

Compressors, Gas Dynamics and Gas Turbines

1. The main function of a compressor is to:

- (A) Increase pressure of gas
- (B) Increase velocity of gas
- (C) Reduce temperature of gas
- (D) Decrease pressure of gas

Answer: A) Increase pressure of gas

2. The most common type of air compressor used in industry is:

- (A) Centrifugal compressor
- (B) Axial compressor
- (C) Reciprocating compressor
- (D) Rotary compressor

Answer: C) Reciprocating compressor

3. Efficiency of a compressor increases with:

- (A) Decrease in clearance volume
- (B) Increase in clearance volume
- (C) Increase in temperature
- (D) Increase in speed

Answer: A) Decrease in clearance volume

4. The volumetric efficiency of a compressor is affected by:

- (A) Clearance volume
- (B) Compression ratio
- (C) Valve timing
- (D) All of these

Answer: D) All of these

5. Which cycle is followed in gas turbines?

- (A) Otto cycle
- (B) Brayton cycle
- (C) Rankine cycle
- (D) Diesel cycle

Answer: B) Brayton cycle

6. In reciprocating compressors, inter-cooling is used to:

- (A) Reduce temperature of compressed air
- (B) Increase efficiency
- (C) Reduce work of compression
- (D) All of these

Answer: D) All of these

7. The process in which pressure is increased at constant temperature is called:

- (A) Isothermal compression
- (B) Adiabatic compression
- (C) Isobaric compression
- (D) Polytropic compression

Answer: A) Isothermal compression

8. Gas turbines are generally driven by:

- (A) Steam
- (B) Hot gases
- (C) High-pressure liquids
- (D) None of these

Answer: B) Hot gases

9. The main advantage of axial flow compressors is:

- (A) High pressure ratio
- (B) High volume flow rate
- (C) Low cost
- (D) Easy maintenance

Answer: B) High volume flow rate

10. The function of diffuser in a compressor is to:

- (A) Increase pressure
- (B) Increase velocity
- (C) Reduce pressure
- (D) Reduce velocity

Answer: A) Increase pressure

11. The work input to a compressor is minimum if the compression is:

- (A) Isothermal
- (B) Adiabatic
- (C) Polytropic
- (D) Isobaric

Answer: A) Isothermal

12. The clearance volume in a reciprocating compressor should be:

- (A) Maximum
- (B) Minimum
- (C) Zero
- (D) Half of cylinder volume

Answer: B) Minimum

13. The polytropic index in compression lies between:

- (A) 1 and γ
- (B) γ and infinity
- (C) Zero and 1

(D) γ and 2γ

Answer: A) 1 and γ

14. Gas turbines are used in:

(A) Aircraft

(B) Power plants

(C) Ships

(D) All of these

Answer: D) All of these

15. Blowers are used for:

(A) Delivering air at low pressure and high volume

(B) Delivering air at high pressure and low volume

(C) Delivering air at constant temperature

(D) All of these

Answer: A) Delivering air at low pressure and high volume

16. In a turbojet engine, the compressor is usually of:

(A) Axial flow type

(B) Centrifugal type

(C) Rotary type

(D) Reciprocating type

Answer: A) Axial flow type

17. The pressure ratio across a single stage gas turbine is generally:

(A) 1.5 to 2.5

(B) 10 to 15

(C) 2 to 4

(D) 5 to 10

Answer: A) 1.5 to 2.5

18. In gas dynamics, Mach number is defined as the ratio of:

- (A) Fluid velocity to sound velocity
- (B) Sound velocity to fluid velocity
- (C) Pressure to density
- (D) Temperature to pressure

Answer: A) Fluid velocity to sound velocity

19. When Mach number is less than 1, the flow is:

- (A) Subsonic
- (B) Sonic
- (C) Supersonic
- (D) Hypersonic

Answer: A) Subsonic

20. Shock waves occur when Mach number is:

- (A) Less than 1
- (B) Equal to 1
- (C) Greater than 1
- (D) Zero

Answer: C) Greater than 1

21. The temperature ratio across a compressor is:

- (A) Depends on efficiency
- (B) Depends on pressure ratio
- (C) Always constant
- (D) Zero

Answer: B) Depends on pressure ratio

22. Isentropic flow is:

- (A) Adiabatic and reversible
- (B) Isothermal and reversible

- (C) Isobaric and irreversible
- (D) Polytropic and reversible

Answer: A) Adiabatic and reversible

23. The Brayton cycle consists of:

- (A) Two adiabatic and two isobaric processes
- (B) Two isothermal and two adiabatic processes
- (C) Three isochoric and one isobaric process
- (D) All isothermal processes

Answer: A) Two adiabatic and two isobaric processes

24. The maximum efficiency of a compressor is obtained when:

- (A) Compression is isothermal
- (B) Compression is adiabatic
- (C) Compression is polytropic
- (D) Compression is isobaric

Answer: A) Compression is isothermal

25. The ideal gas constant is:

- (A) 287 J/kg K
- (B) 8.314 kJ/kg mol K
- (C) 1000 J/kg K
- (D) 1 kJ/kg K

Answer: B) 8.314 kJ/kg mol K

26. The main loss in compressors is due to:

- (A) Friction
- (B) Leakage
- (C) Heat loss
- (D) Air resistance

Answer: A) Friction

27. Intercooling in multi-stage compressors:

- (A) Decreases the work done
- (B) Increases the work done
- (C) Has no effect
- (D) Increases temperature

Answer: A) Decreases the work done

28. The outlet velocity from a convergent nozzle at sonic conditions is:

- (A) Equal to speed of sound
- (B) Double speed of sound
- (C) Zero
- (D) Half speed of sound

Answer: A) Equal to speed of sound

29. The function of a regenerator in gas turbines is to:

- (A) Increase inlet temperature of air
- (B) Cool exhaust gases
- (C) Increase efficiency
- (D) Both A and C

Answer: D) Both A and C

30. The term "choked flow" refers to:

- (A) Maximum mass flow through a nozzle
- (B) Zero mass flow
- (C) Infinite mass flow
- (D) Constant pressure flow

Answer: A) Maximum mass flow through a nozzle

31. The cycle efficiency of a simple gas turbine is:

- (A) Lower than steam turbine

- (B) Higher than steam turbine
- (C) Same as steam turbine
- (D) Zero

Answer: A) Lower than steam turbine

32. The axial flow compressor operates by:

- (A) Increasing velocity of gas
- (B) Increasing pressure of gas
- (C) Both A and B
- (D) None of these

Answer: C) Both A and B

33. Diffuser is fitted in compressor to:

- (A) Reduce velocity and increase pressure
- (B) Increase velocity and reduce pressure
- (C) Maintain constant velocity
- (D) All of these

Answer: A) Reduce velocity and increase pressure

34. The overall efficiency of multi-stage compressor is:

- (A) Lower than single stage
- (B) Higher than single stage
- (C) Same as single stage
- (D) Variable

Answer: B) Higher than single stage

35. In gas dynamics, Prandtl number is the ratio of:

- (A) Kinematic viscosity to thermal diffusivity
- (B) Thermal conductivity to specific heat
- (C) Pressure to density
- (D) Temperature to density

Answer: A) Kinematic viscosity to thermal diffusivity

36. The main difference between rotary and reciprocating compressors is:

- (A) Rotary compressors deliver continuous flow
- (B) Reciprocating compressors deliver intermittent flow
- (C) Both A and B
- (D) None of these

Answer: C) Both A and B

37. The expansion ratio in a gas turbine is:

- (A) Ratio of inlet to outlet pressure
- (B) Ratio of outlet to inlet pressure
- (C) Ratio of temperatures before and after turbine
- (D) Ratio of mass flow rates

Answer: A) Ratio of inlet to outlet pressure

38. Gas turbines operate at:

- (A) Constant pressure
- (B) Constant volume
- (C) Both
- (D) Variable pressure

Answer: A) Constant pressure

39. The stagnation pressure in flow is the pressure at:

- (A) Zero fluid velocity
- (B) Maximum fluid velocity
- (C) Sonic velocity
- (D) Supersonic velocity

Answer: A) Zero fluid velocity

40. The main application of gas turbines is in:

- (A) Power generation
- (B) Aircraft propulsion
- (C) Marine propulsion
- (D) All of these

Answer: D) All of these

41. The volumetric efficiency of reciprocating compressor decreases with:

- (A) Increase in clearance volume
- (B) Decrease in clearance volume
- (C) No effect
- (D) Increase in compression ratio

Answer: A) Increase in clearance volume

42. The mass flow rate in a nozzle is maximum when:

- (A) Mach number is 1
- (B) Mach number is 0.5
- (C) Mach number is less than 1
- (D) Mach number is infinite

Answer: A) Mach number is 1

43. The main function of a combustion chamber in gas turbines is:

- (A) To burn fuel and raise temperature
- (B) To mix air and fuel
- (C) To compress gases
- (D) To control speed

Answer: A) To burn fuel and raise temperature

44. The specific work output of a gas turbine depends on:

- (A) Pressure ratio
- (B) Temperature difference
- (C) Both A and B

(D) Airline velocity

Answer: C) Both A and B

45. The principle of operation of turbocharger is using:

(A) Exhaust gases to drive compressor

(B) Fuel to drive compressor

(C) Electricity to drive compressor

(D) Compressor powered by battery

Answer: A) Exhaust gases to drive compressor

46. Gas turbines are preferred in aircraft due to:

(A) High power/weight ratio

(B) High efficiency at low speeds

(C) Low efficiency

(D) Low power/weight ratio

Answer: A) High power/weight ratio

47. Reciprocating compressors are best suited for:

(A) Low volume, high pressure

(B) High volume, low pressure

(C) High volume, high pressure

(D) Low volume, low pressure

Answer: A) Low volume, high pressure

48. The pressure ratio in axial flow compressors is:

(A) 1.2–2.0 per stage

(B) 10–20 per stage

(C) 0.5 per stage

(D) 2.5 per stage

Answer: A) 1.2–2.0 per stage

49. The efficiency of Brayton cycle increases with:

- (A) Regeneration
- (B) Intercooling
- (C) Increase in pressure ratio
- (D) All of these

Answer: D) All of these

50. The main disadvantage of compressors is:

- (A) High noise
- (B) High maintenance cost
- (C) Large size
- (D) High speed

Answer: B) High maintenance cost

51. The tip clearance in centrifugal compressors is provided to:

- (A) Avoid blade rubbing
- (B) Increase pressure
- (C) Decrease efficiency
- (D) Reduce temperature

Answer: A) Avoid blade rubbing

52. The mass flow rate of air in compressors is proportional to:

- (A) Inlet density
- (B) Suction pressure
- (C) Inlet temperature
- (D) All

Answer: D) All

53. In gas turbines, the work output is maximum at:

- (A) Maximum temperature difference
- (B) Minimum temperature difference

- (C) Constant pressure
- (D) Minimum pressure difference

Answer: A) Maximum temperature difference

54. A turbojet engine is mostly used in:

- (A) Cargo planes
- (B) Fighter planes
- (C) Passenger planes
- (D) All of these

Answer: B) Fighter planes

55. The jet propulsion method uses:

- (A) High velocity exhaust gases
- (B) Low velocity intake air
- (C) High velocity intake air
- (D) Low velocity exhaust gases

Answer: A) High velocity exhaust gases

56. The compression process in gas turbines is:

- (A) Isothermal
- (B) Isentropic
- (C) Adiabatic
- (D) All of these

Answer: B) Isentropic

57. The relative velocity in gas turbines is:

- (A) Velocity of gas with respect to blades
- (B) Velocity of blades with respect to axis
- (C) Velocity of air with respect to compressor
- (D) Velocity of fuel with respect to rotor

Answer: A) Velocity of gas with respect to blades

58. The specific fuel consumption in gas turbines is:

- (A) Higher than reciprocating engines
- (B) Lower than reciprocating engines
- (C) Same as reciprocating engines
- (D) Zero

Answer: A) Higher than reciprocating engines

59. Mechanical efficiency of compressors is:

- (A) Output power/input power
- (B) Input power/output power
- (C) Zero
- (D) One

Answer: A) Output power/input power

60. In axial compressors, the flow is mostly:

- (A) Along axis
- (B) Perpendicular to axis
- (C) Spirally
- (D) Randomly

Answer: A) Along axis

61. The temperature at the inlet of gas turbine is:

- (A) Minimum
- (B) Maximum
- (C) Zero
- (D) Constant

Answer: B) Maximum

62. The outlet pressure of a multi-stage compressor:

- (A) Increases with number of stages

- (B) Decreases with number of stages
- (C) Constant
- (D) Variable

Answer: A) Increases with number of stages

63. The main type of loss in centrifugal compressor is:

- (A) Friction
- (B) Disk friction
- (C) Heat loss
- (D) None

Answer: B) Disk friction

64. In gas dynamics, stagnation temperature is measured at:

- (A) Zero velocity
- (B) Maximum velocity
- (C) Minimum velocity
- (D) Average velocity

Answer: A) Zero velocity

65. The main function of a nozzle in gas turbines is to:

- (A) Increase velocity
- (B) Increase pressure
- (C) Decrease velocity
- (D) Maintain constant pressure

Answer: A) Increase velocity

66. The efficiency of gas turbine plant is less due to:

- (A) High turbine blade temperature
- (B) High compressor work
- (C) Both A and B
- (D) High work output

Answer: C) Both A and B

67. The pressure rise in compressor is:

- (A) Directly proportional to work input
- (B) Inversely proportional to work input
- (C) Independent of work input
- (D) Inversely proportional to efficiency

Answer: A) Directly proportional to work input

68. The volumetric efficiency of compressor is highest at:

- (A) Low pressure ratio
- (B) High pressure ratio
- (C) Constant pressure
- (D) Variable pressure

Answer: A) Low pressure ratio

69. The blade profile in axial compressors is preferred as:

- (A) Airfoil shape
- (B) Square shape
- (C) Circular shape
- (D) Flat shape

Answer: A) Airfoil shape

70. The number of blades in an axial compressor stage varies as:

- (A) 20–30
- (B) 50–100
- (C) 80–160
- (D) 200–300

Answer: C) 80–160

71. The principle of jet propulsion is:

- (A) Reaction principle
- (B) Newton's first law
- (C) Conservation of energy
- (D) Conservation of mass

Answer: A) Reaction principle

72. Combustion chamber pressure in gas turbines is:

- (A) Several atmospheres
- (B) 1 atm
- (C) 10 atm
- (D) Zero

Answer: A) Several atmospheres

73. The regenerator in gas turbine plant helps in:

- (A) Preheating air
- (B) Cooling exhaust gases
- (C) Reducing specific fuel consumption
- (D) Both A and C

Answer: D) Both A and C

74. The loss of performance in gas turbines is mainly due to:

- (A) High temperature
- (B) Leakage
- (C) Blade erosion
- (D) All of these

Answer: D) All of these

75. The maximum pressure ratio in a practical jet engine is:

- (A) 8–12
- (B) 12–20
- (C) 2–4

(D) 20–30

Answer: B) 12–20

76. Shock waves in gas dynamics are associated with:

(A) High Mach number

(B) Low Mach number

(C) Maximum temperature

(D) Zero Mach number

Answer: A) High Mach number

77. The work output of gas turbines increases by:

(A) Raising inlet temperature of air

(B) Lowering outlet temperature

(C) Increasing pressure ratio

(D) All of these

Answer: D) All of these

78. Choked flow in nozzles occurs at:

(A) Mach number is unity at throat

(B) Mach number is greater than unity at inlet

(C) Mach number is less than unity throughout

(D) Mach number is zero

Answer: A) Mach number is unity at throat

79. The primary advantage of an intercooler in compressors is:

(A) Reduced work per stage

(B) Increased volumetric efficiency

(C) Increased overall compression ratio

(D) All of these

Answer: D) All of these

80. The work required in compressors is minimum for:

- (A) Perfect intercooling
- (B) No cooling
- (C) Partial intercooling
- (D) Constant cooling

Answer: A) Perfect intercooling

81. Isothermal efficiency of compressor is:

- (A) Isothermal work/Actual work
- (B) Adiabatic work/Actual work
- (C) Actual work/Isothermal work
- (D) Zero

Answer: A) Isothermal work/Actual work

82. The temperature after compression increases due to:

- (A) Work input
- (B) Heat loss
- (C) Friction
- (D) Pressure drop

Answer: A) Work input

83. The heat exchanger in a gas turbine plant is called:

- (A) Combustor
- (B) Regenerator
- (C) Condenser
- (D) Rotor

Answer: B) Regenerator

84. The stagnation properties are measured at:

- (A) Zero velocity
- (B) Maximum velocity

(C) Minimum velocity

(D) Random velocity

Answer: A) Zero velocity

85. In gas turbines, the exhaust gases are used to:

(A) Drive turbocharger

(B) Preheat combustion air

(C) Expel through nozzle

(D) All of these

Answer: D) All of these

86. The material for turbine blades is chosen for:

(A) High-temperature resistance

(B) High-strength

(C) Fatigue resistance

(D) All of these

Answer: D) All of these

87. The main disadvantage of rotary compressors is:

(A) Low pressure ratio

(B) High power consumption

(C) High maintenance cost

(D) Large size

Answer: A) Low pressure ratio

88. The sound wave travels in a gas at:

(A) Velocity proportional to temperature

(B) Velocity proportional to pressure

(C) Velocity proportional to density

(D) Constant velocity

Answer: A) Velocity proportional to temperature

89. Reciprocating compressors are used for:

- (A) Industrial refrigeration
- (B) Automobile air conditioning
- (C) Pneumatic tools
- (D) All of these

Answer: D) All of these

90. Mach number is unity at the:

- (A) Throat of convergent-divergent nozzle
- (B) Exit of nozzle
- (C) Entry of nozzle
- (D) Diffuser inlet

Answer: A) Throat of convergent-divergent nozzle

91. The gas turbine engine is most efficient at:

- (A) High speeds
- (B) Low speeds
- (C) Constant speeds
- (D) Zero speed

Answer: A) High speeds

92. The volumetric flow rate in compressors is given by:

- (A) Area \times velocity
- (B) Pressure \times area
- (C) Density \times area
- (D) None of these

Answer: A) Area \times velocity

93. The effectiveness of regenerator increases with:

- (A) Higher heat exchange surface

- (B) Lower heat loss
- (C) Higher temperature difference
- (D) All of these

Answer: D) All of these

94. The degree of reaction in axial compressors is typically:

- (A) 0.5
- (B) 1
- (C) 0
- (D) 2

Answer: A) 0.5

95. Specific speed of compressor is:

- (A) Dimensionless
- (B) Depends on design
- (C) Used for classification
- (D) All of these

Answer: D) All of these

96. The efficiency of axial compressors is highest at:

- (A) Design speed
- (B) Low speed
- (C) High speed
- (D) Zero speed

Answer: A) Design speed

97. Gas dynamics studies:

- (A) High-speed gas flow
- (B) Low-speed gas flow
- (C) Static gas behavior
- (D) Both A and B

Answer: D) Both A and B

98. In gas turbines, the combustor is located between:

- (A) Compressor and turbine
- (B) Turbine and nozzle
- (C) Compressor and regenerator
- (D) Nozzle and turbine

Answer: A) Compressor and turbine

99. The main advantage of centrifugal compressor is:

- (A) High pressure ratio per stage
- (B) Low cost
- (C) Compact size
- (D) Low maintenance

Answer: A) High pressure ratio per stage

100. The Brayton cycle is also called:

- (A) Joule cycle
- (B) Otto cycle
- (C) Diesel cycle
- (D) Carnot cycle

Answer: A) Joule cycle
