Unit-2

Short Answer Questions

1.Write the Working principle alternators.

Ans: Alternator or AC generator is a machine, which converts mechanical energy into electrical energy and Works on the principle of Faraday's law of electromagnetic induction.

when there is a relative motion between the conductors and the flux, e.m.f. gets induced in the conductors.

2. Define synchronous speed.

Ans: The frequency of the generated voltage depends on the number of field poles and the speed at which the field poles are rotated.

P = Number of field poles

$\mathbf{N_s}$ = Speed in r.p.m (revolutions per minute)

f = Frequency/number of cycles per second

Synchronous Speed, $\mathbf{N_s} = \frac{120F}{P}$

A machine which runs on synchronous speed is called synchronous machine.

3. Working Principle of a Transformer:

Ans: It is a device that transfers electric energy from one alternating current circuit to one or more circuits, either increasing or reducing the voltage by maintaining constant frequency and it works on the principle of electromagnetic induction and mutual induction between the two coils.

Faraday's law of **electromagnetic induction** states that, when a change takes place in the magnetic flux which is linked with a circuit, an electromotive force current will induce in the circuit.

When the AC supply is given to the primary winding with a certain voltage, an alternating flux sets up in the core of the transformer, which links with the secondary winding and as a result of it, an emf is induced in it called **Mutually Induced emf**.

4. Step-up Transformer and Step-down Transformer

In Step up Transformer: L.V Winding is primary; (H.V) Secondary

In Step down Transformer: H.V winding is primary; (L.V) Secondary

5. What are Conventional Energy Sources

The sources of energy which are exhaustible in nature are called conventional energy sources. The energy sources which once used cannot be recovered any more. They are depleting in nature.
The sources of energy which are used for the mass generation of power are called conventional energy sources.

Ex: Diesel, Gas, Coal, Nuclear etc.

6. What are Non-conventional Energy Sources or Renewable Energy Sources

These energy sources are available abundantly in nature and they can be reused again. The energy sources which are non-exhaustible in nature are called non-conventional sources.

Ex: Solar energy, Wind energy, Tidal energy, Geo-thermal energy, Biomass energy, Ocean thermal energy, Biogas energy, Fuel cells etc.

7. Types of measuring instruments

1) Permanent Magnet Moving Coil (PMMC) Instrument:

2) Moving Iron (MI) Instruments

8. Define Tariff

The rate at which electrical energy is supplied to a consumer is known as tariff.

9. What is Permanent Magnet Moving Coil (PMMC) Instrument?

The instruments which use the permanent magnet for creating the stationary magnetic field between which the coil moves, is known as the permanent magnet moving coil or PMMC instrument. It operates on the principle that the torque is exerted on the moving coil placed in the field of the permanent magnet.

10. What is Moving Iron (MI) Instrument?

The instrument in which the moving iron is used for measuring the flow of current or voltage is known as the moving iron instrument. It works on the principle that the iron place near the magnet attracts towards it. The force of attraction depends on the strength of the magnet field. The magnetic field induces by the electromagnet whose strength depends on the magnitude of the current passes through it.

11. Advantages & Disadvantages of solar energy:

Advantages:

- Abundant and inexhaustible source.
- Low environmental impact during operation.
- Suitable for decentralized energy production.
- Off-grid applications in remote areas.

Disadvantages:

- Intermittent energy production due to weather conditions.
- High initial installation costs for solar technologies.
- Land use concerns for large-scale solar farms.

12. Advantages & Disadvantages of wind energy:

Advantages:

- Clean and abundant source of energy.
- Low greenhouse gas emissions during operation.
- Onshore and offshore wind farms can be established in various geographical locations.
- Technological advancements have led to increased efficiency.

Disadvantages:

- Intermittent nature of wind patterns.
- Impact on wildlife, particularly birds and bats.
- Visual and noise impacts on local communities.
- Initial costs for wind turbine installation.

Subjective Type

1. Explain the construction and working of 3-phase alternator.
2. Explain the schematic of Thermal power plant and its working with a neat diagram.
3. Explain the schematic of Hydro power plant and its working with a neat diagram.
4. Describe the operation of solar cell with neat diagram.
5. Describe the operation of wind power plant with neat diagram.
6. Illustrate the construction and working of PMMC instrument.
7. Illustrate the construction and working of MI instrument.
8. Illustrate the construction and working of Single-phase Energy meter (Digital Energy Meter).
9. List Power rating of different household appliances.