blue
- Dangers from harmful radiation are Alpha, Gamma, Beta, X – ray, Laser ray.
- Alpha – particles are helium nuclei, which carry positive charge.
- Beta – particles are negatively charged and identical with electrons.

- Gamma rays and X – rays are electromagnetic waves.
- Gamma rays are actually X – rays of short wave length.
- **DOSE** is the amount of radiation delivered to a specific absorber.
- The **REM** is the dose for the measurement of biological effectiveness.
- **FILM BADGES** are usually worn on coats or overall or on wrists or finger. They are used for the measurement of radiation.
- **SHIELDING** are materials used to protect people from penetrating harmful rays.
- Alpha particles range of penetration is about 25mm in the air.
- Beta particles can penetrate body tissues because it has longer penetrating range.
- Precaution is a preventive measure embarked upon in order to prevent situations arising that will result in accident or failure of system, appliance, and health, loss or damage of body parts and limbs.
- Preventive measures against hazard include general cleaning, visual inspection, general testing, routine maintenance, record keeping, reconfiguration to enhance performance etc.
- A combination of combustible fuel, heat and oxygen is needed to start a fire.
- Combustible fuels are wood, paper, petrol, oil etc
- Examples of heat sources that can set up fire are electric current, mechanical friction, live cigarette ends etc.
- The principal method of extinguishing a fire are:
 - Starving (removing the fuel).
 - Smothering (removing the oxygen).
 - Cooling (removing the heat).
- Smothering and cooling are the usual methods as starving is seldom practicable.
- Fire risks are classified into 3 groups:

Class A – all carbonaceous materials such as wood.

Class B – Inflammable liquids such as oil, petrol etc

Class C – live electrical wiring and equipments.

- There are two types of portable water extinguishers;
 - The soda acid type.
 - The gas pressure type.
- There are two main ways of reducing accidents at work;
 - Safe place approach.
 - Safe person approach.

- Smoke from fire contains carbon dioxide.
- A method of protecting an individual from fatal shock is "double insulation".
- Accidents are unexpected or unforeseen occurrences, resulting into loss of life or damage to the body.
- First aid is the first help rendered to any accident victim or anyone in danger as a result of major or minor accidents.
- Burns make the skin reddened, blistered or destroyed.
- First aid is the application of acceptable skill of treatment on the occurrence of an accident using facilities or materials available at that time.
- The fundamental objectives of a first aider are to sustain life, prevent the condition from becoming worse and promote recovery.
- Sustain life could be seen in resuscitation of a casualty.
- Prevent the condition from becoming worse can be practically done by covering the wound with a clean material.
- Promote recovery could be achieved through relieving pain.
- Responsibilities of a first aider are:
 - Assess
 - Diagnosis
 - Disposal

CHAPTER THIRTY SEVEN

INTRODUCTION TO MANAGEMENT ACCOUNTING

- ☒ Management Accounting is concerned with date gathering (from internal and external sources), processing, analyzing interpreting and communicating the resulting information for use within the organization so that management can use it in making effective decision and control operation.
- ☒ Management accounting requires financial and cost accounting information.
- ☒ Management accounting is a decision making system which is futuristic as it evaluates future as it becomes present.
- Management Accounting Practice Committee defined M.A as the process of identification, measurement, accumulation, analysis, preparation, interpretation and communication of financial information used by management to plan, evaluate and control within an organization and to ensure appropriate use and accountability for its resources.
- ☒ Management Accounting Process: Identification – measurement – accumulation -preparation and interpretation-communication.
- ☒ Management accounting is used to plan, evaluate, control and assure responsibility.
- Functions of management accounting include: planning and control, reporting and interpreting, tax administration, government reporting, protection of assets, economic appraisal etc.
- In a broader sense, management accounting includes financial accounting.

Basis	Financial Accounting	Management Accounting
Users	External & Internal	Internal
Rules	Strict compliance	No compliance
Nature of information	Historical	Futuristic
Time frame	Annually	Anytime
Approximation	Disallowed	Allowed

- Planning process requires identification of priorities and an evaluation of the critical and limiting strategic needs. It is needed to bridge the gap between the present and future.
- Planning process involves:
 - Establishing enterprise objectives

- Determining short range objective or operational goals
 - Developing strategies
 - Formulating budgets or profit plans
- Objectives are statement of broad and long range desired state or position of the enterprise in the future.
- Goals represent the operational specifications of the broad objectives with time and quantity dimensions.
- Strategies lay down the foundation for attaining the objectives and goals of the enterprises.
- A budget is a formal expression of the enterprise plans and objectives stated in financial terms for a specified period of time.
- Control is the process that ensures that plans are being attained.
- The primacy of planning denotes the singular importance of planning in the management process.
- Levels of management can be top, middle and lower level management.
- Top level (strategic), Middle (tactical) , Lower (operational)
- Forecasting is a vital function that pervades every planning effort. It is the connecting link between an organization and its environment.
- Types of forecasting are subject to classification
 - Classification based on purpose
 - (a) Demand forecasting
 - (b) Environmental forecasting
 - (c) Technology forecasting
 - Classification based on time horizon
 - (a) Long range forecasting
 - (b) Medium range forecasting
- Methods of forecasting are generally classified into subjective forecasting methods, time series method and causal forecasting methods.
- Methods of forecasting include subjective forecasting method (qualitative), Delphi method, collective opinion

method, market research and historical analogy.

CHAPTER THIRTY EIGHT

COUNSELING SERVICES AND UNIVERSITY STUDENTS

- Guidance is the other side of the coin "counseling".
- Counseling is needed to prevent problems, resolve problems and sustain oneself in the course of a problem.
- ☒ There are three key areas in counseling, which are; **career counseling, educational counseling and socio-personal matter.**
- The ultimate goal of counseling involves something more than a solution to a problem.
- Counseling helps to make the student better, happier and more successful.
- Counseling is the application of mental health psychological or human development principle.
- Freshmen in the universities need orientation on the culture, social and academic matters in their new environment.
- Orientation help fresher's to adjust faster and better to their new environment.
- University students have to start their educational career at this level by registering for certain courses which are compulsory, required and elective courses.
- While reading students are advised to use what is known as Robins SQ3R study method.
- S stand for study, Q for question, R for reading, R for recite, and the third R for review.
- Student should not hesitate to request for explanation of specific sections of a lecture from lecturer or serious minded course mates.
- Student should have a notebook each for putting down correctly assignments given by either lecturers
- Student should develop a good habit of taking down notes while reading a text or listening to a lecturer / teacher.
- Student should develop motivation for remembering, minimize distractions, practice memory skills, and use meaningful or familiar examples among others to improve their memory.

CHAPTER THIRTY NINE

INTRODUCTION TO SUPPLY CHAIN MANAGEMENT

- Logistic and supply chain management relates to distribution functions with specific reference to transport, warehousing, stock inventory, packaging, materials handling and the delivery process.
- Logistic is the management of inventory in motion and at rest.
- Supply chain extends from suppliers' suppliers to customers' customers.
- With regards to the e-supply chain i.e e-strategy, the internet and other forms of rapid date exchange are creating more efficient supply chains.
- Supply Chain Event management (SCEM) enables companies to cut costs, moderate inventory expand markets, create new products and improve responsiveness to customer needs.
- Goods are handled by a number of intermediate organizations who together form a sort of chain along which the goods are passed until they reach the final consumers.
- The ultimate aim of supply chain management is to get the product or services from their origin to their destination.
- Supply chain management has many aliases, among which are; supply network management, supply web, demand chain, value network – integration, among others.
- Marketing creates the demand, supply chain fulfills it.
- Modern supply chain management techniques are making possible the daily production of more and more product of varied items and their distribution to customers within the shortest possible time.
- A total synchronization of the chain is necessary to reduce and control procurement costs, simplify and streamline purchasing and leverage supplier efficiency through collaborative planning and execution.
- Supply chain management manages three kinds of business flows, namely: materials, information and money.
- In pushing e- business, the internet is bringing to the fore an opportunistic new breed of firms which are known as **business to business "infomediaries"**.
- The e- strategy helps to cut supply chain costs through increased process efficiency and help companies gain return on investment (ROI).

- Supply chain management is globally recognized as an industry and a profession.
- Technology will help us to truly move from the market driven commerce to customer driven commerce.
- Moving to a customer driven model will allow companies to perform pull instead of push marketing.
- To solve our increasingly complex problems, we have to improve the way in which we improve, i.e to become faster and smarter at improving. The only way we are to achieve improvement of a sufficiently high quality is to pool our knowledge and build on it.

CHAPTER FORTY

BIO SAFETY AND BIO SECURITY

- Bio safety is a word derived from a combination of two distinct terms "Biological" from Biology and "safety"
- Bio- safety mean "Biological safety"
- Safety means keeping away from danger or maintaining a condition of avoiding danger.
- Bio safety is all about safety to the living organism.
- Bio safety was defined by the Nigeria Centre of Disease Control (N.C.D.C) on April 28, 2015 **"as a discipline addressing the safe handling of hazardous biological materials"**
- Biology is a scientific discipline that studies every aspect of living things including plants, animals and micro-organisms such as bacteria, viruses and others.
- Safe handling means keeping the biological materials in a way that does not cause disease or physical effect.
- Containment is a place where we confine the organisms to in order for them not to go beyond that place.
- Infectious micro organisms are parasites that are very small and may likely not to be seen but they can cause death.
- Hazardous biological materials refer to anything of biological nature (living) that is capable of causing diseases.
- Laboratory bio – safety is defined by the Global Risk Management Curriculum Library as containment principles, technologies and practice implemented to prevent un-intentional exposure to pathogen and their intentional release.
- Global Bio – Risk Management Curriculum is the library only accessible by certified trainers.
- Bio risk generally refers to the risk associated with biological materials and/or infectious agents.

- Bio Safety and Bio – Security are called Bio Risk.
- G.M.O means "Genetically Modified Organisms".
- Bio Safety levels refer to the stringency of bio containment precautions deemed necessary by the Centre for Disease Control and Prevention (CDC) for laboratory work with infectious materials .
- There are four levels of Bio – Safety:
 - BSL or BL 1 – Is suitable for work with well characterized agent which does not cause disease in healthy humans. In general, these agents should pose minimal potential hazard to laboratory personnel and environment.
 - BSL or BL 2 – It is a higher sophisticated level. It is suitable for work involving agent of moderate potential hazard to personnel and the environment.
 - BSL or BL 3 – Here, the precautions taken in BSL – 1 & BSL -2 labs are followed. It is appropriate for work involving microbes which can cause serious and potentially lethal disease via the inhalation route.
 - BSL or BL 4 – It is the highest level of bio-safety precautions and it is appropriate for work with agent that could easily be aerosol transmitted within the laboratory and cause severe fatal disease in humans for which there are no available vaccines or treatment.

- Bio - security is a set of preventive measure designed to reduce the risk of transmission of infectious diseases in crops and livestock, quarantined pests, invasive alien species, and living modified organisms (Koblenz, 2010)
- Medical Counter Measures ("MCMs") are products such as biologics and pharmaceutical drugs that can protect from or treat the effects of a Chemical, Biological, Radiological, or Nuclear ("CBRN") attack.