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ECO292 INTRODUCTION TO ENVIRONMENTAL ECONOMICS

in the early _____the reality of economic thought brought to a halt the perception of economics merely as a science of production and distribution.

1970s, _____is concerned with the analysis of the impact of the economy on the **environment**, the significance of the environment to the economy and appropriate way of regulating economic activity so that balance is achieved among environmental, economic and other social objectives.

Environmental economics

Environmental study requires a synthesis of the various branches of knowledge like_____

- science,
- economics,
- philosophy,
- ethics,
- anthropology etc.

Therefore, the study of the environment may be approached from different perspectives and environmental economics may borrow from such perspectives in its analysis.

_____ AND _____ should be allocated in the same way we want to allocate all resources.

Environmental and **natural resources**

_____ is a sub discipline of economics,
environmental economics

Environmental economics originated early years of the so-called_____
environmental movement.

The nature and scope of the issues addressed in environmental economics are quite varied and all-encompassing. Below is a list of some of the major topics addressed in this field of study.

1. The causes of environmental degradation.
2. The need to re-establish the disciplinary ties between ecology and economics.
3. The difficulties associated with assigning ownership right to environmental resources.
4. The trade-off between environmental degradation and economic goods and services.
5. The ineffectiveness of the market, if left alone, in allocating environmental resources.
6. Assessing the monetary value of environmental damage.
   Public policy instruments that can be used to slow, halt and reverse the deterioration of environmental resources and/or the overexploitation of renewable and non-renewable resources.

7. The macroeconomic effects of environmental regulation and other resource conservative policies.
8. The extent to which technology can be used as a means of ameliorating environmental degradation or resource scarcity, in general- that is, limits to technology.
9. Environmental problems that transcend national boundaries, and thus require international cooperation for their resolution.
10. The limits of economic growth.
11. The extent to which past experience can be used to predict the future events that are characterized by considerable economic, technological and ecological uncertainties.
12. Ethical and moral imperatives for environmental resource conservation- concern for the welfare of future generations.
13. The interrelationship among population, poverty and environmental degradation in the developing countries of the world.
14. The necessity and viability of sustainable development.

Structure of the Environment

The structure of the environment can be described in terms of_____

its interdependent components

independent components that contributes to the structure of the environment includes_____

- **air**,
- **water**,
- **land living system** and
- **social structure**.

However, there are other two aspects that impact on the natural environment, these are: _____

Anthrosphere and **Social environment** .

The Air Environment is made up of _____ and _____

air and the atmosphere.

The atmosphere reaches over_____ kilometers from the surface of the earth.

550 kilometer

SIGNIFICANCES OF THE ATMOSPHERE INCLUDES

i. The atmosphere contains life-supporting gasses for plants and animals. The presence of carbon dioxide and oxygen is essential for the coexistence of the basic living systems of plants and animals.
ii. Nitrogen gas present in the atmosphere is an essential component of plants, animals and microbes.
iii. The **atmosphere** is a shield that protects life on earth from the hostile conditions from the outer spheres.
iv. The atmosphere offers mankind a field of study called **meteorology** that deals with weather and climate change which have profound influence on other spheres of the environment.
v. A major layer in the atmosphere is the ozone layer which protects human, plants and other animals from hazardous radiation from the sun.

Water Environment Is also known as _____

Hydrosphere

The water environment constitutes _____of the planet Earth.

three-quarters

All plants and animals (including humans) on earth depend on the availability and quality of _____ for survival.

Water

All forms of life depend on water for survival, for instance:

1. Water energizes food particles, which are able to supply the body with energy during digestion
2. Water increases the rate of absorption of essential substances in food
3. Water increases the efficiency of red blood cell in collecting oxygen in the lungs
4. Water carries every nutrient, mineral, vitamin, protein, hormone and chemical messenger in the body to its destination
5. Water is essential to the cleaning process of the body (cleanses internal organs and eliminates toxins from the bloodstream) etc.

Water is an essential requirement for all agricultural, aqua cultural and industrial activities of man.

Land environment comprises of geospheric components like_____

rocks, soils, and other associated constituents.

Components like soils and rocks are called _____

Geospheric components

_____ is the source of all our vital requirements [such as building materials, minerals (rocks), fuels, soil, wilderness areas etc] that are needed for living.

Land resources

Biological Environment is reffered to as _____

Biosphere

The biosphere consists of_____

all aspects of living systems

living things contained in the biosphere includes _____

- microorganisms,

- macro plants, and
- macro animals.

It should be noted that humans are a part of the biological environment true or false?

True

_____is the global ecological system integrating all living beings and their interactions among each other and between living things (especially humans) and the other components of the natural environment.

The biological environment

The biological environment is linked to other components of the natural

i. The first is the dependence of the entire biosphere on itself and other natural environment components.
ii. The second is the impact link of the biological environment (the human activity sub-component) to itself and other components of the natural environment.

<u>Biosphere and its Dependent Links to the other Spheres: Some of the ways the biological environment depends on other components of the natural environment are highlighted below</u>

1. **Dependence on atmosphere**: Life processes involve a vast number of chemical reactions, some of which either extract or emit gases from and to the atmosphere which acts as the store house for these gases.
   For instance, **photosynthesis** absorbs **CO2** from and produces oxygen to the atmosphere.

2. **Dependence on Hydrosphere**: The biological environment requires water to survive because water is essential for all living organisms in the biosphere and has played a key role in the evolution and sustenance of life on our planet. Water is also important in transporting soluble nutrients (phosphate and nitrate) that are needed for plant growth, and for transporting the waste products of life's chemical reactions.

3. **Dependence on Geosphere**: The land (geosphere) and biological (biosphere) components of the natural environment are intimately connected through soil which consists of a mixture of air, mineral matter, organic matter, and water. Indeed, soil is important for both plant and animal life. Minerals exploitation and mining activities for human survival also depend on the land. One pertinent environment issue is how to use land sustainably.

Why is the biological environment (biosphere) of great importance to us?

i. **Humans are part of the biological environment and so should naturally be concerned about it.**
ii. **The changes that occur in the biosphere itself and in other spheres (components) of natural environment originate from human activities.**

In order to impact on the four basic components of the natural environment, humans created another sphere of the environment called_____

ANTHROSPHERE .

_____ is that part of the environment that is made or modified by humans for use in human activities.

The Anthrosphere

The Anthrosphere is also called_____

the **techno sphere**

IMPACTS OF THE ATMOSPHERE TO THE NATURAL ENVIRONMENT

i. **Atmosphere**: Industrial and agricultural activities have changed the composition of the atmosphere (the air environment). For example, we have increased the concentration of carbon dioxide in the atmosphere by not less than 26% and doubled the concentration of methane gas. The productions of chlorofluorocarbons are depleting the earth's ozone layer, our natural defense against ultraviolent radiation. Man has also affected the quality of air (e.g. smog), especially in urban areas which result in respiratory problems.

ii. **Hydrosphere**: Humans have impacted the water environment by withdrawing large amounts of groundwater for agriculture and contaminating rivers, lakes, groundwater and oceans by organic and industrial wastes.

iii. **Biosphere**: Humans have already altered the biological environment, of which they are a part, through economic activities. A prime example is the slash and burn agricultural practice in the tropics where rainforest is cut and burned and the land is converted to pasture.

iv. **Geosphere**: Minerals and energy resources (coal, crude oil, coke, etc) from the land environment have fueled the industrial revolution that has permitted the human specie to increase so prodigiously in number. For example, the exploitation of fossil fuels has increased our standard of living but an unintended consequence of this action may be climate change and global warming.

_____Is The ultimate goal of environmental economic

To minimize the flux of pollutants and/or toxic substances across the interface between the astrosphere and other spheres while maintaining a functional technological society.

The social environment refers to_____

The combined structure involving human to human interactions.

The social structure of a human community is made up of;

i. The constraint environment which includes the physical, biological and chemical constraints to which human activity is subject.

ii. Infrastructure, defined here to include; **i**. Mode of production which deals with the technology and the practices employed in expanding or limiting production and the ensuing techno-environmental relationships. **ii**. Mode of reproduction which deals with the technology and practices employed for expanding, limiting and maintaining population size.

iii. Structure which refers to relationships or bonds between group of individuals in a society.

The Human Economy and the Natural Environment

The physical, chemical, and biological surroundings that comprise the Earth's endowment of life-support systems refers to _____

The natural environment

The natural environment includes_____

Air, water, land (the Earth's crust), living system, and even radiation from the sun.

_____is the supplier of all natural resources like arable land, wilderness areas, mineral fuels, nonfuel minerals, watersheds

The natural environment

The ability of the natural environment to degrade waste and absorb ultraviolet light from the sun, is controlled by _____

The natural environment

_____ consists of all the production and consumption activities of human

Such production and consumption activities can occur on land, beneath the Earth's crust, in seas, in the atmosphere and outer space.

it produces both useful commodities (goods and services) and non-useful materials called wastes. Is a characteristic of_____

Human economy

Humans cannot exist in isolation of the natural system why?

because all economic (even non-economic) activities of man are interconnected with the various other living and non-living endowments of nature.

Similarly, the complex physical, chemical, and biotic factors of the natural system act on man and ultimately determine human form and survival.

_____is One characteristics of the human economy

it produces intended useful product and some by-products.

The by-products of an economic reconfiguration process is referred to as "**waste**"

The production of "**waste**" from any reconfiguration of natural capital is a necessary consequence of_____

the first law of thermodynamics

what is the first law of thermodynamics?

"The law says that matter is neither created nor destroyed in chemical reactions, although it may be transformed from one form to another".

The first law of thermodynamics, is often referred to as_____

the law of conservation of matter and energy

Therefore, the first law of thermodynamics implies the accounting identities of material balance model.

Any wastes from production and consumption activities are absorbed by_____

the natural environment.

Natural system has assimilative capacity true or false?

True

Assimilative capacity is sometimes called a_____

"**throughput constraint**".

If human activity produces more "wastes" than can be naturally recycled, then, there is a flow of waste in excess of assimilative capacity. True or false

True

The relationship between human economy and natural environment can be explained in the form of_____

"**Material Balance Models**"

_____models consider the total economic process as a physical balanced flow between inputs and output.

Material balance models

A material balance models was developed by_____ and _____

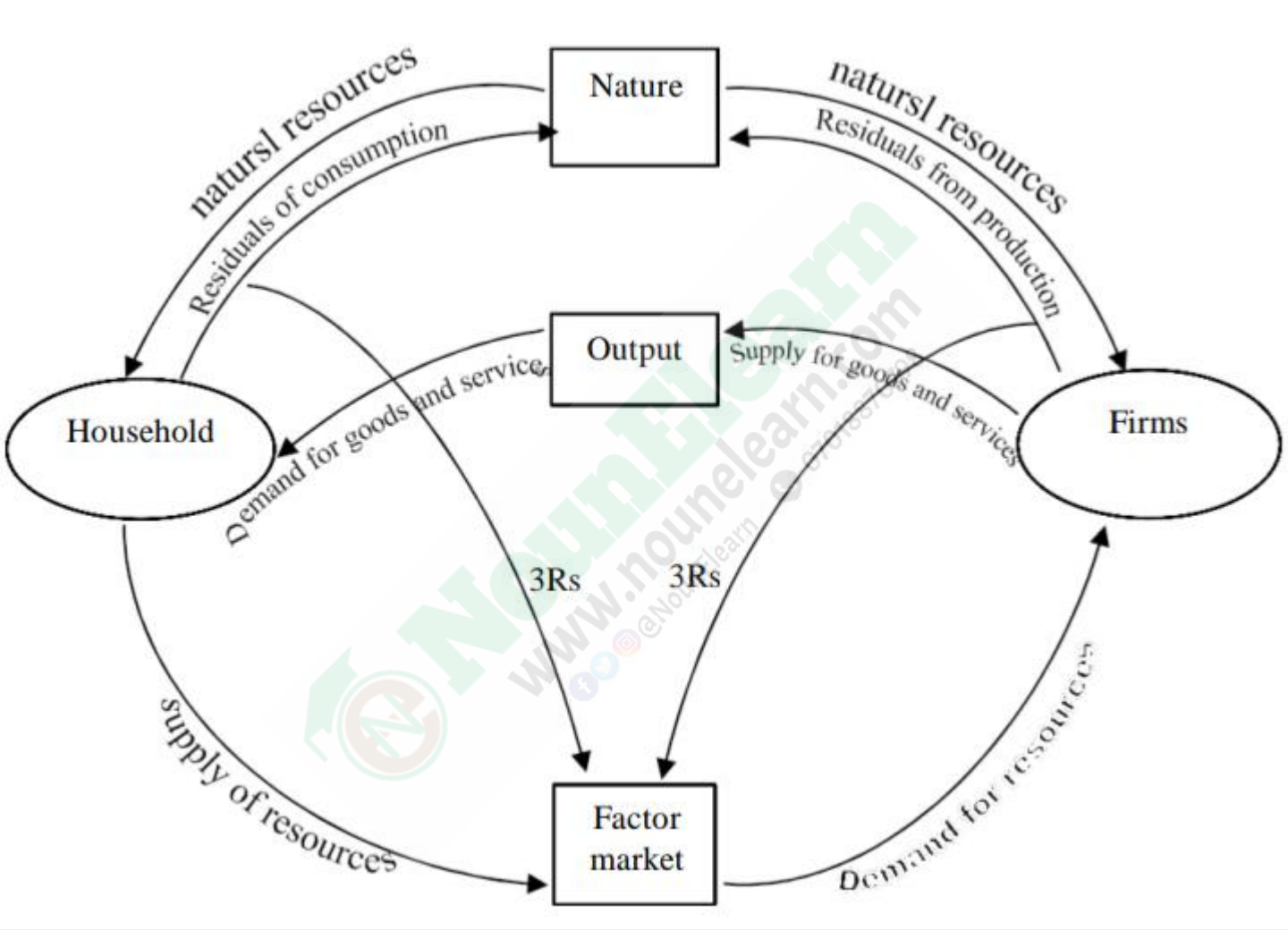
Alen Kneeze and **R. V. Ayres**.

The material balance model are based on _____ and _____

first and second law of thermodynamics.

_____act as a sinking for cleaning up of waste.

The environment



_____is the supplier of all forms of resources like renewable and non-renewable

The environment

Households and firms depend on_____

the nature of resources.

Both households and firms send out residual consumption and production respectively to nature. True or false?

True

The process of transformation is better explained with the help of _____ **laws of thermodynamics.**

The second law of thermodynamics is known as_____

The **law of entropy**.

What is the second law of thermodynamics?

The second law says that as long as there is utilization of material inputs and energy for production and consumption activities, the level of entropy will be high.

_____ is usually considered as the measure of unavailability of the benefits of energy or simply wastes.

Entropy

Entropy will be low, when materials and energy are highly structured and organized. True or false?

True

When a piece of coal is kept idle, there is low entropy, but when it is burnt up, the same piece of coal is subject to high entropy true or false?

True (since heat and carbon dioxide are dissipated, but sometimes unavailable for use).

Economic activity helps to convert **low entropy** resources and energy into_____

high entropy waste

The environment discharges the following economic functions:

i. The environment is the supplier of all forms of resources.
ii. The wastes are cleaned up by the environment.
iii. The environment maintains genetic diversity and stabilizes the ecosystem.

The Neoclassical worldview of environmental economic relationship is_____

anthropocentric.

Environmental economic relationship is anthropocentric this means_____

That the humans are treated on pre-eminent in the natural environment.

The economy depend on the environment for three distinctive purposes:

i. **The extraction of nonrenewable resources (such as iron ore, fossil fuels, etc) and the harvest of renewable resources (such as fish of various species, agricultural products, forest products, etc.) to be used as factors of production;(Arrow 1)**
ii. **The disposal and assimilation of wastes ;(Arrow 2) and**
iii. **The consumption of environmental amenities (such as bird watching, canoeing, hiking national park trails, observing a morning sunrise or an evening sunset, etc.)**

54.**Environmental (Natural) resources** are 'essential' factors of _____

production.

.

56.The economic value of natural resources is determined by_____

consumers' preferences

_____ can be used as a measure (indicator) of resource scarcity, including the environment.

Market price

58.In both the production and the consumption sectors of an economy, a specific natural resources can always be replaced (partially or fully) by the use of_____

other resources that are either man-made (manufactured) or natural.

The **ecological perspective** of the relative between the natural environment and the human economy is_____

biocentric

Being biocentric means_____

That the human economy is not viewed in the natural ecosystems. isolation from

The basic objective of the ecological perspective is_____

To establish a clear understanding of the basic principles governing the nature, structure and functions of the biosphere and the functional relationship between the biosphere and the human economy.

Environmental resources of the biosphere are_____

finite.

In nature, everything is related to everything else TRUE OR FALSE

TRUE

The biosphere is characterized by _____

continuous transformation of matter and energy.

The transformation of matter and energy are governed by _____

immutable natural laws.

The branch of science that systematically studies the relationships between living organisms and the physical and chemical environment in which they live is called _____

Ecology

SCARCITY AND RESOURCES

66.A _____ resource is one which, when offered to people at no cost, more would be wanted (demanded) than is available (supplied).

Scarce

The opposite of a **scarce resource** is _____

free resource.

At no price, the quantity supplied of a free good for instance exceeds the quantity demanded leading to a surplus, this definition describes _____

Free resource

The significant economic problem involves rationing limited resources to satisfy human wants and, accordingly, has the following four implications:

i. **Choice**- the most implication of scarcity is the need to choose. That is, in a world of scarcity, we cannot attain the satisfaction of all our material needs completely. Hence, we need to make choices and set priorities.

ii. **Opportunity cost**- every choice we make has a cost associated with it; one cannot get more of something withot giving up something else. In other words, an economic choice always entails sacrifice or opportunity cost- the highest-valued alternative that must be satisfied to attain something or satisfy a want. In a world of scarcity, "there is no such thing as a free lunch."

iii. **Efficiency** – in the presence of scarcity, no individual or society can afford to be wasteful or inefficient. The objective is, therefore, to maximize the desired goods and services that can be obtained from a given set of resources. Furthermore, efficiency implies that the best available technology is being used (McConnell and Bruce 1996). iv. **Social institutions**- as noted earlier, the essence of scarcity lies in the fact that people's desire or goods and services exceeds society's ability

to produce them at appoint in time. In the presence of scarcity, therefore, the allocation and distribution of resources always cause conflicts. To resolve these conflicts in a systematic fashion, some kind of institutional mechanism(s) need to be established.

_____ are the final users of goods and services and the owners of resources.

.**Households**

_____ represent an **institutional** arena in which exchanges (buying and selling) of final goods and services and factors of production (labour, capital and natural resources) take place.

Market

Economists group markets into _____ broad categories,

two (2)

- **product** and
- **factor** markets.

_____ is where the exchange of **final goods and services** occurs.

product market

In Product market, demand and supply provide information about _____and _____

households and firms,

_____refers exclusively to the buying and selling of basic resources, such as labour, capital and natural resources.

factor market

In Factor Market _____market information about firms and supplt provides information about households.

demand imparts

_____are the supplier of labour, capital and natural resources,

households

_____ are the buyers Of labor, capita, and in turn use these items to produce final goods and services for the product market.

firms

.A market does not function in a vacuum This means that_____

For a market to operate efficiently, ownership rights need to be clearly defined and enforced.

_____ can be defined as anything that is directly or indirectly capable of satisfying human wants.

resources

Resources can be classified from two perspectives which are;

i. Traditional economics resource classification and,

ii. Environmental economics resource classification

80.**TRADITIONAL ECONOMICS CLASSIFICATION OF RESOURCES**: the economic notion of resources classify resources into three broad categories: land, labour and capital.

i. **Land**: This refers broadly to natural resources which are the stock of living and non-living materials found in the physical environment, and which have an identifiable potential use to human begins. Thus, in Environmental Economics, it is better to say “natural resources” rather than simply “land”. Agricultural land, deposits of ferrous and non-

ferrous minerals, water, fisheries, and other aquatic life, wilderness and its multiple products are examples of **material resources**.

ii. **Labour**: Labour encompasses the productive capacity of human physical and/or mental efforts, measured in terms of ability to work or produce goods and services. Entrepreneurship is often included under labour.

iii. **Capital**: This refers to a class of resources that are man-made for the purpose of creating a more efficient production process. In other words, capital is the stock of produced items available not for direct consumption, but for further production process. Examples include all sorts of machineries.

Resources are said to be _____ if they are replaced by natural processes at a rate comparable or faster than their rate of consumption by humans.

Renewable resources

Resources for which there is no replenishment or the rate of growth is so slow as to be imperceptible in human life span is called_____

Non-renewable Resources

Examples include oil, gas, uranium, aluminum e. t. c.

The three stages of non-renewable resource use to consider in economics are_____

exploration, development and extraction.

THE CONCEPTS OF DEMAND, SUPPLY AND MARKET EQUILIBRIUM

In a **market oriented economy** the majority of price and output decisions are determined in the market through _____

market forces of demand and supply.

_____ and _____constitute the backbone of a market economy.

Demand and supply

_____ is the quantity of a commodity buyer wish to purchase at each conceivable price.

.**Demand**

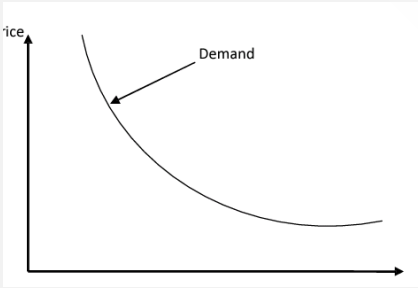
_____is a table showing how much of a given commodity a buyer would be willing to buy at different prices.

Demand Schedule:

Price	Qty
5	35
4	45
3	60
2	80
1	110

_____ is a graph illustrating how much of a given commodity buyer would buy at different prices.

Demand Curve:



Demand curves are usually derived from _____

demand schedule.

The law of demand states that _____

other things being equal, as price increases, the quantity demanded of a commodity decreases.

_____stipulates that there is a negative or inverse relationship between price and quantity demanded of a commodity.

The law of demand

_____can be illustrated by the downward sloping nature of the demand curve.

The law of demands

_____ is the satisfaction derived from the consumption of a commodity.

Utility

The satisfaction derived from the consumption of one more extra unit of the commodity.is called_____

Marginal utility

The law of demand can be explained by _____

diminishing marginal utility.

A lower price increases the purchasing power of money income enabling the consumer to buy more at lower prices without having to reduce demand for other goods and conversely.This is known as_____

Income Effect

A lower price induces the consumer to buy more of the good with the lower price and less of the relatively high-priced substitutes This is known as_____

Substitution effect

_____ is the sum of individually demanded quantities at the various prices.

Substitution effect

DETERMINANTS OF DEMEND:

i. **Tastes** – favourable change leads to increase in demand; unfavourable change to decrease.

ii. **Number of buyers** – more buyers lead to an increase in demand; fewer buyers lead to a decrease.

iii Income – more income lead to an increase in demand; less leads to decrease in demand for normal goods. (the rare case of goods whose demand varies inversely with income is called inferior goods).

iv.Prices of related goods also affect demand: **i**. Substitute goods (those that can be used in place of each other): the price of the substitute good and demand for the other good are directly related. If the price of coke rises (because of a supply decrease), demand for Pepsi should increase. **ii**. Complementary goods (those that are used together like tennis ball and rackets). When goods are complements, there is an inverse relationship between the price of one and the demand for the other.

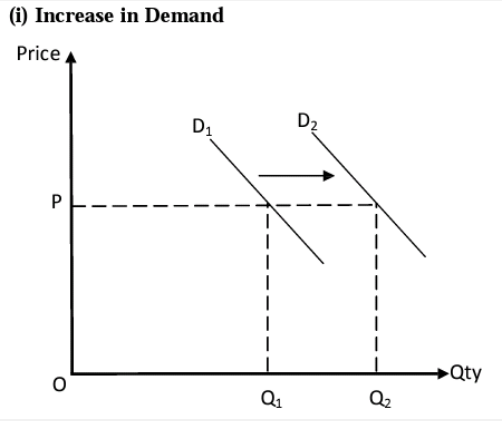
V.Consumer expectations – consumer view about future prices and income can shift demand.

A shift of the entire demand curve to the right or to the left of the initial demand curve. Is called

Change in demand

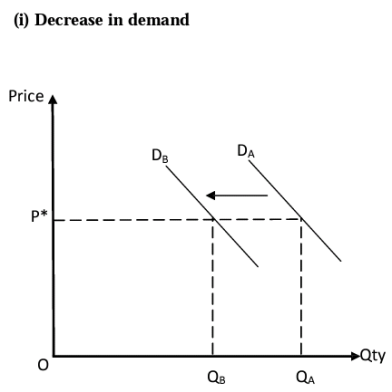
A shift of the demand curve to the **right** indicates_____

An increase in demand



while a shift to the **left** implied _____

A decrease in demand



_____ refers to movement along a demand curve as a result of changes in the price of the commodity.

Change in quantity demanded

A change in quantity demanded can be in two respects_____

increase or decrease.

_____ occurs as a movement downwards on a demand curve when price falls and other determinants of demand remain constant.

.**Increase in quantity demanded**

_____occurs as an upward movement along a demand curve when price of the commodity increases but other demand determinants remain constant.

Decrease in quantity demanded

_____ is the quantity of a commodity sellers wish to sell at each conceivable price.

Supply

A table showing how much of a given commodity a seller would be willing to sell different prices.is called_____

Supply Schedule

_____is a graph illustrating how much of a given commodity sellers (firms) would sell at different prices.

Supply Curve

The law of supply states that _____

The higher the price of a commodity. The higher the quantity supplied, if all other things are unchanged.

_____is the supply for a good or service can be defined for an individual firm, or for a group of firms that make up the supply side of the market.

Market Supply:

_____ is the sum of all the quantities of a good or serviced per period by each firm at the various prices.

Market Supply:

As with market demand, _____ is the horizontal summation of individual firms' supply curves.

Market Supply:

DETERMINATS OF SUPPLY

1.Resource prices- a rise in resource prices will cause a decrease in supply or leftward shift in supply curve; a decrease in resource prices will cause an increase in supply or rightward shift in the supply curve.

2.Technology- a technological improvement means more efficient production and lower costs, so an increase in supply, or rightward shift in the curve results.

3.Taxes and subsidies- a business tax is treated as a cost, so decrease supply; a subsidy lowers cost of production, so increases supply.

4.Prices of related goods- if price of substitute production good rises, producers might shift production toward the higher priced good, causing a decrease in supply of the original good.

5.Producer expectations- expectations about the future price of a product can cause producers to increase or decrease current supply.

6.Number of sellers- generally, the higher the number of sellers the grater the supply.

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