

Compressors, Gas Turbines and Jet Engines

1. Free air is the air at

- (a) atmospheric conditions at any specific location
- (b) 20°C and 1 kg/cm² and relative humidity of 36%
- (c) 0°C and standard atmospheric conditions
- (d) 15°C and 1 kg/cm²
- (e) 25°C, 1 kg/cm² and relative humidity of 50%.

Ans: a

2. Standard air is the air at

- (a) atmospheric conditions at any specific location
- (b) 20°C and 1 kg/cm² and relative humidity 36%
- (c) 0°C and standard atmospheric conditions
- (d) 15°C and 1 kg/cm²
- (e) 25°C, 1 kg/cm² and RH of 60%.

Ans: b

3. 1 m of air at atmospheric condition weighs approximately

- (a) 0.5 kg
- (b) 1.0 kg
- (c) 1.3 kg
- (d) 2.2 kg
- (e) 3.2 kg.

Ans: c

4. Adiabatic compression is one in which

- (a) temperature during compression remains constant
- (b) no heat leaves or enters the compressor cylinder during compression
- (c) temperature rise follows a linear relationship
- (d) work done is maximum
- (e) entropy decreases.

Ans: b

5. The capacity of a compressor is 5 m³/min. 5 m³/min refers to

- (a) standard air
- (b) free air
- (c) compressed air
- (d) compressed air at delivery pressure
- (e) air sucked.

Ans: b

6. The overall isothermal efficiency of compressor is defined as the ratio of

- (a) isothermal h.p. to the BHP of motor
- (b) isothermal h.p. to adiabatic h.p.
- (c) power to drive compressor to isothermal h.p.
- (d) work to compress air isothermally to work for actual compression
- (e) isothermal work to ideal work.

Ans: a

7. The most efficient method of compressing air is to compress it

- (a) isothermally
- (b) adiabatically
- (c) isentropically
- (d) isochronically

(e) as per law pV

Ans: a

8. Maximum work is done in compressing air when the compression is

- (a) isothermal
- (b) adiabatic
- (c) polytropic
- (d) any one of the above
- (e) none of the above.

Ans: b

9. The pressure and temperature conditions of air at the suction of compressor are

- (a) atmospheric
- (b) slightly more than atmospheric
- (c) slightly less than atmospheric
- (d) pressure slightly more than atmospheric and temperature slightly less than atmospheric
- (e) pressure slightly less than atmospheric and temperature slightly more than atmospheric.

Ans: e

10. Isothermal compression efficiency can be attained by running the compressor

- (a) at very high speed
- (b) at very slow speed
- (c) at average speed
- (d) at zero speed
- (e) isothermally.

Ans: b

11. The compressor capacity with decrease in suction temperature

- (a) increases
- (b) decreases
- (c) remains unaffected
- (d) may increase or decrease depending on compressor capacity
- (e) increases upto certain limit and then decreases.

Ans: a

12. Isothermal compression efficiency, even when running at high speed, can be approached by using

- (a) multi-stage compression
- (b) cold water spray
- (c) both (a) and (b) above
- (d) fully insulating the cylinder
- (e) high stroke.

Ans: c

13. Compression efficiency is compared against

- (a) ideal compression
- (b) adiabatic compression
- (c) both isothermal and adiabatic compression
- (d) isentropic compression
- (e) isothermal compression.

Ans: e

14. Aeroplanes employ following type of compressor

- (a) radial flow
- (b) axial flow

- (c) centrifugal
 - (d) combination of above
 - (e) none of the above.
- Ans: b

15. Inter cooling in compressors

- (a) cools the delivered air
- (b) results in saving of power in compressing a given volume to given pressure
- (c) is the standard practice for big compressors
- (d) enables compression in two stages
- (e) prevents compressor jacket running very hot.

Ans: b

16. An ideal air compressor cycle without clearance on p-v diagram can be represented by following processes

- (a) one adiabatic, two isobaric, and one constant volume
- (b) two adiabatic and two isobaric
- (c) two adiabatic, one isobaric and one constant volume
- (d) one adiabatic, one isobaric and two constant volume
- (e) two isobaric, two adiabatic and one constant volume.

Ans: a

17. An ideal air compressor cycle with clearance on p-v diagram can be represented by following processes

- (a) one adiabatic, two isobaric, and one constant volume
- (b) two adiabatic and two isobaric
- (c) two adiabatic, one isobaric and one constant volume,
- (d) one adiabatic, one isobaric and two constant volume
- (e) two isobaric, two adiabatic and one constant volume.

Ans: b

18. What will be the volume of air at 327°C if its volume at 27°C is 1.5 m³/mt

- (a) 3 m³/mt .
- (b) 1.5 m³/mt
- (c) 18 m³/mt'
- (d) 6 m³/mt
- (e) 0.75 m³/mt.

Ans: a

19. The work done per unit mass of air in compression will be least when n is equal to

- (a) 1
- (b) 1.2 ,
- (c) 1.3
- (d) 1.4
- (e) 1.5

Ans: a

20. Isothermal compression though most efficient, but is not -practicable because

- (a) it requires very big cylinder
- (b) it does not increase pressure much
- (c) it is impossible in practice
- (d) compressor has to run at very slow speed to achieve it
- (e) it requires cylinder to be placed in water.

Ans: d

21. Ratio of indicated H.P. and brake H.P. is known as

- (a) mechanical efficiency

- (b) volumetric efficiency
- (c) isothermal efficiency
- (d) adiabatic efficiency
- (e) relative efficiency.

Ans: a

22. The ratio of work done per cycle to the swept volume in case of compressor is called

- (a) compression index
- (b) compression ratio
- (c) compressor efficiency
- (d) mean effective pressure
- (e) compressor effectiveness.

Ans: d

23. Cylinder clearance in a compressor should be

- (a) as large as possible
- (b) as small as possible
- (c) about 50% of swept volume
- (d) about 100% of swept volume
- (e) none of the above.

Ans: b

24. Ratio of compression is the ratio of

- (a) gauge discharge pressure to the gauge intake pressure
- (b) absolute discharge pressure to the absolute intake pressure
- (c) pressures at discharge and suction corresponding to same temperature
- (d) stroke volume and clearance volume
- (e) none of the above.

Ans: b

25. Clearance volume in actual reciprocating compressors is essential

- (a) to accommodate Valves in the cylinder head
- (b) to provide cushioning effect
- (c) to attain high volumetric efficiency
- (d) to avoid mechanical bang of piston with cylinder head
- (e) to provide cushioning effect and also to avoid mechanical bang of piston with cylinder head.

Ans: e

26. The net work input required for compressor with increase in clearance volume

- (a) increases
- (b) decreases
- (c) remains same
- (d) increases/decreases depending on compressor capacity
- (e) unpredictable.

Ans: c

27. Ratio of indicated h.p. to shaft h.p. is known as

- (a) compressor efficiency
- (b) isothermal efficiency
- (c) volumetric efficiency
- (d) mechanical efficiency
- (e) adiabatic efficiency.

Ans: d

28. Volumetric efficiency is

- (a) the ratio of stroke volume to clearance volume

- (b) the ratio of the air actually delivered to the amount of piston displacement
- (c) reciprocal of compression ratio
- (d) index of compressor performance
- (e) proportional to compression ratio.

Ans: b

29. Volumetric efficiency of air compressors is of the order of

- (a) 20-30%
- (b) 40-50%
- (c) 60-70%
- (d) 70-90%
- (e) 90-100%.

Ans: d

30. Volumetric efficiency of a compressor with clearance volume

- (a) increases with increase in compression ratio
- (b) decreases with increase in compression ratio
- (c) is not dependent upon compression ratio
- (d) may increase/decrease depending on compressor capacity
- (e) unpredictable.

Ans: b

31. Volumetric efficiency of a compressor without clearance volume

- (a) increases with increase in compression ratio
- (b) decreases with increase in compression ratio
- (c) is not dependent upon compression ratio
- (d) may increase/decrease depending on compressor capacity
- (e) unpredictable.

Ans: c

32. The clearance volume of the air compressor is kept minimum because

- (a) it allows maximum compression to be achieved
- (b) it greatly affects volumetric efficiency
- (c) it results in minimum work
- (d) it permits isothermal compression
- (e) none of the above.

Ans: b

33. Euler's equation is applicable for

- (a) centrifugal compressor
- (b) axial compressor
- (c) pumps
- (d) all of the above
- (e) none of the above.

Ans: d

40. Out of the following, from where you will prefer to take intake for air compressor

- (a) from an air conditioned room maintained at 20°C
- (b) from outside atmosphere at 1°C
- (c) from coal yard side
- (d) from a side where cooling tower is located nearby
- (e) from any one of the above locations.

Ans: d

41. Mining industry usually employs following motive power

- (a) A.C. electric motor
- (b) compressed air

- (c) petrol engine
 - (d) diesel engine
 - (e) D.C. electric motor.
- Ans: b

42. Which is false statement about air receivers
- (a) These are used to dampen pulsations ,
 - (b) These act as reservoir to- take care of sudden demands
 - (c) These increase compressor efficiency
 - (d) These knock out some oil and moisture
 - (e) These reduce frequent on/off operation of compressors.
- Ans: c

44. An air receiver is to be placed outside. Should it be placed in
- (a) sun
 - (b) shade
 - (c) rain
 - (d) enclosed room
 - (e) anywhere.
- Ans:

45. Which is false statement about multistage compression .
- (a) Power consumption per unit of air delivered is low
 - (b) Volumetric efficiency is high
 - (c) It is best suited for compression ratios around 7:1
 - (d) The moisture in air is condensed in the intercooler
 - (e) Outlet temperature is reduced.
- Ans: b

46. In multistage compressor, the isothermal compression is achieved by
- (a) employing intercooler
 - (b) by constantly cooling the cylinder
 - (c) by running compressor at very slow speed
 - (d) by insulating the cylinder
 - (e) none of the above.
- Ans: c

47. Reciprocating air compressor is best suited for
- (a) large quantity of air at high pressure
 - (b) small quantity of air at high pressure
 - (c) small quantity of air at low pressure
 - (d) large quantity of air at low pressure
 - (e) any one of the above.
- Ans: a

48. Rotary compressor is best suited for
- (a) large quantity of air at high pressure
 - (b) small quantity of air at high pressure
 - (c) small quantity of air at low pressure
 - (d) large quantity of air at low pressure
 - (e) any one of the above.
- Ans: b

49. The capacity of compressor will be highest when its intake temperature is
- (a) lowest
 - (b) highest
 - (c) anything.

- (d) atmospheric
- (e) none of the above.

Ans: d

50. After-cooler is used to

- (a) cool the air
- (b) decrease the delivery temperature for ease in handling
- (c) cause moisture and oil vapour to drop out
- (d) reduce volume
- (e) increase pressure.

Ans: c

51. To avoid moisture troubles, the compressed air main line should

- (a) rise gradually towards the point of use
- (b) drop gradually towards the point of use
- (c) be laid vertically
- (d) be laid exactly horizontally
- (e) none of the above

Ans: b

52. Separators in compressor installations are located

- (a) before intercooler
- (b) after intercooler
- (c) after receiver
- (d) between after-cooler and air receiver
- (e) before suction.

Ans: d

53. The area of actual indicator diagram on an air compressor as compared to area of ideal indicator diagram is

- (a) less
- (b) more
- (c) same
- (d) more/less depending on compressor capacity
- (e) unpredictable.

Ans: b

54. An air compressor may be controlled by

- (a) throttle control
- (b) clearance control
- (c) blow-off control
- (d) any one of the above
- (e) none of the above.

Ans: d

55. The compressor efficiency is the

- (a) isothermal H.P./indicated H.R
- (b) isothermal H.P./shaft H.R
- (c) total output/air input
- (d) compression work/motor input
- (e) none Of the above.

Ans: a

56. To avoid moisture troubles, the branch connections from compressed air lines should be taken from

- (a) top side of main
- (b) bottom side of main
- (c) left side of main

- (d) right side of main
- (e) any location.

Ans: a

57. The thrust on the rotor in a centrifugal compressor is produced by

- (a) radial component
- (b) axial component
- (c) tangential component
- (d) resultant component

Ans: b

58. The compressor performance at higher altitude compared to sea level will be

- (a) same
- (b) higher
- (c) lower
- (d) dependent on other factors
- (e) none of the above.

Ans: c

59. A compressor at high altitude will draw

- (a) more power
- (b) less power
- (c) same power
- (d) more/less power depending on other factors
- (e) none of the above.

Ans: b

60. During peak load periods, the best method of controlling compressors is

- (a) start-stop motor
- (b) constant speed unloader
- (c) relief valve
- (d) variable speed
- (e) none of the above.

Ans: b

61. A centrifugal compressor works on the principle of

- (a) conversion of pressure energy into kinetic energy
- (b) conversion of kinetic energy into pressure energy
- (c) centripetal action
- (d) generating pressure directly
- (e) combination of (a) and (d).

Ans: b

62. For a compressor, least work will be done if the compression is

- (a) isentropic
- (b) isothermal
- (c) polytropic
- (d) somewhere in between isentropic and isothermal
- (e) none of the above.

Ans: b

67. In a compressor, free air delivered is the actual volume delivered at the stated pressure reduced to

- (d) N.T.P. conditions
- (b) intake temperature and pressure conditions
- (c) 0°C and 1 kg/cm²
- (d) 20°C and 1 kg/cm²

(e) none of the above.

Ans: b

68. The volumetric efficiency of a compressor is calculated on the basis of

- (a) volume of air inhaled at working conditions
- (b) volume of air inhaled at N.T.P. conditions
- (c) volume at 0°C and 1 kg/cm²
- (d) volume at 20°C and 1 kg/cm²
- (e) none of the above.

Ans: b

69. The volumetric efficiency of a compressor falls roughly as follows for every 100 m increase in elevation

- (a) 0.1%
- (b) 0.5%
- (c) 1.0%
- (d) 5%
- (e) 10%.

Ans: c

70. For slow-speed large capacity compressor, following type of valve will be best suited

- (a) poppet valve
- (b) mechanical valve of the corliss, sleeve, rotary or semirotary type
- (c) disc or feather type
- (d) any of the above
- (e) none of the above.

Ans: c

71. During base load operation, the best method of controlling compressor is

- (a) start-stop motor
- (b) constant speed unloader
- (c) relief valve
- (d) variable speed
- (e) none of the above.

Ans: a

72. More than one stage will be preferred for reciprocating compressor if the delivery pressure is more than

- (a) 2 kg/cm²
- (b) 6 kg/cm²
- (c) 10 kg/cm²
- (d) 14.7 kg/cm²
- (e) none of the above.

Ans: a

73. The advantage of multistage compression over single stage compression is

- (a) lower power consumption per unit of air delivered
- (b) higher volumetric efficiency
- (c) decreased discharge temperature
- (d) moisture free air
- (e) all of the above.

Ans: e

74. Pick up the wrong statement about advantages of multistage compression

- (a) better lubrication is possible advantages of multistage
- (b) more loss of air due to leakage past the cylinder
- (c) mechanical balance is better

- (d) air can be cooled perfectly in between
- (e) more uniform torque, light cylinder and saving in work.

Ans: b

75. As the value of index ' γ ' is decreased, the volumetric efficiency will

- (a) increase
- (b) decrease
- (c) remain unaffected
- (d) may increase/decrease depending on compressor clearance
- (e) none of the above.

Ans: b

76. The ratio of outlet whirl velocity to blade velocity in case of centrifugal compressor is called

- (a) slip factor
- (b) velocity factor
- (c) velocity coefficient
- (d) blade effectiveness

Ans: a

79. Losses in a centrifugal compressor are due to

- (a) inlet losses
- (b) impeller channel losses
- (c) diffuser losses
- (d) all of the above
- (e) none of the above

Ans: d

80. The volumetric efficiency of a compressor falls roughly as follows for every 5°C increase in atmospheric temperature

- (a) 0.1%
- (b) 0.5%
- (c) 1%
- (d) 5%
- (e) 10%.

Ans: c

81. The indicated work per unit mass of air delivered is

- (a) directly proportional to clearance volume
- (b) greatly affected by clearance volume
- (c) not affected by clearance volume
- (d) inversely proportional to clearance volume

Ans: c

89. For actual single stage centrifugal compressor, the maximum pressure ratio is of the order of

- (a) 1 : 1.2
- (b) 1 : 2
- (c) 1 : 4
- (d) 1 : 10
- (e) 1 : 1

Ans:

90. Which is false statement about advantages of multistage compressor in comparison to single stage compressor

- (a) less power requirement
- (b) better mechanical balance

- (c) less loss of air due to leakage past the cylinder
 - (d) more effective lubrication
 - (e) lower volumetric efficiency.
- Ans: e

91. The ratio of isentropic work to Euler work is known as
- (a) pressure coefficient
 - (b) work coefficient
 - (c) polytropic reaction
 - (d) slip factor
 - (e) compressor efficiency.
- Ans: a

92. The criterion of the thermodynamic efficiency for rotary compressor is
- (a) isentropic compression
 - (b) isothermal compression
 - (c) polytropic compression
 - (d) any one of the above
 - (e) none of the above.
- Ans: a

93. For supplying intermittent small quantity of air at high pressure, following compressor is best suited
- (a) centrifugal
 - (b) reciprocating
 - (c) axial
 - (d) screw
 - (e) turbo jet.
- Ans: b

94. For minimum work in multistage compression, assuming same index of compression in all stages
- (a) work done in first stage should be more
 - (b) work done in subsequent stages should increase
 - (c) work done in subsequent stages should decrease
 - (d) work done in all stages should be equal
 - (e) work done in any stage is no criterion for minimum work but depends on other factors.
- Ans: d

95. For a two stage compressor* if index of compression for higher stage is greater than index of compression for lower stage, then the optimum pressure as compared to ideal case will
- (a) increase
 - (b) decrease
 - (c) remain unaffected
 - (d) other factors control it
 - (e) unpredictable.
- Ans: a

96. Diffuser in a compressor is used to
- (a) increase velocity
 - (b) make the flow stream-line
 - (c) convert pressure energy into kinetic energy
 - (d) convert kinetic energy into pressure energy
 - (e) increase degree of reaction.
- Ans: d

98. The ratio of isentropic work to euler's work is known as

- (a) compressor efficiency
- (b) isentropic efficiency
- (c) Euler's efficiency
- (d) pressure coefficient
- (e) pressure ratio.

Ans: d

99. The thermodynamic efficiency of rotary compressor is based on

- (a) isothermal compression
- (b) adiabatic compression
- (c) isentropic compression
- (d) polytropic compression
- (e) none of the above.

Ans: b

100. Phenomenon of choking in compressor means

- (a) no flow of air
- (b) fixed mass flow rate regardless of pressure ratio
- (c) reducing mass flow rate with increase in pressure ratio
- (d) increased inclination of chord with air steam
- (e) does not occur.

Ans: b

101. The maximum compression ratio in an actual single stage axial flow comperssor is of the order of

- (a) 1 : 1.2
- (b) 1 : 2
- (c) 1 : 5
- (d) 1 : 10
- (e) 1 : 1

Ans: a

102. Maximum delivery pressure is a rotary air compressor is of the order of

- (a) 6 kg/cm²
- (b) 10 kg/cm²
- (c) 16 kg/cm²
- (d) 25 kg/cm²
- (e) 40 kg/cm².

Ans: b

103. Surging is the phenomenon of

- (a) air stream blocking the passage
- (b) motion of air at sonic velocity
- (c) unsteady, periodic and reversed flow
- (d) air stream not able to follow the blade contour
- (e) production of no air pressure.

Ans: c

104. Pick up wrong statement.

Surging phenomenon in centrifugal com-pressor depends on

- (a) mass flow rate
- (b) pressure ratio
- (c) change in load
- (d) stagnation pressure at the outlet
- (e) all of the above.

Ans: d

105. The ratio of the increase in pressure in rotor blades to total increase in pressure in the stage is called

- (a) pressure ratio
- (b) pressure coefficient
- (c) degree of reaction
- (d) slip factor
- (e) stage factor.

Ans: c

106. Axial flow compressor resembles

- (a) centrifugal pump
- (b) reciprocating pump
- (c) turbine
- (d) sliding vane compressor
- (e) none of the above.

Ans: c

107. Axial flow compressor has the following advantage over centrifugal compressor

- (a) larger air handling ability per unit frontal area
- (b) higher pressure ratio per stage
- (c) aerofoil blades are used
- (d) higher average velocities
- (e) none of the above.

Ans: a

108. Actual compression curve is

- (a) same as isothermal
- (b) same as adiabatic
- (c) better than isothermal and adiabatic
- (d) in between isothermal and adiabatic
- (e) none of the above.

Ans: d

109. Atmospheric pressure is 1.03 kg/cm and vapour pressure is 0.03 kg/cm . The air pressure will be

- (a) 1.03 kg/cm²
- (b) 1.06 kg/cm²
- (c) 1.00 kg/cm²
- (d) 0.53 kg/cm²
- (e) 0.5 kg/cm².

Ans: c

110. The pressure ratio of an ideal vaned compressor with increase in mass flow rate

- (a) increases
- (b) decreases
- (c) remains constant
- (d) first decreases and then increases
- (e) unpredictable.

Ans: c

111. Rotary compressors are suitable for

- (a) large discharge at high pressure
- (b) low discharge at high pressure
- (c) large discharge at low pressure
- (d) low discharge at low pressure

(e) there is no such limitation.

Ans: c

112. The volumetric efficiency of compressor with increase in compression ratio will

- (a) increase
- (b) decrease
- (c) remain same
- (d) may increase/decrease depending on clearance volume
- (e) none of the above.

Ans: b

113. Stalling of blades in axial flow compressor is the phenomenon of

- (a) air stream blocking the passage
- (b) motion of air at sonic velocity
- (c) unsteady periodic and reversed flow
- (d) air stream not able to follow the blade contour
- (e) production of no air pressure.

Ans: d

114. Pick up the wrong statement

- (a) centrifugal compressors deliver practically constant pressure over a considerable range of capacities
- (b) Axial flow compressors have a substantially constant delivery at variable pressures
- (c) centrifugal compressors have a wider stable operating range than axial flow compressors
- (d) axial flow compressors are bigger in diameter compared to centrifugal type
- (e) axial flow compressors apt to be longer as compared to centrifugal type.

Ans: d

115. The work ratio of a gas turbine plant is defined as the ratio of

- (a) net work output and heat supplied
- (b) net work output and work done by turbine
- (c) actual heat drop and isentropic heat drop
- (d) net work output and isentropic heat drop
- (e) isentropic increase/drop in temperature and actual increase/ drop in temperature.

Ans: b

116. Gas turbine works on

- (a) Brayton or Atkinson cycle
- (b) Carnot cycle
- (c) Rankine cycle
- (d) Ericsson cycle
- (e) Joule cycle.

Ans: a

117. The work ratio of simple gas turbine cycle depends on

- (a) pressure ratio
- (b) maximum cycle temperature
- (c) minimum cycle temperature
- (d) all of the above
- (e) none of the above.

Ans: d

118. The pressure ratio for an open cycle gas turbine compared to closed cycle gas turbine of same h.p. is

- (a) low
- (b) high

- (c) same
 - (d) low/high depending on make and type
 - (e) unpredictable.
- Ans: a

119. Open cycle gas turbine works on

- (a) Brayton or Atkinson cycle
- (b) Rankine cycle
- (c) Carnot cycle
- (d) Ericsson cycle
- (e) Joule cycle.

Ans: a

120. The fuel consumption in gas turbines is accounted for by

- (a) lower heating value
- (b) higher heating value
- (c) heating value
- (d) higher calorific value
- (e) highest calorific value.

Ans: a

121. Gas turbines for power generation are normally used

- (a) to supply base load requirements
- (b) to supply peak load requirements
- (c) to enable start thermal power plant
- (d) in emergency
- (e) when other sources of power fail.

Ans: b

122. Mechanical efficiency of gas turbines as compared to I.C engines is

- (a) higher
- (b) lower
- (c) same
- (d) depends on other considerations
- (e) unpredictable.

Ans: a

123. The ratio of specific weight/h.p. of gas turbine and I.C engines may be typically of the order of

- (a) 1 : 1
- (b) 2 : 1
- (c) 4 : 1
- (d) 1:2
- (e) 1 : 6.

Ans: e

124. The thermal efficiency of a gas turbine as compared to a diesel plant is

- (a) same
- (b) more
- (c) less
- (d) depends on other factors
- (e) unpredictably.

Ans: c

125. The air-fuel ratio in gas turbines is of the order of

- (a) 7 : 1
- (b) 15 : 1

- (c) 30 : 1
 - (d) 40 : 1
 - (e) 50: 1.
- Ans: e

126. The pressure ratio in gas turbines is of the order of

- (a),2:l
- (b)4:1
- (c) 61: 1
- (d) 9 : 1
- (e) 12:1.

Ans: c

128. The hottest point in a gas turbine is

- (a) at the base
- (b) at the tip
- (c) in the center
- (d) between \sim to i of the blade height
- (e) uniformly heated.

Ans: d

129. The following is true for an open cycle gas turbine having exhaust heat exchanger. Atmospheric air before entering the compressor is

- (a) heated
- (b) compressed air before entering the combustion chamber is heated
- (c) bled gas from turbine is heated and readmitted for complete expansion
- (d) exhaust gases drive the compressor
- (e) part of exhaust gases are heated and mixed up with atmospheric air to utilise exhaust heat.

Ans: b

130. Gas turbine blades are given a rake

- (a) equal to zero
- (b) in the direction of motion of blades
- (c) opposite to the direction of motion of blades
- (d) depending on the velocity
- (e) none of the above.

Ans: b

131. Efficiency of gas turbine is increased by

- (a) reheating
- (b) inter cooling
- (c) adding a regenerator
- (d) all of the above
- (e) none of the above.

Ans: c

132. Temperature of gases at end of compression as compared to exhaust gases in a gas turbine is

- (a) higher
- (b) lower
- (c) equal
- (d) can't be compared
- (e) unpredictable.

Ans: b

133. The ideal efficiency of simple gas turbine cycle depends on

- (a) pressure ratio
- (b) maximum cycle temperature
- (c) minimum cycle temperature
- (d) all of the above
- (e) none of the above.

Ans: a

134. The thermal efficiency of a simple gas turbine for a given turbine inlet temperature with increase in pressure ratio

- (a) increases
- (b) decreases
- (c) first increases and then decreases
- (d) first decreases and then increases
- (e) remains same.

Ans: a

135. Gas turbines use following type of air compressor

- (a) centrifugal type
- (b) reciprocating type
- (c) lobe type
- (d) axial flow type
- (e) none of the above.

Ans: d

136. As the turbine inlet temperature increases, the thermal efficiency of gas turbine for the optimum pressure ratio

- (a) increases
- (b) decreases
- (c) remains same
- (d) first increases and then decreases
- (e) first decreases and then increases.

Ans: a

137. There is a certain pressure ratio (optimum) for a gas turbine at which its thermal efficiency is maximum. With increase in turbine temperature, the value of pressure ratio for the peak efficiency would

- (a) remain same
- (b) decrease
- (c) increase
- (d) unpredictable
- (e) none of the above.

Ans: c

138. The material commonly used for air craft gas turbine is

- (a) stainless steel
- (b) high alloy' steel
- (c) duralumin
- (d) Timken, Haste and Inconel allpys
- (e) titanium.

Ans: d

139. It is not possible to use closed gas turbine cycle in aeronautical engines because

- (a) it is inefficient
- (b) it is bulky
- (c) it requires cooling water for its operation

Ans: c

140. The combustion efficiency of a gas turbine using perfect combustion chamber is of the order of

- (a) 50%
- (b) 75%
- (c) 85%
- (d) 90%
- (e) 99%.

Ans: e

141. The maximum combustion pressure in gas turbine as compared to I.C. engine is

- (a) more
- (b) less
- (c) same
- (d) depends on other factors
- (e) unpredictable.

Ans: b

142. For an irreversible gas turbine cycle, the efficiency and work ratio both depend on

- (a) pressure ratio alone
- (b) maximum cycle temperature alone
- (c) minimum cycle temperature alone
- (d) both pressure ratio and maximum cycle temperature
- (e) none of the above.

Ans: d

143. Producer gas is produced by

- (a) carbonisation of coal
- (b) passing steam over incandescent coke
- (c) passing air and a large amount of steam over waste coal at about 65°C
- (d) partial combustion of coal, coke, anthracite coal or charcoal in a mixed air steam blast
- (e) same way as the natural gas.

Ans: d

144. Water gas is produced by

- (a) carbonisation of coal
- (b) passing steam over incandescent coke
- (c) passing air and a large amount of steam over waste coal at about 65°C
- (d) partial combustion of coal, coke, anthracite coal or charcoal in a mixed air steam blast
- (e) same way as the natural gas.

Ans: b

145. Water is injected in gas turbine cycle to

- (a) control temperature
- (b) control output of turbine
- (c) control fire hazards
- (d) increase efficiency
- (e) it is never done.

Ans: b

146. A gas turbine used in air craft should have

- (a) high h.p. and low weight
- (b) low weight and small frontal area
- (c) small frontal area and high h.p.
- (d) high speed and high h.p.
- (e) all of the above.

Ans: b

148. The closed cycle in gas turbines

- (a) provides greater flexibility
- (b) provides lesser flexibility
- (c) is never used
- (d) is used when gas is to be burnt
- (e) none of the above.

Ans: a

149. In the axial flow gas turbine, the work ratio is the ratio of

- (a) compressor work and turbine work
- (b) output and input
- (c) actual total head temperature drop to the isentropic total head drop from total head inlet to static head outlet
- (d) actual compressor work and theoretical compressor work
- (e) none of the above.

Ans: c

150. The degree of reaction of an axial flow turbine is the ratio of isentropic temperature drop in a blade row to the

- (a) adiabatic temperature drop in the stage
- (b) total temperature drop
- (c) total temperature drop in the stage
- (d) total adiabatic temperature drop
- (e) difference of maximum and minimum temperature in the cycle.

Ans: c

153. If infinite number of heaters be used in a gas turbine, then expansion process in turbine approaches

- (a) isothermal
- (b) isentropic
- (c) adiabatic
- (d) isochoric
- (e) isobaric.

Ans: a

154. Pick up the correct statement

- (a) gas turbine uses low air-fuel ratio to economise on fuel
- (b) gas turbine uses high air-fuel ratio to reduce outgoing temperature
- (c) gas turbine uses low air-fuel ratio to develop the high thrust required
- (d) all of the above
- (e) none of the above.

Ans: b

15 Intercooling in gas turbine results in

- (a) increase in net output but decrease in thermal efficiency
- (b) increase in thermal efficiency but decrease in net output
- (c) increase in both thermal efficiency and net output
- (d) decrease in both thermal efficiency and net output
- (e) none of the above.

Ans: a

156. If V , U and V_r represent the absolute velocity of fluid, velocity of blade, and relative velocity of fluid, and suffix i and o stand for entry and exit conditions, then in a rotary machine whose degree of reaction is unity

- (a) $V_i = V_o$
- (b) $V_t > V_o$

- (c) $U, < V_0$
 - (d) $V_r = U_0$
 - (e) $V_{ri} = V_m$.
- Ans: a

157. Pick up the wrong statement

- (a) large gas turbines employ axial flow compressors
 - (b) axial flow compressors are more stable than centrifugal type compressors but not as efficient
 - (c) axial flow compressors have high capacity and efficiency
 - (d) axial flow compressors have instability region of operation
 - (e) centrifugal compressors are used mainly on low flow pressure ratio gas turbines.
- Ans: b

158. The power available for take off and climb in case of turbojet engine as compared to reciprocating engine is

- (a) less
 - (b) more
 - (c) same
 - (d) may be less or more depending on ambient conditons
 - (e) unpredictable.
- Ans: a

159. Pick up the correct statement

- (a) large gas turbines use radial inflow turbines
 - (b) gas turbines have their blades similar to steam turbine
 - (c) gas turbine's blade will appear as impulse section at the hub and as a reaction section at tip
 - (d) gas turbines use both air and liquid cooling
 - (e) all of the above are correct.
- Ans: c

160. A closed gas turbine in which fuel is burnt directly in the air is not possible because of

- (a) high pressure ratio
 - (b) increasing gas temperature
 - (c) high specific volume
 - (d) high friction losses
 - (e) paucity of O_2 .
- Ans: e

161. Choose the correct statement

- (a) gas turbine requires lot of cooling water
 - (b) gas turbine is capable of rapid start up and loading
 - (c) gas turbines have flat efficiency at part loads
 - (d) gas turbines have high standby losses and require lot of maintenance
 - (e) gas turbines can be used to generate power only.
- Ans: b

162. Ram compression in turbojet involves

- (a) reduction of speed of incoming air and conversion of part of it into pressure energy
 - (b) compression of inlet air
 - (c) increasing speed of incoming air
 - (d) lost work
 - (e) leakage losses.
- Ans: a

163. In gas turbines^ high thermal efficiency is obtained in

- (a) closed cycle
- (b) open cycle
- (c) both of the above
- (d) closed/open depending on other con-siderations
- (e) unpredictable.

Ans: a

164. In the cross compounding of the gas turbine plant

- (a) h.p. compressor L connected to h.p. turbine and l.p. compressor ot l.p. tur-bine
- (b) h.p. compressor is connected to l.p. turbine and l.p. compressor is con-nected to h.p. turbine
- (c) both the arrangements can be employed
- (d) all are connected in series
- (e) none of the above.

Ans: b

16 A jet engine works on the principle of conservation of

- (a) mass
- (b) energy
- (c) flow
- (d) linear momentum
- (e) angular momentum.

Ans: d

166. In jet engines, for the efficient production of large power, fuel is burnt in an atmosphere of

- (a) vacuum
- (b) atmospheric air
- (c) compressed air
- (d) oxygen alone
- (e) liquid hydrogen.

Ans: c

167. Which of the following fuels can be used in turbojet engines

- (a) liquid hydrogne
- (b) high speed diesel oil
- (c) kerosene
- (d) demethylated spirit
- (e) methyl alcohol

Ans: c

168. Turbo propeller has the^following additional feature over the turbojet

- (a) peopeller
- (b) diffuser
- (c) intercooler
- (d) turbine and combustion chamber
- (e) starting engine.

Ans: a

169. Propulsive efficiency is defined as ratio of

- (a) thrust power and fuel energy
- (b) engine output and propulsive power
- (c) propulsive power and fuel input
- (d) thrust power and propulsive power
- (e) none of the above.

Ans: d

170. In jet engines, paraffin is usually used as the fuel because of its

- (a) high calorific value
- (b) ease of atomisation
- (c) low freezing point
- (d) (a) and (c) above
- (e) none of the above.

Ans: d

171. A rocket engine for the combustion of its fuel

- (a) carries its own oxygen
- (b) uses surrounding air
- (c) uses compressed atmospheric air
- (d) does not require oxygen
- (e) depends on electrical energy supplied by solar cells.

Ans: a

172. A rocket works with maximum overall efficiency when air craft velocity is equal to the

- (a) jet velocity
- (b) twice the jet velocity
- (c) half the jet velocity
- (d) average of the jet velocity
- (e) no such co-relationship with jet velocity exists.

Ans: c

173. Propulsion efficiency of the following order-is obtained in practice

- (ti) 34%
- (b) 50%
- (c) 60%
- (d) 72%
- (e) 85%.

Ans: c

174. The maximum propulsion efficiency of a turbojet is attained at around following speed -

- (a) 550 km/hr
- (b) 1050km/hr
- (c) 1700 km/hr
- (d) 2400km /hr
- (e) 4000 km/hr.

Ans: d

17 In jet propulsion power unit, the inlet duct of diverging shape is used in order to

- (a) collect more air
- (b) convert kinetic energy of air into pres-sure energy
- (c) provide robust structure
- (d) beautify the shape
- (e) none of the above

Ans: b

176. In jet engines the products of combustion after passing through the gas lurbine are discharged into

- (a) atmosphere
- (b) back to the compressor
- (c) discharge nozzle
- (d) vacuum

(e) none of the above.

Ans: c

177. The air entry velocity in a rocket as compared to aircraft is

- (a) same
- (b) more
- (c) less
- (d) zero
- (e) dependent on power and speed.

Ans: d

183. The weight per horse power ratio for gas turbine as compared to I.C. engine and steam turbine is

- (a) same
- (b) higher
- (c) lower
- (d) uncomparable
- (e) unpredictable.

Ans: c

184. Fighter bombers use following type of engine

- (a) turbo-jet
- (b) turbo-propeller
- (c) rocket
- (d) ram-jet ,
- (e) pulsojet.

Ans: a

18 Pick up the wrong statement

- (a) pulsojet requires no ambient air for propulsion
- (b) ramjet-engine has no turbine
- (c) turbine drives compressor in a turbojet
- (d) bypass turbo-jet engine increases the thrust without adversely affecting, the propulsive efficiency and fuel economy
- (e) propeller is an indirect reaction device.

Ans: a

186. Thrust of a jet propulsion power unit can be increased by

- (a) burning fuel after gas turbine
- (b) injecting water in the compressor
- (c) injecting ammonia into the combustion chamber
- (d) all of the three above
- (e) none of the above.

Ans:

187. The blades of gas turbine are made of

- (a) mild steel
- (b) stainless steel
- (c) carbon steel
- (d) high alloy steel
- (e) high nickel alloy (Inconel).

Ans: e

188. The following property is most important for material used for gas turbine blade

- (a) toughness
- (b) fatigue
- (c) creep

- (d) corrosion resistance
- (e) bulk modulus.

Ans: c

189. The effective power of gas turbines is increased by adding the following in compressor

- (a) ammonia and water vapour
- (b) carbon dioxide
- (c) nitrogen
- (d) hydrogen
- (e) none of the above.

Ans: a

190. High air-fuel ratio is used in gas turbines

- (a) to increase the output
- (b) to increase the efficiency
- (c) to save fuel
- (d) to reduce the exit temperature
- (e) none of the above.

Ans: d

191. Air-fuel ratio in a jet engine will be of the order of

- (a) 10: 1
- (b) 15: 1
- (c) 20 : 1
- (d) 60 : 1
- (e) 100 : 1.

Ans: d

192. In which case the air-fuel ratio is likely to be maximum

- (a) 2-stroke engine
- (b) 4-stroke petrol engine
- (c) 4-stroke diesel engine
- (d) multi-cylinder engine
- (e) gas turbine.

Ans: e

193. In jet engines the compression ratio

- (a) varies as square root of the speed
- (b) Varies linearly to the speed
- (c) varies as square of the speed
- (d) varies as cube of the speed
- (e) is constant irrespective of variation in speed.

Ans: c

194. The specific output per kg mass flow rate of a gas turbine (having fixed efficiencies of compressor and turbine and fixed higher and lower temperature) with increase in pressure ratio will

- (a) increase first at fast rate and then slow
- (b) increase first at slow rate and then fast
- (c) decrease continuously
- (d) first increase, reach maximum and then decrease
- (e) none of the above.

Ans: d

19 The working fluid in ai turbine is

- (a) in two phases

- (b) in three phases
- (c) in a single phase
- (d) in the form of air and water mixture
- (e) gas and no air.

Ans: c

196. Gas turbine cycle with regenerator

- (a) increases thermal efficiency
- (b) allows high compression ratio
- (c) decreases heat loss is exhaust
- (d) allows operation at very high altitudes
- (e) permits high moisture content fuel to be used.

Ans: a

197. The compression ratio in a gas turbine is of the order of

- (a) 3.5 : 1
- (b) 5 : 1
- (c) 8 : 1
- (d) 12 : 1
- (e) 20 : 1.

Ans: c

198. Reheating in multistage expansion gas turbine results in

- (a) high thermal efficiency
- (b) reduction in compressor work
- (c) decrease of heat loss in exhaust
- (d) maximum work output
- (e) none of the above.

Ans: d

199. The main purpose of reheating in gas turbine is to

- (a) increase temperature
- (b) reduce turbine size
- (c) increase power output
- (d) increase speed
- (e) increase pressure ratio.

Ans: c

200. Reheating in gas turbine results in

- (a) increase of work ratio
- (b) decrease of thermal efficiency
- (c) decrease of work ratio
- (d) both (a) and (b) above
- (e) both (b) and (c) above.

Ans: d

201. Work ratio of a gas turbine plant is ratio of

- (a) net work output and work done by turbine
- (b) net work output and heat supplied
- (c) work done by turbine and heat supplied
- (d) work done by turbine and net work output
- (e) actual/heat drop and isentropic heat drop.

Ans: a

202. Work ratio of a gas turbine may be improved by

- (a) decreasing the compression work
- (b) increasing the compression work

- (c) increasing the turbine work
 - (d) decreasing the turbine work
 - (e) (a) and (c) above.
- Ans: e

203. Maximum temperature in a gas turbine is of the order of COMPRESSORS, GAS TURBINES AND JET ENGINES

- (a) 2500°C
 - (b) 2000°C
 - (c) 1500°C
 - (d) 1000°C
 - (e) 700°C.
- Ans: e

21 In the aircraft propellers

- (a) the propulsive matter is caused to flow around the propelled body
 - (b) propulsive matter is ejected from within the propelled body
 - (c) its functioning does not depend on presence of air
 - (d) all of the above
 - (e) none of the above.
- Ans: d

216. In air breathing jet engine, the jet is formed by expading

- (a) gases
 - (b) solids
 - (c) liquid
 - (d) plasma
 - (e) highly heated atmospheric air.
- Ans: e

217. Ram-jet engine

- (a) is self-operating at zero flight speed
 - (b) is not self-operating at zero^flight speed
 - (c) requires no air for its operation
 - (d) produces a jet consisting of plasma
 - (e) none of the above.
- Ans: b

218. For speed above 3000 km/hour, it is more advantageous to use

- (a) turbo-jet engine
 - (b) ram-jet engine
 - (c) propellers
 - (d) rockets
 - (e) hydraulic jet propulsion.
- Ans: b

219. A simple turbo-jet engine is basically

- (a) a propeller system
 - (b) gas-turbine engine equipped with a propulsive nozzle and diffuse*
 - (c) chemical rocket regine
 - (d) ram-jet enigne
 - (e) none of the above.
- Ans: b

220. Which of the following plants is smallest and lightest for genrating a given amount of power

- (a) steam power plant

- (b) petrol engine
- (c) diesel engine'
- (d) solar plant
- (e) gas turbine plant.

Ans: e

221. In turbo fan engine, the jet velocity as compared to turbo-jet engine is

- (a) less
- (b) more
- (c) same
- (d) may be less or more depening upon speed
- (e) none of the above.

Ans: a

222. Turbofan engine employs

- (a) one air stream
- (b) two or more air streams
- (c) no air stream
- (d) solid fuel firing
- (e) rocket principle for its operation.

Ans: b

223. Pressure ratio in gas turbines is the ratio of

- (a) compressor pressure ratio
- (b) highest pressure to exhaust pressure
- (c) inlet pressure to exhaust pressure
- (d) pressures across the turbine
- (e) none of the above.

Ans: b

224. Pick up the false statement

- (a) gas turbine is a self-starting unit
- (b) gas turbine does not require huge quantity of water like steam plant
- (c) exhaust losses in gas turbine are high due to large mass flow rate
- (d) overall efficiency of gas turbine plant is lower than that of a reciprocating engine
- (e) gas turbine can be easily started and stopped and thus is best suited for peaking demands.

Ans: a

22 The efficiency and work ratio of a gas turbine plant can be increased by

- (a) using mulit-stage compressor with mfercooler
- (b) adding heat exchanger
- (c) injecting water in/around combustion chamber
- (d) reheating the air after partial expansion in the turbine
- (e) all of the above.

Ans: e

226. Pick up the correct statement

- (a) closed cycle gas turbine is an I.C engine
- (b) gas turbine uses same working fluid over and over again
- (c) air-fuel ratio in a gas turbine is 100 : 1
- (d) ideal efficiency of closed cycle gas turbine plant is more than carnot cycle efficiency
- (e) thrust in turbo-jet is produced by nozzle exit gases.

Ans: e

227. The compression ratio in a jet engine varies proportional to

- (a) speed

- (b) speed
- (c) altitude
- (d) Vspeed
- (e) does not Vary.

Ans: b

228. The efficiency of jet engine is

- (a) higher at ground
- (b) higher at high altitudes
- (c) same at all altitudes
- (d) higher at high speed
- (e) lower at low speed.

Ans: b

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