Steam Nozzles and Turbines

1. A steam nozzle is used to:

(A) Increase velocity of steam

(B) Increase pressure of steam

(C) Reduce velocity of steam

(D) None of these

Answer: A) Increase velocity of steam

2. The function of a nozzle in a steam turbine is to convert:

(A) Thermal energy to kinetic energy

(B) Kinetic energy to thermal energy

(C) Pressure energy to thermal energy

(D) None of these

Answer: A) Thermal energy to kinetic energy

3. In a convergent-divergent nozzle, steam expands:

(A) First convergently then divergently

(B) First divergently then convergently

(C) Only convergently

(D) Only divergently

Answer: A) First convergently then divergently

4. Critical pressure ratio in a steam nozzle is defined as:

(A) Inlet pressure/outlet pressure

(B) Outlet pressure/inlet pressure

(C) Pressure at throat/inlet pressure

(D) Inlet pressure/pressure at throat

Answer: C) Pressure at throat/inlet pressure

5. The velocity of steam increases in a nozzle because:

(A) Enthalpy decreases

(B) Pressure increases

(C) Volume decreases

(D) Density increases

Answer: A) Enthalpy decreases

6. The maximum velocity in a steam nozzle occurs at:

(A) Inlet

(B) Throat

(C) Outlet

(D) Any point

Answer: C) Outlet

7. The area of the throat of a nozzle is:

(A) Maximum

(B) Minimum

(C) Same as inlet

(D) Same as outlet

Answer: B) Minimum

8. Steam turbines operate on the principle of:

(A) Conservation of energy

(B) Conversion of heat to work

(C) Momentum principle

(D) All of these

Answer: D) All of these

9. In impulse turbines, steam expands in the:

(A) Nozzle only

(B) Moving blades only

(C) Both nozzle and blades

(D) Rotor only

Answer: A) Nozzle only

10. In reaction turbines, steam expands in:

(A) Nozzles only

(B) Moving blades only

(C) Both fixed and moving blades

(D) Rotor only

Answer: C) Both fixed and moving blades

11. The work done by steam in a turbine is maximum when steam is:

(A) Completely dry

(B) Superheated

(C) Slightly wet

(D) At critical pressure

Answer: B) Superheated

12. The purpose of a governor in steam turbine is to:

(A) Control speed

(B) Reduce steam consumption

(C) Maintain temperature

(D) Increase pressure

Answer: A) Control speed

13. The efficiency of a steam nozzle is maximum when:

(A) Friction is minimum

(B) Length is maximum

(C) Pressure difference is maximum

(D) Temperature is minimum

Answer: A) Friction is minimum

14. The enthalpy drop in a nozzle represents:

(A) Work done

(B) Increase in velocity

(C) Heat loss

(D) Shaft power

Answer: B) Increase in velocity

15. In a convergent nozzle, steam cannot reach:

(A) Sonic velocity

(B) Subsonic velocity

(C) Supersonic velocity

(D) Zero velocity

Answer: C) Supersonic velocity

16. The throat of a nozzle is the section where:

(A) Area is maximum

(B) Pressure is maximum

(C) Velocity is maximum

(D) Area is minimum

Answer: D) Area is minimum

17. The function of a blade in a turbine is to:

(A) Extract energy from steam

(B) Increase speed of steam

(C) Reduce temperature

(D) All of these

Answer: A) Extract energy from steam

18. The compounding of steam turbines is done to:

(A) Reduce speed and increase efficiency

(B) Increase speed and reduce efficiency

(C) Maintain constant speed

(D) Reduce shaft power

Answer: A) Reduce speed and increase efficiency

19. The governing of reaction turbines is usually done by:

(A) Throttle governing

(B) Nozzle governing

(C) By-pass governing

(D) Blade governing

Answer: C) By-pass governing

20. Partial admission in turbines means:

(A) Only some nozzles admit steam at a time

(B) All nozzles admit steam always

(C) No nozzles admit steam

(D) Blades admit steam at partial pressure

Answer: A) Only some nozzles admit steam at a time

21. In a Parsons turbine, the flow of steam is:

(A) Axial

(B) Radial

(C) Tangential

(D) Mixed

Answer: A) Axial

22. The relative velocity of steam at entrance and exit of the blade in an impulse turbine differs due to:

(A) Blade friction

(B) Pressure drop

(C) Temperature change

(D) No change

Answer: A) Blade friction

23. The degree of reaction in Parson's turbine is:

(A) 50%

(B) 25%

(C) 0%

(D) 75%

Answer: A) 50%

24. The main advantage of velocity compounding is:

(A) Higher output

(B) Lower speed

(C) Lower cost

(D) Less maintenance

Answer: B) Lower speed

25. The pressure compounding is done by:

(A) Adding more blades

(B) Adding more stages of nozzles

(C) Increasing steam pressure at all stages

(D) None of these

Answer: B) Adding more stages of nozzles

26. The reheat factor is a measure of:

(A) Increase in heat supplied

(B) Increase in temperature

(C) Increase in power output

(D) None of these

Answer: A) Increase in heat supplied

27. Blade efficiency of a turbine is related to:

(A) Work delivered by blade

(B) Kinetic energy of steam at entry and exit

(C) Pressure drop across blade

(D) Heat supplied to blade

Answer: B) Kinetic energy of steam at entry and exit

28. The losses in steam turbines are mainly due to:

(A) Friction and leakage

(B) Blade shape

(C) Steam dryness

(D) Water hammer

Answer: A) Friction and leakage

29. The drum in a steam turbine is used for:

(A) Collecting condensed steam

(B) Separating water from steam

(C) Maintaining speed

(D) Reducing vibration

Answer: B) Separating water from steam

30. The main function of a condenser in steam turbines is to:

(A) Increase pressure

(B) Decrease pressure

(C) Condense steam and create vacuum

(D) Control speed

Answer: C) Condense steam and create vacuum

31. The capacity of a steam turbine is expressed in:

(A) kW

(B) MW

(C) BHP

(D) All of these

Answer: D) All of these

32. Impulse turbines are preferred for:

(A) High pressure and small flow rates

(B) Low pressure and large flow rates

(C) Zero pressure operation

(D) None of these

Answer: A) High pressure and small flow rates

33. The main disadvantage of reaction turbines is:

(A) Low efficiency

(B) High cost

(C) High leakage

(D) Low speed

Answer: C) High leakage

34. In a reaction turbine stage, pressure drop occurs in:

(A) Fixed blades only

(B) Moving blades only

(C) Both fixed and moving blades

(D) No pressure drop

Answer: C) Both fixed and moving blades

35. For maximum efficiency in an impulse turbine, the blade velocity is:

(A) Equal to steam velocity

(B) Half the steam velocity

(C) Double the steam velocity

(D) Zero

Answer: B) Half the steam velocity

36. The axial discharge of steam in a turbine occurs when:

(A) Steam leaves parallel to shaft

(B) Steam leaves perpendicular to shaft

(C) Steam leaves at an angle

(D) None of these

Answer: A) Steam leaves parallel to shaft

37. The pressure at the exit of a condenser is:

(A) Atmospheric

(B) Below atmospheric (vacuum)

(C) Above atmospheric

(D) None of these

Answer: B) Below atmospheric (vacuum)

38. Stage efficiency in turbines is defined as:

(A) Ratio of work done to energy supplied

(B) Ratio of shaft power to steam consumption

(C) Ratio of output power to input power

(D) All of these

Answer: A) Ratio of work done to energy supplied

39. The windage loss is due to:

(A) Friction between steam and blades

(B) Friction between rotating parts and air

(C) Heat loss in condenser

(D) Steam leakage

Answer: B) Friction between rotating parts and air

40. The nozzle angle in impulse turbines affects:

(A) Speed ratio

(B) Blade motion

(C) Pressure drop

(D) Turbine stability

Answer: A) Speed ratio

41. The mechanical efficiency in turbines is the ratio of:

(A) Shaft output to indicated power

(B) Work output to heat supplied

(C) Useful power to total power

(D) Indicated power to shaft output

Answer: A) Shaft output to indicated power

42. Nozzle control governs:

(A) Quantity of steam admitted

(B) Quality of steam

(C) Pressure ratio

(D) Temperature drop

Answer: A) Quantity of steam admitted

43. The main reason for compounding in steam turbines is:

(A) To reduce high steam velocity

(B) To increase steam consumption

(C) To maintain temperature

(D) To improve blade life

Answer: A) To reduce high steam velocity

44. In mixed pressure turbines, steam enters at:

(A) Only low pressure

(B) Only high pressure

(C) Both high and low pressure

(D) None

Answer: C) Both high and low pressure

45. The dryness fraction of steam affects:

(A) Heat supplied

(B) Blade erosion

(C) Turbine efficiency

(D) All of these

Answer: D) All of these

46. The enthalpy drop in a turbine is converted into:

(A) Mechanical work

(B) Heat loss

(C) Pressure gain

(D) All of these

Answer: A) Mechanical work

47. Throttling losses are associated with:

(A) Gland leakage

(B) Blade passage

(C) Steam flow through valves

(D) Condenser operation

Answer: C) Steam flow through valves

48. The stage pressure ratio in steam turbines is:

(A) Ratio of outlet to inlet pressure

(B) Ratio of inlet to outlet pressure

(C) Ratio of pressure at two consecutive stages

(D) Ratio at each blade

Answer: B) Ratio of inlet to outlet pressure

49. The regenerative feed heating in steam turbines:

(A) Reduces fuel consumption

(B) Increases efficiency

(C) Raises temperature of feed water

(D) All of these

Answer: D) All of these

50. Emergency stop valves in turbines are operated by:

(A) Governor

(B) Hydraulic system

(C) Manual control

(D) Blade motion

Answer: B) Hydraulic system

51. Reheat cycle in steam turbine is used to:

(A) Increase thermal efficiency

(B) Reduce work output

(C) Minimize friction

(D) None of these

Answer: A) Increase thermal efficiency

52. Condensation of steam in turbines causes:

(A) Loss of efficiency

(B) Blade erosion

(C) Noise and vibration

(D) All of these

Answer: D) All of these

53. Turbine blades are usually made of:

(A) Cast iron

(B) High alloy steel

(C) Mild steel

(D) Copper

Answer: B) High alloy steel

54. The bypass governing in turbines is applied to:

(A) Control flow

(B) Maintain pressure at all loads

(C) Increase efficiency

(D) Reduce speed

Answer: B) Maintain pressure at all loads

55. The degree of reaction is zero in:

(A) Parsons turbine

(B) Impulse turbine

(C) Reaction turbine

(D) Mixed turbine

Answer: B) Impulse turbine

56. The blade friction loss increases with:

(A) Increase in blade roughness

(B) Decrease in blade roughness

(C) Increase in blade length

(D) Decrease in blade angle

Answer: A) Increase in blade roughness

57. The purpose of equalizing pipes in turbines is:

(A) To distribute steam equally

(B) To reduce vibration

(C) To balance pressure

(D) To increase speed

Answer: A) To distribute steam equally

58. For maximum blade efficiency, the angle of nozzle is:

(A) 15°

(B) 20°

(C) 30°

(D) 45°

Answer: D) 45°

59. The velocity of steam entering the turbine is:

(A) Sonic

(B) Supersonic

(C) Subsonic

(D) Depends on nozzle design

Answer: D) Depends on nozzle design

60. The condensation of steam in turbines mainly occurs in:

(A) Nozzle

(B) Moving blade

(C) Condenser

(D) Fixed blade

Answer: C) Condenser

61. Pressure compounding is used to:

(A) Reduce rotor speed

(B) Increase temperature

(C) Increase pressure

(D) Reduce friction

Answer: A) Reduce rotor speed

62. The main function of a steam chest is:

(A) Steam distribution to nozzles

(B) Pressure reduction

(C) Maintain temperature

(D) Increase dryness fraction

Answer: A) Steam distribution to nozzles

63. The enthalpy drop in a reaction turbine takes place in:

(A) Rotor only

(B) Stator only

(C) Both rotor and stator

(D) No enthalpy drop

Answer: C) Both rotor and stator

64. In a Parsons turbine, how does the pressure vary along the stage?

(A) Uniform

(B) Decreases steadily

(C) Increases

(D) Remains constant

Answer: B) Decreases steadily

65. The annual overhaul of turbines is mainly for:

(A) Blade inspection

(B) Pressure checking

(C) Vibration study

(D) Temperature control

Answer: A) Blade inspection

66. The main cause of wear in turbine blades is:

(A) Corrosion

(B) Friction

(C) Blade erosion due to water droplets

(D) Excessive speed

Answer: C) Blade erosion due to water droplets

67. The emergency trip valve is fitted to:

(A) Steam chest

(B) Governor

(C) Blade passage

(D) By-pass line

Answer: A) Steam chest

68. Reheat factor in turbines is:

(A) Generally > 1

(B) Always < 1

(C) Exactly 1

(D) Zero

Answer: A) Generally > 1

69. The effectiveness of regenerative cycle depends on:

(A) Number of heaters

(B) Pressure

(C) Speed

(D) Temperature

Answer: A) Number of heaters

70. The main function of gland sealing steam is:

(A) Prevent leakage from shaft gland

(B) Reduce noise

(C) Increase velocity

(D) Achieve vacuum

Answer: A) Prevent leakage from shaft gland

71. The governing of steam turbines is done to maintain:

(A) Constant pressure

(B) Constant speed

(C) Constant temperature

(D) Constant load

Answer: B) Constant speed

72. The ideal nozzle efficiency for steam is:

(A) 80-90%

(B) 30-40%

(C) 100%

(D) 60-70%

Answer: A) 80-90%

73. The blade angle for maximum work output should be:

(A) Acute

(B) Right

(C) Obtuse

(D) 45 degrees

Answer: D) 45 degrees

74. The loss due to velocity of steam at turbine exit is:

(A) Called carryover loss

(B) Called windage loss

(C) Called stage loss

(D) Negligible loss

Answer: A) Called carryover loss

75. The main purpose of compounding in steam turbine is:

(A) Reduce rotational speed and increase efficiency

(B) Increase power output

(C) Reduce cost

(D) Reduce friction

Answer: A) Reduce rotational speed and increase efficiency

76. The type of turbine most often used for low pressure applications is:

(A) Impulse

(B) Reaction

(C) Mixed flow

(D) Tangential flow

Answer: B) Reaction

77. The steam nozzle has maximum efficiency if expansion takes place:

(A) Isothermally

(B) Adiabatically and reversibly

(C) At constant pressure

(D) At constant volume

Answer: B) Adiabatically and reversibly

78. The governing of turbines is done to regulate:

(A) Speed

(B) Pressure

(C) Temperature

(D) Power

Answer: A) Speed

79. The dryness fraction of steam after expansion in a nozzle:

(A) Decreases

(B) Increases

(C) Stays constant

(D) Becomes zero

Answer: B) Increases

80. The compounding where steam velocity is reduced in stages is:

(A) Pressure compounding

(B) Velocity compounding

(C) Reaction compounding

(D) Mixed compounding

Answer: B) Velocity compounding

81. The stage efficiency of turbine is affected by:

(A) Blade friction

(B) Steam quality

(C) Both A and B

(D) Neither A nor B

Answer: C) Both A and B

82. The main cause for erosion in turbine blades is presence of:

(A) Water vapor

(B) Oil droplets

(C) Air bubbles

(D) Solid impurities

Answer: A) Water vapor

83. The nozzle angle in steam turbines is usually about:

(A) 20°

(B) 30°

(C) 45°

(D) 60°

Answer: C) 45°

84. Ejector in turbines is used for:

(A) Creating vacuum

(B) Increasing velocity

(C) Reducing temperature

(D) Maintaining speed

Answer: A) Creating vacuum

85. For impulse turbines, the pressure drop occurs in:

(A) Fixed blades only

(B) Moving blades only

(C) Nozzle only

(D) Both blades

Answer: C) Nozzle only

86. The specific steam consumption in turbine is minimum when:

(A) Enthalpy drop is maximum

(B) Steam velocity is minimum

(C) Blade angle is maximum

(D) Pressure is minimum

Answer: A) Enthalpy drop is maximum

87. The work output from a steam turbine is maximum when:

(A) Difference in enthalpy is maximum

(B) Difference in pressure is minimum

(C) Steam input is minimum

(D) Blade length is maximum

Answer: A) Difference in enthalpy is maximum

88. The compounding which uses steam expansion in several stages is:

(A) Velocity compounding

(B) Pressure compounding

(C) Reaction compounding

(D) Mixed compounding

Answer: B) Pressure compounding

89. The main role of the throttle valve is:

(A) Control steam flow

(B) Increase steam velocity

(C) Decrease steam pressure

(D) Increase steam temperature

Answer: A) Control steam flow

90. The main purpose of gland packing in turbines is:

(A) Prevent leakage

(B) Reduce vibration

(C) Increase pressure

(D) Increase speed

Answer: A) Prevent leakage

91. In steam turbines, the blade has least wear and tear at:

(A) Leading edge

(B) Trailing edge

(C) Mid-span

(D) None of these

Answer: A) Leading edge

92. The turbine with maximum specific output per unit steam is:

(A) Reaction turbine

(B) Impulse turbine

(C) Mixed turbine

(D) Parsons turbine

Answer: B) Impulse turbine

93. The condenser vacuum in turbines is measured by:

(A) McLeod gauge

(B) Manometer

(C) Bourdon gauge

(D) Absolute gauge

Answer: B) Manometer

94. The steam chest serves to:

(A) Distribute steam to nozzles

(B) Increase speed

(C) Reduce temperature

(D) Increase pressure

Answer: A) Distribute steam to nozzles

95. The main cause of steam leakage in turbines is:

(A) Faulty gland packing

(B) Excess speed

(C) Overheating

(D) High pressure steam

Answer: A) Faulty gland packing

96. The main function of booster pump in turbines is:

(A) Increase steam pressure

(B) Maintain speed

(C) Reduce vibration

(D) Remove moist steam

Answer: A) Increase steam pressure

97. The throttle governing is used for:

(A) Small capacity turbines

(B) Large capacity turbines

(C) Medium capacity turbines

(D) All turbines

Answer: A) Small capacity turbines

98. Reheat cycle in turbines gives:

(A) Higher thermal efficiency

(B) Lower efficiency

(C) Same efficiency

(D) Zero efficiency

Answer: A) Higher thermal efficiency

99. For maximum expansion ratio, nozzle should be:

(A) Short and narrow

(B) Long and wide

(C) Convergent-divergent

(D) None

Answer: C) Convergent-divergent

100. The main advantage of reheat cycle in turbines is:

(A) Increased output

(B) Increased efficiency

(C) Reduction in blade erosion

(D) All of these

Answer: D) All of these

***