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Assignment - 1

Ques No-1) Explain impact of energy usage on climate.

Ans No-1) IMPACT OF ENERGY USAGE IN CLIMATE :-

- Combustion of hydrocarbon based fuels in industrial activity generates by-product materials, many of which are considered to be air pollution.
- The principal emissions which could cause impact on the air environment are particulate matter (dust), sulphur oxides, nitrogen oxides, hydrocarbons and carbon monoxide.
- Some of the key environmental issues of global significance are -
  - * Acid rain
  - * Ozone layer depletion
  - * Global warming and climate change
  - * Loss of biodiversity.

1) Acid Rain -

Acid rain is caused by release of sulphur oxides and nitrogen oxides from combustion of fossil fuels, which then mix with water vapour in atmosphere to form sulphuric and nitric acids rain.

The effects of acid rains are as follows

- Acidification ⇒ Acidification of lakes, streams and soils.
- Direct and indirect effects ⇒ Release of metals washes away plant nutrients
  Eg:- Al which
- Killing of wildlife ⇒ Trees, crops, aquatic plants and animals
- Decay ⇒ Decay of building materials and paints, statues, and sculptures.
- Health problems ⇒ Respiratory, burning skin and eyes.

Ozone Layer Depletion –

Ozone layer is a thin layer of ozone (O_3) present in stratosphere which extends from 20-50 Km from the earth.

The ozone layer is highly beneficial to life on earth as it blocks the sun's ultra-violet radiations (UV-B) from reaching the way. earth.

Any disturbance or depletion of this layer would result in an increase of harmful radiation reaching the earth's surface leading to dangerous consequences.

Effects of Ozone layer depletion :-

- On human & animal health → increased eye diseases, skin cancer and infectious disease.
- On plants → Increased radiation is likely to change species composition in plants, thus altering the bio-diversity in different ecosystems.

- On aquatic ecosystems ⇒ Damage to the development stages of fish, shrimp, crab, amphibians and other animals, the
- On Air Quality ⇒ Reduct" of stratospheric ozone and increased penetration of UV-B radiation result in higher photo dissociation rates of key trace gases that control the chemical reactivity of troposphere.

3) Global Warming & Climatic Change

(i) The atmosphere is a thin layer of gas which surrounds the earth.

(ii) The most important layers in the atmosphere are k/a troposphere and stratosphere.

(iii) The atmosphere is composed mainly of 21% of O_2, 78% of N_2, 0.04% of CO_2 and Air by volume.

(iv) The earth is surrounded by a blanket of gases including greenhouse gases.

Ques No-2) Write features of energy conservation Act 2001

Ans No-2) FEATURES OF ENERGY CONSERVATION ACT 2001 - (objectives)

Act empowers the Central & State Govt to facilitate and enforce efficient use of energy and its conservation.

a) Building: "Building" means any structure or erection, which is having a connected load of 100 KW or contract demand of 120 KVA are to be used for commercial purposes.

b) Designated agency: "Designated agency" means an agency which co-ordinates, regulates and enforces provisions of this act within a state.

c) Designated consumer: "Designated consumer" means any user or class of users of energy in the "energy" intensive industries and other establishment

Energy ⇒

IMPORTANT FEATURES OF ENERGY CONSERVATION ACT 2001:

1) Standards & Labeling (S&L) ⇒

Evolve minimum energy consumption and performance standards for notified equipment and appliances.

2) Designated consumers to ⇒

Get energy audit by accredited energy firms and energy audit conducted by an accredited energy auditor.

3) Energy conservation building codes →

To provide minimum requirements for the energy efficient design and construction of buildings

4) Energy conservation fund →

For providing: Promotion of energy service companies. Research and development demonstration.

reau of Energy Efficiency →

plimentation of provisions of energy.
nservation act.

ick coordination and policy research.

ole of Bureau of Energy Efficiency →

he role would include development of
ESCOs. & Tranforming the market for
energy efficiency and create awareness
through measure including steering local.

Role of Central and State Govt. →

Central → To notify rules and regulation
under various provisions of the
act. provide initial financial assistance
to BEE and EC Fund.

- State → To amend energy conservation
building codes to suit the regional
and local climatic condition.

8) Penalties →
Amount not exceeding Rs. 10,00,000 for
each offence.

Ques No. 3) Explain losses in electric power distribution system.

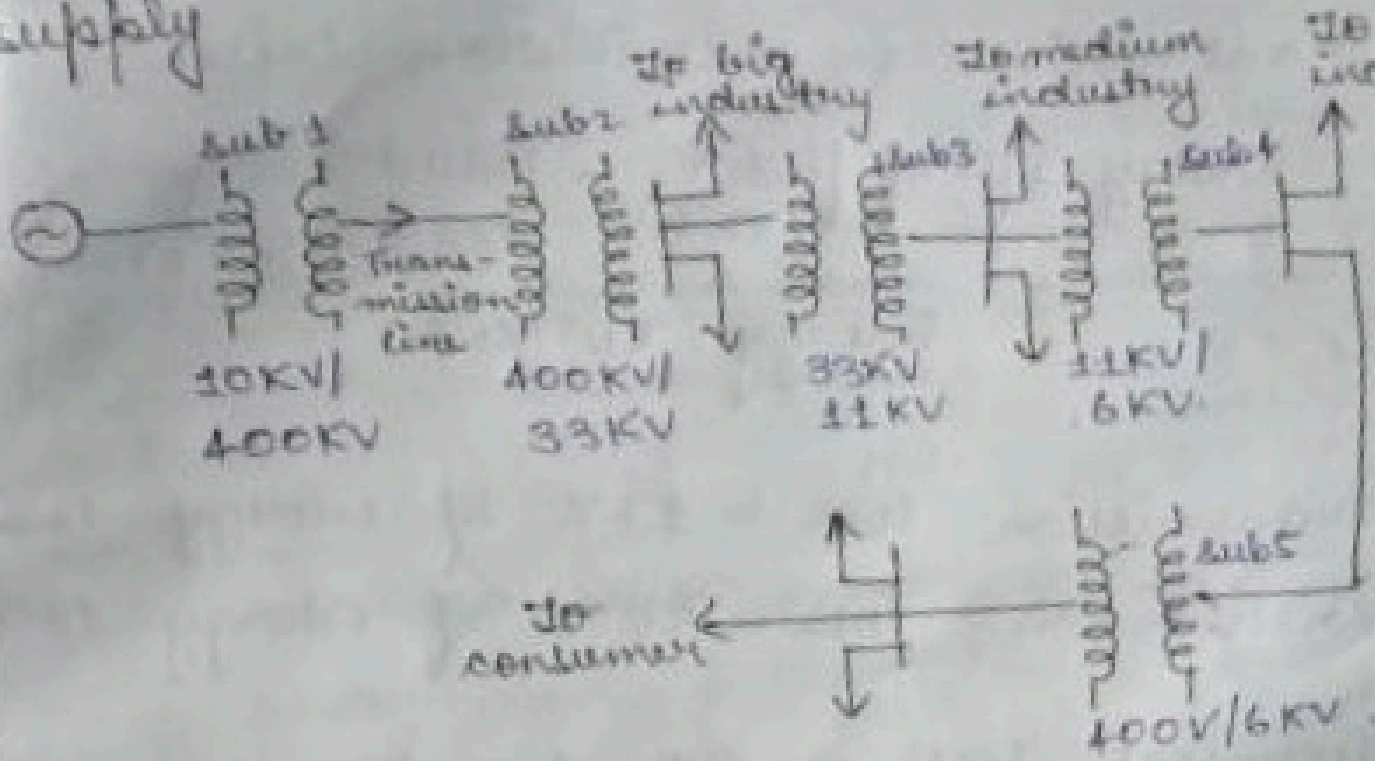
Ans No. 3) Electrical Power System (2)

* It is a network of electrical compo deployed (planted) to supply, transfe and use electrical power.
* The supply of electric power to an electric load is known as electric supply.
* The system used for electric supply is known as electric supply system.

Types of electrical Supply System

1) DC supply → Supplies a constant DC voltage to the loads.
2) AC-DC supply → AC energy can deliver DC power with help of rectifier, which convert the transform output to a varying DC voltage.

Single line representation of power supply



Substations are places where level of voltage undergoes changes with the help of transformer. Apart from transformer substation with house switches, meters, relays and other control equipments.

Transmission and Distribution Losses

The ratio of the difference between energy Input of feeder (KWH) and billed energy of consumer (KWH) to the energy input (KWH), which is multiplied by 100.

Formula :-

Transmission & distribution loss

$$= \frac{\text{Energy I/P of feeder (KWh)} - \text{Billed energy of consumer (KWh)}}{\text{Energy I/P (KWh)}}$$

Transmission loss = 17% of energy loss

Distribution loss = 50% of energy loss.

* Technical loss ⇒ are due to energy dissipated (loss) in conductors, equipment used in transmission line, transformer, substransmission line and distribution line and magnetic loss in transformer.

Technical Loss

Permanent or fixed loss	variable loss
* These losses take form of heat, noise and occure as long as	* It is directly proportional to the square of current.

transformer is energized.	
It is of 1/4 to 1/3 of technical loss.	It is of 2/3 to 3/4 of technical loss.

Main reason for Technical losses

1) Lengthy distribution line.
2) Inadequate size of conductors.
3) Bad workmanship.
4) Low power and energy losses are reduced by raising load factor.
5) Switching off transformer.

Load factor = $\frac{\text{Average load in a specified time period}}{\text{Peak load during that time period.}}$

6) Transformer sizing and selection.

Electricity bill: $C = Ax + By + C$

where,

C = total charge for a period.
x = max. demand during the period (KW or KVA)
y = total energy consumed during the period (KW or KVA)
A = cost per KW or KVA of max. demand

B = cost per KW or KVA of energy

D = fixed charge during each billing period.

(i) Flat demand tariff $C = Ax$

(ii) Straight line meter tariff $C = By$

(iii) Block meter rate tariff.

Ques No. - 4) Discuss types of electricity tariff.

Ans No. 4) **Electricity tariff**

The amount of money frame by the supplier for the supply of electrical energy to various types of consumers is known as electricity tariff.

Types of electricity tariff

There are eight type of electricity tariff

1) **Flat Demand Rate tariff** →

It is expressed by the eqn $C = Ax$.

In this type of tariff, the bill of the power consumption depends only on the max. demand of the load.

7) Peak - load tariff :-

It is similar to seasonal rate tariff. The difference between it that seasonal tariff measures peak for of the year and peak tariff calculates it for the d...

8) Three - part tariff :-

In the form of,

$$C = Ax + By + D$$

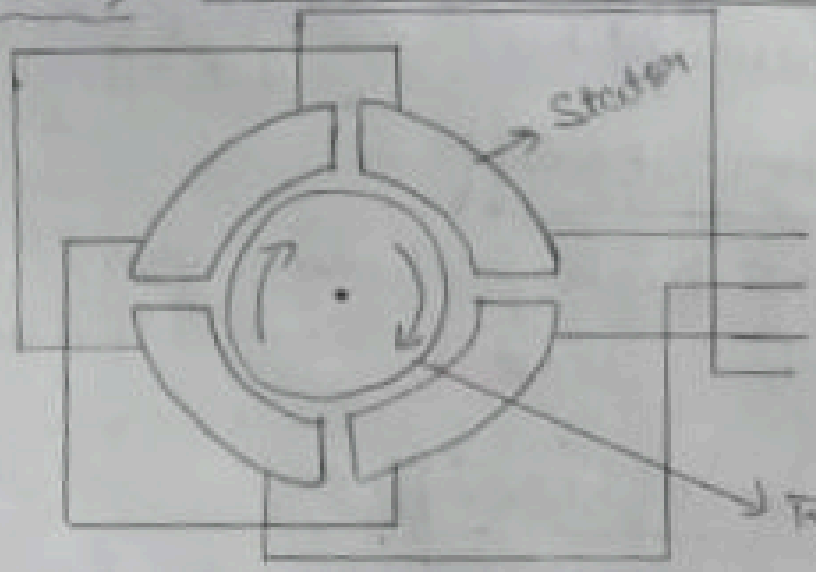
and it is applied to the big consumer.

Que No. 5) Explain -

(a) AC induction motor

(b) DC motor.

Ans No. 5) AC Induction motor



induction motor or asynchronous motor is an AC electric motor in which the electric current in the motor needed to produce co is obtained by electromagnetic induction from the magnetic field

stator = Ring of electromagnets arranged outside. Inside is solid metal axle, a loop of wire, a coil and a squirrel cage.

Advantage	Disadvantage
1) Simple 2) Low cost 3) Quiet 4) Long lasting	1) Speed of motor depends on frequency of current 2) Heavy & bulky 3) Can't be driven by batteries.

DC Motor