EEE - Sh Revision: 2015

Sub code: H03H

Electrical power Generation Distribution and Transmiss

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GENERATION TRANSMISSION AND DISTRIBUTION.

PART - A

1. Main components of a nuclear power plant are:-
   a) Nuclear reactor
   b) Heat exchanger or steam generator
   c) Steam or gas turbine
   d) AC generator or exciter
   e) condenser.

2. a) Load factor: It is defined as the ratio of number of units actually generated in a given period to the number of units that could have been generated with the same maximum demand.

$$\text{Load factor} = \frac{\text{Avg. load or Avg. demand}}{\text{max. demand.}}$$

$$= \frac{\text{energy generated in a given period}}{(\text{max. demand}) \times (\text{hours of operation in the given period})}$$

b) Demand factor: It is defined as the ratio of max. demand on the station to the total connected load to the station.

$$\text{demand factor} = \frac{\text{max. demand on the station}}{\text{Total connected load to the station.}}$$

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3. Base load : It is the load on the generating station which remains for a long period in a day (or) the load that remains constant throughout the day.

Peak load : It is the max. load on the generating station & this remains only for a short time (or) the max. load which is only for short duration. 2

4. Transmission Efficiency : It is defined as the ratio of power at the receiving end to the power at the sending end of a transmission line.

Transmission efficiency, $\eta_t = \frac{\text{receiving end power}}{\text{sending end power}}$ 2

$$\% \eta_t = \frac{V_R I \cos\phi_R}{V_S I \cos\phi_S} \times 100$$

$$= \frac{V_R I \cdot \cos\phi_R}{V_R \cdot I \cos\phi_R + I^2 R} \times 100 .$$

5. Feeders : The feeders are the conductors, which connect the substations or in some cases generating stations, to the areas served by these stations. These are of large current carrying capacity & carry the current in bulk to feeding points.

Distributors : They are conductors which run along a street or an area to supply power to consumers. The current loading of a distributor is not uniform & varies along its length. 2

PART - B.

(3)

1. Low head HEP :→ When the operating head is less than 25 mt., the plant is named as low head plant.

→ This type of plant uses vertical shaft Francis or Kaplan turbine.

→ A small dam is built to provide the necessary head

Medium head HEP :→ when the operating head of wat is from 25 to 100 mt., the power plant is called medi head plant.

→ This type of plant uses Francis turbine.

→ The forebay provided at the beginning of penstock serves as water reservoir. It draws water from the main reservoir through canal or tunnel. It also stores rejected water as the load on the turbine decreases.

High head HEP :→ When the water head exceeds 100 mt, the plant is known as high head HEP.

→ Pelton turbines are used in such plants.

→ A surge tank is attached to the penstock to reduce the water hammer effect on the penstoc

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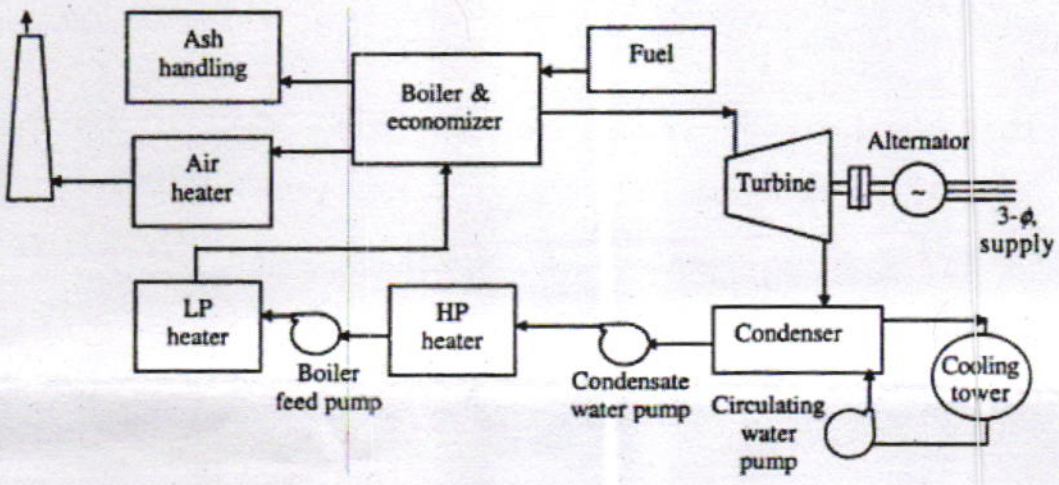
2)



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3)

3. (a) load factor = $\frac{\text{Avg. load}}{\text{M.D}}$

$\therefore$ Avg load = load factor × M.D

$= 0.45 \times 25 \times 10^3$

$= 11.25 \times 10^3$ KW

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(b) energy supplied / year = avg. load × No. of hrs in a yr.

$= 11.25 \times 10^3 \times 8760$

$= 98.55 \times 10^6$ KWh

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(c) demand factor = $\frac{\text{max. demand}}{\text{connected load}} = \frac{25}{10+8.5+5+4.5}$

$= \frac{25}{28} = 0.893$

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4) Combined operation of power plants

Advantages: 1. Greater reliability of supply to the consumers. 2. When one of the stations fails to operate the consumers can be fed from the other stations, thus avoiding complete shut down. 3. The overall cost of the energy per unit of an interconnected system is less. 4. There is more effective use of transmission line facilities at higher voltage. 5. Less capital investment required. 6. Less expenses on supervision, operation and maintenance

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5) The **overhead transmission lines** are categorized as three types