1. What is the purpose of impulse staging in steam turbines?
a) To increase pressure compounding
b) To decrease velocity compounding
c) To utilize steam velocity for energy conversion
d) To reduce blade and nozzle losses

Answer: c) To utilize steam velocity for energy conversion

Explanation: Impulse staging in steam turbines involves converting the kinetic energy of steam into mechanical energy by utilizing the impulse principle, where high-velocity jets of steam impact turbine blades, transferring momentum and generating rotational motion.

2. Which factor is crucial for determining the optimum utilization factor in Curtis stages?
a) Blade height
b) Velocity compounding
c) Pressure compounding
d) Stage efficiency

Answer: d) Stage efficiency

Explanation: The optimum utilization factor in Curtis stages is determined by maximizing stage efficiency, which involves minimizing losses and maximizing the conversion of steam energy into mechanical work.

3. What is the effect of blade and nozzle losses on vane efficiency in steam turbines?
a) Decreases vane efficiency
b) Increases vane efficiency
c) No effect on vane efficiency

d) Improves vane efficiency

Answer: a) Decreases vane efficiency

Explanation: Blade and nozzle losses, such as friction and leakage losses, reduce the overall efficiency of the turbine stage by decreasing the effectiveness of the blades and nozzles in converting steam energy into mechanical work.

4. What is the primary purpose of reactions staging in steam turbines?
a) To minimize axial thrust
b) To maximize pressure compounding
c) To optimize nozzle efficiency
d) To achieve smoother energy conversion

Answer: d) To achieve smoother energy conversion

Explanation: Reactions staging in steam turbines aims to achieve a gradual transfer of energy from steam to the turbine blades, resulting in smoother energy conversion and reduced axial thrust.

5. What does the degree of reaction indicate in steam turbines?
a) The efficiency of the stator
b) The balance between impulse and reaction stages
c) The velocity coefficient of the turbine
d) The pressure compounding factor

Answer: b) The balance between impulse and reaction stages

Explanation: The degree of reaction represents the proportion of the total enthalpy drop across the turbine that occurs in the rotor (reaction) versus the stator (impulse). It indicates the balance between impulse and reaction stages in a turbine.

6. Which parameter is used to evaluate nozzle efficiency in steam turbines?
a) Velocity coefficient
b) Carry over efficiency
c) Stator efficiency
d) Speed ratio

Answer: a) Velocity coefficient

Explanation: Nozzle efficiency in steam turbines is evaluated using the velocity coefficient, which compares the actual velocity of steam at the nozzle exit to the ideal velocity for maximum energy conversion.

7. What is the purpose of the axial thrust in steam turbines?
a) To balance radial forces
b) To improve turbine efficiency
c) To stabilize rotational motion
d) To optimize nozzle design

Answer: a) To balance radial forces

Explanation: Axial thrust in steam turbines serves to balance the radial forces generated by the steam flow, ensuring stable operation and minimizing mechanical stresses on turbine components.

8. How does the reheat factor influence turbine performance?
a) It increases turbine efficiency
b) It reduces turbine speed
c) It minimizes blade losses
d) It improves steam quality

Answer: a) It increases turbine efficiency

Explanation: The reheat factor involves reheating steam between turbine stages to maintain its temperature and pressure, which can increase turbine efficiency by utilizing steam more effectively for energy conversion.

9. Which type of flow is associated with forced vortex in steam turbines?
a) Radial equilibrium
b) Constant reaction
c) Free vortex
d) Variable reaction

Answer: c) Free vortex

Explanation: Forced vortex flow in steam turbines occurs when steam flows through the turbine blades with a rotational motion, resulting in a free vortex where the angular velocity of the flow increases with radius.

10. What are the governing characteristics of steam turbines?
a) Pressure and temperature
b) Speed and load
c) Blade height and mass flow

d) Efficiency and nozzle area

Answer: b) Speed and load

Explanation: Steam turbines are governed by controlling both the rotational speed and the load they are subjected to, ensuring optimal performance and safety under varying operating conditions.

11. Which factor determines the stage efficiency of a steam turbine?
a) Blade material
b) Steam pressure
c) Steam temperature
d) Blade and nozzle losses

Answer: d) Blade and nozzle losses

Explanation: Blade and nozzle losses significantly affect the stage efficiency of a steam turbine by reducing the effectiveness of energy conversion and increasing frictional losses within the turbine stage.

12. What conditions are necessary for achieving optimum efficiency in Parsons stages?
a) High pressure and low temperature
b) Low pressure and high temperature
c) Uniform velocity distribution
d) High axial thrust

Answer: c) Uniform velocity distribution

Explanation: Optimum efficiency in Parsons stages is achieved when there is a uniform velocity distribution across the turbine blades, ensuring smooth energy conversion and minimizing losses.

13. What role does the velocity coefficient play in steam turbines?
a) It determines the efficiency of the stator
b) It quantifies losses due to friction
c) It measures the effectiveness of nozzle design
d) It evaluates the velocity of steam at the nozzle exit

Answer: d) It evaluates the velocity of steam at the nozzle exit

Explanation: The velocity coefficient is a parameter used to evaluate the velocity of steam at the nozzle exit in steam turbines, indicating how effectively steam is accelerated to generate rotational motion.

14. How does the speed ratio affect turbine performance?
a) It increases axial thrust
b) It decreases stage efficiency
c) It influences the balance between impulse and reaction stages
d) It reduces the need for blade cooling

Answer: c) It influences the balance between impulse and reaction stages

Explanation: The speed ratio in steam turbines influences the balance between impulse and reaction stages, affecting the overall energy conversion process and the efficiency of the turbine.

15. What is the primary purpose of stator efficiency in steam turbines?
a) To minimize blade losses
b) To optimize nozzle design
c) To balance axial thrust
d) To maximize energy conversion

Answer: a) To minimize blade losses

Explanation: Stator efficiency in steam turbines aims to minimize losses associated with the stationary blades (stators), such as friction and leakage losses, thereby optimizing the overall efficiency of the turbine stage.

16. Which type of flow is associated with constant reaction in steam turbines?
a) Radial equilibrium
b) Free vortex
c) Forced vortex
d) Variable reaction

Answer: b) Free vortex

Explanation: Constant reaction flow in steam turbines results in a free vortex where the angular velocity of the flow remains constant with radius, contributing to efficient energy conversion within the turbine stage.

17. What characteristic defines the performance of steam turbines under varying operating conditions?
a) Mass flow rate
b) Blade height

c) Turbine efficiency
d) Steam quality

Answer: c) Turbine efficiency

Explanation: Turbine efficiency is a crucial characteristic that defines the performance of steam turbines under varying operating conditions, reflecting how effectively steam energy is converted into mechanical work.

18. Which factor poses a challenge to radial equilibrium in steam turbines?
a) Blade material
b) Axial thrust
c) Reheat factor
d) Nozzle efficiency

Answer: b) Axial thrust

Explanation: Axial thrust in steam turbines poses a challenge to radial equilibrium by exerting radial forces on turbine components, potentially causing mechanical instability and requiring balancing mechanisms.

19. What is the primary function of carry over efficiency in steam turbines?
a) To optimize blade design
b) To minimize nozzle losses
c) To improve stator efficiency
d) To ensure smooth energy transfer between stages

Answer: d) To ensure smooth energy transfer between stages

Explanation: Carry over efficiency in steam turbines ensures smooth energy transfer between stages by minimizing losses associated with the carryover of steam from one stage to the next, optimizing overall turbine performance.

20. What governs the performance characteristics of steam turbines?
a) Steam pressure and temperature
b) Blade and nozzle design
c) Mass flow rate and velocity
d) Efficiency and stage configuration

Answer: a) Steam pressure and temperature

Explanation: The performance characteristics of steam turbines are primarily governed by the pressure and temperature of the steam entering the turbine, which determine the available energy for conversion into mechanical work.

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