**THERMAL ENGINEERING**
**MULTIPLE CHOICE QUESTIONS - OTTO CYCLE AND DIESEL CYCLE**

01. In which of the following cycle heat is added at constant volume?

a. Otto cycle
b. Diesel cycle
c. Dual cycle
d. Carnot cycle

**Answer a. Otto cycle**

02. In which of the following cycle heat is added at constant pressure?

a. Otto cycle
b. Diesel cycle
c. Dual cycle
d. Carnot cycle

**Answer b. Diesel cycle**

03. Which of the following cycle is used for Spark Ignition engine?

a. Otto cycle
b. Diesel cycle
c. Dual cycle
d. Carnot cycle

**Answer a. Otto cycle**

04. Which of the following cycle is used for Compression Ignition engine?

a. Otto cycle
b. Diesel cycle
c. Dual cycle
d. Carnot cycle

**Answer b. Diesel cycle**

05. The efficiency of the Otto cycle is independent of

a. Heat supplied
b. Compression ratio
c. Ratio of specific heats
d. None of the above

**Answer a. Heat supplied**

06. For same compression ratio

a. Diesel cycle has lower efficiency than Otto cycle
b. Diesel cycle has higher efficiency than Otto cycle
c. Diesel cycle and Otto cycle have equal efficiencies
d. Depends upon the load on engine

**Answer a. Diesel cycle has lower efficiency than Otto cycle**

07. What is the formula for compression ($r_k$) ratio of the Otto cycle?

a. $r_k$ = Volume of cylinder at the beginning of compression / Volume of cylinder at the end of compression

b. $r_k$ = Volume of cylinder at the end of compression / Volume of cylinder at the beginning of compression

c. $r_k$ = Volume of cylinder at the end of compression / clearance volume

d. none of the above

**ANSWER a. $r_k$ = Volume of cylinder at the beginning of compression / Volume of cylinder at the end of compression**

08. What is the relation between compression ratio ($r_k$) and the efficiency of the Otto cycle?

a. efficiency decreases with increase in compression ratio
b. efficiency increases with increase in compression ratio
c. efficiency is not affected by change in compression ratio
d. none of the above

**ANSWER b. efficiency increases with increase in compression ratio**

09. The compression ratio cannot be increased beyond certain limit as it results in

a. auto-ignition of fuel
b. detonation
c. engine knocking
d. all the above

**ANSWER d. all the above**

10. Use of gasoline blend like tetraethyl lead in internal combustion engine

a. increases the octane rating of the fuel
b. allows engine to operate at higher compression ratio
c. avoids auto-ignition of fuel
d. all of the above

**ANSWER d. all of the above**

11. How the efficiency of the SI engine is affected by the specific heat ratio (γ) of the working fluid?

a. the efficiency of the engine increases with increase in specific heat ratio (γ) of the working fluid
b. the efficiency of the engine decreases with increase in specific heat ratio (γ) of the working fluid
c. the efficiency of the engine does not affected by change in specific heat ratio (γ) of the working fluid
d. none of the above

**ANSWER a. the efficiency of the engine increases with increase in specific heat ratio (γ) of the working fluid**

12. For the same capacity engines, the compression ratio of diesel engine

a. is lower than the compression ratio of SI engine
b. is higher than the compression ratio of SI engine
c. is same as the compression ratio of SI engine
d. cannot say

**ANSWER b. is higher than the compression ratio of SI engine**

13**.** Rate of burning in the compression ignition engine can be controlled by

a. rate of injection of fuel
b. rate of air taken into carburetor
c. both a. and b.
d. none of the above

ANSWER **a. rate of injection of fuel**

14. For the same maximum pressure and temperature, what is the relation among the efficiencies of the Otto cycle, the Diesel cycle and the Dual cycle?
a. $\eta_{Dual} > \eta_{Diesel} > \eta_{Otto}$
b. $\eta_{Diesel} > \eta_{Dual} > \eta_{Otto}$
c. $\eta_{Diesel} > \eta_{Otto} > \eta_{Dual}$
d. $\eta_{Otto} > \eta_{Diesel} > \eta_{Dual}$

**ANSWER b. $\eta_{Diesel} > \eta_{Dual} > \eta_{Otto}$**

**15.** Air standard cycle uses ____ as a working medium**.**

a. Perfect gas
b. Real gas
c. Ideal gas
d. Natural gas

**ANSWER a. Perfect gas**

16.**For perfect gas**

a. $c_p - c_v = R$
b. $c_p + c_v = R$
c. $c_p / c_v = R$
d. $c_p \times c_v = R$

Where $c_p$ & $c_v$ are specific heats at constant pressure and volume.

**ANSWER a. $C_P - C_V = R$**

17. The self-ignition temperature of diesel as compared to petrol is
    a. higher
    b. lower
    c. same
    d. varies

**ANSWER a. higher**

18. For same compression ratio and heat input
    a. Otto cycle is more efficient
    b. Diesel cycle is more efficient
    c. Both are equally efficient
    d. None of the above

**ANSWER a. Otto cycle is more efficient**

19. For the same peak pressure and heat input
    a. Otto cycle is more efficient
    b. Diesel cycle is more efficient
    c. Both are equally efficient
    d. None of the above

**ANSWER b. Diesel cycle is more efficient**

20.In diesel engine, the fuel is ignited by
    a. spark
    b. injected fuel
    c. heat resulting from compressing air that is supplied for combustion
    d. ignitor

**ANSWER c. heat resulting from compressing air that is supplied for combustion**

21. Scavenging air in diesel engine means
    a. air used for combustion under pressure
    b. forced air for cooling the cylinder
    c. burnt air containing products of combustion
    d. air used for forcing burnt gases out of the engines cylinder during the exhaust stroke

**ANSWER d. air used for forcing burnt gases out of the engines cylinder during the exhaust stroke**

22. Supercharging is the process of
    a. supplying the engine with air at a density greater than the density of the surrounding atmosphere
    b. providing forced cooling air
    c. injecting excess fuel

d. raising the exhaust pressure

**ANSWER a. supplying the engine with air at a density greater than the density of the surrounding atmosphere**

23. If the compression ratio of an engine working on Otto cycle is increased from 5 to 7 the percentage increase in efficiency will be

a. 2%
b. 4%
c. 8%
d. 14%

**ANSWER d. 14%**

24. A spark plug is used in

a. petrol engine
b. diesel engine
c. gas engine
d. steam engine

**ANSWER a. petrol engine**

25. The air standard Otto cycle comprises

a two constant pressure processes and two constant volume processes
b two constant pressure and two constant entropy processes
c. two constant volume processes and two constant entropy processes
d. none of the above.

**ANSWER (c) two constant volume processes and two constant entropy processes**

26.An ideal air standard Otto cycle has a compression ratio of 8.5. If the ratio of the specific heats $\gamma$ is 1.4, then what is thermal efficiency (in percentage) of the Otto cycle?

a. 57.5%
b. 45.7%
c. 52.5%
d. 95%

**ANSWER a. 57.5%**

27. For an engine operating on air standard Otto cycle, the clearance volume is 10% of the swept volume. The specific heat ratio of air is 1.4. The air standard cycle efficiency is

a. 38.3 %

b. 39.8 %

c. 60.2 %

d. 61.7 %
**ANSWER d. 61.7%**

28.A diesel engine is usually more efficient than a spark ignition engine because

a. Diesel being a heavier hydrocarbon, release more heat per kg than gasoline

b. The air standard efficiency of diesel cycle is higher than the Otto cycle, at a fixed compression ratio

c. The compression ratio of a diesel engine is higher than that of an Spark ignition engine

d.Self ignition temperature of diesel is higher than that of gasoline.

**ANSWER c. The compression ratio of a diesel engine is higher than that of an S.I engine**

29. For spark ignition engine, the equivalence ratio $\emptyset$ of mixture entering the combustion chamber has values

(A) $\emptyset < 1$ for idling and $\emptyset > 1$ for peak power conditions

(B) $\emptyset > 1$ for both idling and peak power conditions

(C) $\emptyset > 1$ for idling and $\emptyset < 1$ for peak power conditions

(D) $\emptyset < 1$ for both idling and peak power conditions

**ANSWER (B) $\emptyset > 1$ for both idling and peak power conditions**

30. An engine working on air standard Otto cycle has a cylinder diameter of 10 cm and stroke length of 15 cm. The ratio of specific heats for air is 1.4. If the clearance volume is 196.3 cc and the heat supplied per kg of air per cycle is 1800 kJ/kg, then work output per cycle per kg of air is
a. 879.1 kJ/
b. 890.2 kJ
c. 895.3 kJ
d. 973.5 kJ

**ANSWER d. 973.5 kJ**

31. The maximum temperature in the I.C engine cylinder is of the order of

a. 500 – 1000 C

b. 1000 – 1500 C

c. 1500 – 2000 C

d. 2000 – 2500 C

**ANSWER d. 2000 – 2500 C**

32. The thermal efficiency of a diesel cycle having fixed compression ratio with increase in cut-off ratio will
   a. increase
   b. decrease
   c. independent
   d. increase or decrease depending upon other factors

**ANSWER b. decrease**

33. Combustion in compression ignition engine is
   a. homogeneous
   b. heterogeneous
   c. laminar
   d. turbulent

**ANSWER b. heterogeneous**

34. The specific fuel consumption per BHP hour for diesel engine is approximately
   a. 0.1 kg
   b. 0.2 kg
   c. 0.3 kg
   d. 0.4 kg

**ANSWER b. 0.2 kg**

35. The specific fuel consumption per BHP hour for petrol engine is approximately
   a. 0.1 kg
   b. 0.2 kg
   c. 0.25 kg
   d. 0.35 kg

**ANSWER c. 0.25 kg**

36. The output of a diesel engine can be increased without increasing the engine size in following way
   a. injecting more fuel
   b. increasing flywheel size
   c. scavenging
   d. supercharging

**ANSWER d. supercharging**

37.The air fuel ratio in petrol engines is controlled by
   a. valve opening / closing
   b. governing
   c. carburetion
   d. scavenging

**ANSWER c. carburetion**

38. Which of the following is not an internal combustion engine?
    a. petrol engine
    b. steam turbine
    c. diesel engine
    d. gas turbine

**ANSWER b. steam turbine**

39. Most high-speed compression engines operate on
    a. diesel cycle
    b. Otto cycle
    c. dual cycle
    d. Carnot cycle

**ANSWER c. dual cycle**

40. Which of the following medium is compressed in a diesel engine cylinder?
    a. air
    b. air and fuel
    c. air and lubricating oil
    d. fuel

**ANSWER a. air**

41. A supercharger is used to compress
    a. air
    b. gasoline
    c. fuel oil
    d. all of the above

**ANSWER a. air**

42. The term scavenging is generally associated with
    a. 2-stroke engine
    b. 4-stroke engine
    c. high efficiency engine
    d. diesel engine

**ANSWER C. high efficiency engine**

43.If the intake air temperature of Internal combustion engine increases, its efficiency will
    a. increase
b. decrease
    c.remains same
    d unpredictable

**ANSWER b. decrease**

44. The temperature of interior surface of the cylinder wall in normal operation is not allowed to exceed
    a. 80 C
    b. 120 C
    c. 180 C
    d. 240 C

**ANSWER c. 180 C**

45. The theoretically correct air fuel ratio for petrol engine is of the order of
    a.6 : 1
    b. 9 : 1
c. 12 : 1
d. 15 : 1

**Answer d. 15:1**

46. The knocking in spark ignition engines can be reduced by
a. Retarding the spark.
b. Increasing the engine speed.
c. Both a and b.
d. None of these.

**ANSWER c. Both a and b**

47. The probability of knocking in diesel engines is increased by
a. High self-ignition temperature.
b. Low volatility.
c. High viscosity.
    d. All of the above

**ANSWER d. all of the above**

48.In a 75 cc engine the parameter cc indicates
    a. fuel tank capacity
    b. lubricating oil capacity
    c. swept volume
    d. cylinder volume

**ANSWER c. swept volume**

49. Supercharging is done to
    a. increase the efficiency
    b. increase the power
    c. reduce the weight for a given output

d. achieve fuel economy

**ANSWER c. reduce the weight for a given output**

50. The mean effective pressure obtained from the engine indicator indicates the
    a. maximum pressure developed
    b. instantaneous pressure
    c. exhaust pressure
    d. average pressure

**ANSWER d. average pressure**

51. The tendency of a petrol engine to knock increases by
    a. supercharging
    b. scavenging
    c. increasing the engine horse power
    d. reducing the spark advance

**ANSWER a. supercharging**

52. Scavenging is usually done to increase the
    a. thermal efficiency
    b. speed
    c. power output
    d. fuel consumption

**ANSWER c. power output**

53. Which of the following is the lightest and most volatile liquid fuel?
    a. diesel
    b. kerosene
    c. gasoline
    d. fuel oil

**ANSWER c. gasoline**

54. Self-ignition temperature of petrol is of the order of
    a. 150 C
    b. 240 C
    c. 370 C
    d. more than 500 C

**ANSWER d. more than 500 C**

55. The self-ignition temperature of diesel oil compared to petrol is
    a. higher
    b. lower
    c. same
    d. depends on the quality of fuel

**ANSWER a. higher**

56. Ignition quality of petrol is expressed by
    a. Octane number
    b. cetane number
    c. calorific value
    d. self-ignition temperature

**ANSWER a. Octane number**

57. The compression ratio of motor cars is
    a. 5
    b. 7
    c. 10
    d. 13

**ANSWER b. 7**

58. The specific gravity of diesel oil is
    a. 1
    b. 0.85
    c. 0.5
    d. 0.7

**ANSWER b. 0.85**

59. The most popular firing order in a 4-cylinder inline internal combustion engine is
    a. 1-2-3-4
    b. 1-3-2-4
    c. 1-3-4-2
    d. 1-2-4-3

**ANSWER b. 1-3-4-2**

60. The specific gravity of petrol is about
    a. 0.65
    b. 0.75
    c. 0.85
    d. 0.95

**ANSWER b. 0.75**

61. For the best results of efficient combustion, high speed diesel engines need an approximate cetane number of
    a. 100
    b. 50
    c. 10

d. 5

ANSWER b. 50

62. Ignition quality of diesel is expressed by
a. octane number
b. cetane number
c. calorific value
d. carbon content

ANSWER b. cetane number

63. Detonation can be controlled by
a. varying the compression ratio
b. using lean mixture
c. retarding the spark timing
d. reducing the rpm

**ANSWER c. retarding the spark timing**

64. The efficiency of a internal combustion engine normally is of the order of
a. 15-20 %
b. 20-25%
c. 25-30%
d. 30-35%

**ANSWER d. 30-35%**

65. With the increase in speed of the vehicle, the back pressure will
a. decrease
b. increase
c. remains unaffected
d. depends on other factors

**ANSWER b. increase**

66. The tendency of a diesel engine to knock increases if
a. engine speed is increased
b. engine power is increased
c. cetane number of the fuel is increased
d. compression ratio is increased

**ANSWER d. compression ratio is increased**

67. Mixing of air and fuel in the diesel engine occurs in
a. injection pump
b. carburetor
c. engine cylinder

d. inlet manifold

**ANSWER c. engine cylinder**

68. In a petrol engine, which of the following gas gets exhausted out without burning and without transformation?

a. $CO_2$

b. CO

c. $O_2$

d. $N_2$

**ANSWER d. $N_2$**

69. Which of the following engine can work on very lean mixture

a. Spark ignition engine
b. compression ignition engine
c. two stroke engine
d. Four stroke engine

**ANSWER b. compression ignition engine**

70. If petrol is used in a diesel engine

a. higher knocking will occur
b. efficiency will be low
c. low power will be obtained
d. black smoke will be produced

**ANSWER a. higher knocking will occur**

71. For low load operation more economical engine is

a. petrol engine
b. diesel engine
c. muticylinder engine
d. two stroke engine

**ANSWER b. diesel engine**

72. The thermal efficiency of a diesel engine is of the order of

a. 92%
b. 68%
c. 34%
d. 25%

**ANSWER c. 34%**

73. Piston speed is equal to

a. stroke x rpm
b. (stroke x rpm) / 2
c. 2 x stroke x rpm

d. 4 x stroke x rpm

**ANSWER c. 2 x stroke x rpm**

74.Octane number of petrol normally used in petrol engines is of the order of
a. 20-30
b. 40-60
c. 60-70
d. 80-90

**ANSWER d. 80-90**

75.Thermal efficiency of an internal combustion engine on weak mixture is
a. higher
b. lower
c. unaffected
d. unpredictable

**ANSWER a. higher**

76. Cetane number is a measure of
a. ignition quality
b. addition in fuel
c. calorific value of fuel
d. viscosity of the fuel

**ANSWER a. ignition quality**

77.The back pressure of petrol engine is usually
a. 1 ata
b. 1.2 ata
c. 0.8 ata
d. 2 ata.

**ANSWER b. 1.2 ata**

78. If diesel is used in a petrol engine
a. engine will not run
b. engine detonates
c. engine gives smoke
d. engine knocks

**ANSWER a. engine will not run**

79. Cetane number of petrol is around
a. 10
b. 15-20
c. 35
d. 55-70

**ANSWER b. 15-20**

80. A engine will generate maximum torque when it
    a. runs at maximum speed
    b. develops maximum power
    c. runs at lowest speed
    d. consumes more fuel

**ANSWER c. runs at lowest speed**

81. Vapour lock is
    a. complete or partial stoppage of fuel supply due to vaporization of the fuel
    b. locking of carburetor due to high vapor pressure
    c. excess fuel supply to the engine
    d. supply of liquid fuel to the engine

**ANSWER a. complete or partial stoppage of fuel supply due to vaporization of the fuel**

82. Which of the following is not related to spark ignition engine?
    a. fuel injector
    b. spark plug
    c. flywheel
    d. distributor

**ANSWER a. fuel injector**

83. If the temperature of intake air in internal combustion engine is lowered, the efficiency will
    a. increase
    b. decrease
    c. remains same
    d. increases upto certain limit and then decrease

**ANSWER a. increase**

84. The process of breaking up a liquid into fine droplets by spraying is called
    a. vaporization
    b. carburetion
    c. injection
    d. atomization

**ANSWER d. atomization**

85. In diesel engine, the compression ratio as compared with the expansion ratio is
    a. same
    b. less
    c. more
    d. variable

**ANSWER c. more**

86. Specific fuel consumption is defined as
a. fuel consumption per hour
b. fuel consumed per km.
c. fuel consumed per BHP
d. fuel consumed per hour per BHP

**ANSWER d. fuel consumed per hour per BHP**

87. As a result of detonation in Internal combustion engines the following parameter attains very high value.
a. peak pressure
b. rate of rise of pressure
c. rate of rise of temperature.
d. peak temperature.

**ANSWER b. rate of rise of pressure**

88.Diesel as compared to petrol is
a. more difficult to ignite
b. less difficult to ignite
c. highly ignitable
d. just about the same difficult to ignite

**ANSWER a. more difficult to ignite**

89. Engine pistons are usually made of aluminium alloy as it
a. is lighter
b. wears less
c. absorbs shocks
d. is stronger

**ANSWER a. is lighter**

90. Air fuel ratio at which a petrol engine cannot work is
a. 8:1
b. 10:1
c. 20:1 and less
d. 15:1

**ANSWER c. 20:1 and less**

91.The probability of knocking in diesel engines is increased by
a. High self-ignition temperature.
b. Low volatility.

c. High viscosity.
d. all of the above

**ANSWER d. all of the above**

92.In compression ignition engines, swirl denotes
a. Haphazard motion of the gases in the cylinder
b. Rotary motion of the gases in the cylinder.
c. Radial motion of the gases in the cylinder.
d. None of the above

**ANSWER a. Haphazard motion of the gases in the chamber**

93. The knocking in spark ignition engines can be reduced by
a. Retarding the spark.
b. Increasing the engine speed.
c. Both a and b
d. None of these.

**ANSWER c. Both a and b.**

94.An engine indicator is used to determine the following
a. Speed.
b. Temperature.
c. Volume of cylinder.
d. Mean effective pressure and Indicated horse power.

**ANSWER d. Mean effective pressure and Indicated horse power.**

95.Normally, an engine is warmed up at
a. Full-speed with load.
b. Full-speed without load.
c. Reduced speed with load.
d. Reduced speed without load.

**ANSWER b. full-speed without load**

96. The ratio of indicated thermal efficiency to the corresponding air standard cycle efficiency is called
a. net efficiency
b. efficiency ratio
c. relative efficiency
d. overall efficiency

**ANSWER c. relative efficiency**

97.All heat engines utilize
a. lower heating value of oil
b. higher heating value of oil

c. net calorific value of oil
d. calorific value of fuel

**ANSWER a. lower heating value of oil**

98. The fuel in diesel engine is normally injected at pressure of
a. 5-10 kg/cm2
b. 20-25 kg/cm2
c 60-80 kg/cm2
d. 90-130 kg/cm2

**ANSWER d. 90-130 kg/cm$^2$**

99. The air requirement of a petrol engine during starting compared to theoretical air required for complete combustion is
a. more
b. less
c. same
d. may be more or less depending on engine capacity

**ANSWER b. less**

100. The accumulation of carbon in a cylinder results in increase of
a. clearance volume
b. volumetric efficiency
c. ignition time
d. effective compression ratio

**ANSWER d. effective compression ratio**

THERMAL ENGINEERING
AIR COMPRESSORS

01. A large clearance volume in reciprocating compressor results in
A. reduced volume flow rate
B. Increased volume flow rate
C. Lower suction pressure
D. Lower delivery pressure
ANSWER: A

02. In a reciprocating air compressor the compressor work per kg of air
A. Increases as clearance volume increases
B. Decreases as clearance volume increases
C. Is independent of clearance volume
D. Increases with clearance volume only of multistage compressor
ANSWER: C

03. Which one of the following is correct?
A. In a multistage compressor adiabatic efficiency is less than stage efficiency
B. In a multistage turbine adiabatic efficiency is less than the stage efficiency
C. Preheat factor for a multistage compressor is greater than one
D. Preheat factor does not affect the multistage compressor performance
ANSWER: A

04. In reciprocating compressors, one should aim at compressing the air
A. Adiabatically
B. Isentropically
C. Isothermally
D. Polytropically
ANSWER: C

05. The power required to drive a turbo compressor for a given pressure ratio decreases when
A. Air is heated at entry
B. Air is cooled at entry
C. Air is cooled at exit
D. Air is heated at exit
ANSWER: B

06. Which one of the following statements are correct for reciprocating air compressor?
A. Its volumetric efficiency increases with increasing clearance ratio
B. Its volumetric efficiency increases with pressure ratio
C. Its volumetric efficiency does not vary with change in clearance ratio and pressure ratio
D. Its volumetric efficiency decreases with increasing clearance ratio and pressure ratio
ANSWER: D

07. In a two stage reciprocating air compressor, the suction and delivery pressure are 1 and 4 bar respectively. For maximum efficiency the intercooler pressure is
A. 1.5 bar
B. 2 bar
C. 2.5 bar
D. 3 bar
ANSWER: B

08. For minimum work input in a two stage compression process the intermediated pressure is the
A. Arithmetic process of suction and discharge pressure
B. Logarithmic mean of suction and discharge pressure
C. Geometric mean of suction and discharge pressure
D. Hyperbolic mean of suction and discharge
ANSWER: C

09. Which one of the following statement is not correct for the volumetric efficiency of a reciprocating air compressor?
A. It decreases with increase in ambient temperature
B. It increases with decrease in pressure ratio

C. It increases with decrease in clearance ratio
D. It decreases with increases in delivery pressure
ANSWER: A

10. In a single stage reciprocating air compressor, the work done on air to compressor is from suction pressure to delivery pressure will be minimum when the compression is
A. Isothermal process
B. Adiabatic process
C. Polytropic process
D. Constant pressure process.
ANSWER: A

11. In a two stage reciprocating air compressor with a suction pressure of 2 bar and delivery pressure of 8 bar the ideal intercooler pressure will be
A. 10 bar
B. 6 bar
C. 4 bar
D. 3 bar
ANSWER: C

12. For a two stage compressor, the ratio of diameter of low pressure cylinder to high pressure cylinder is equal to
A. Square of the ratio of final pressure to initial pressure
B. The ratio of final pressure to initial pressure
C. The square root of the ratio of final pressure to initial pressure
D. Cube root of the ratio of final pressure to initial pressure
ANSWER: C

13. Which one of the following methods can be adopted to obtain isothermal compression in an air compressor?
A. Increasing the weight of the compressor
B. Inter-stage heating
C. Atmospheric cooling
D. Providing appropriate dimensions to the cylinder
ANSWER: A

14. The pressure rise in the impeller of centrifugal compressor is achieved by
A. the decrease in volume and diffusion action
B. the centrifugal action and decrease in volume
C. the centrifugal and diffusion action
D. the centrifugal and push pull action
ANSWER: D

15. Which one of the following types of impeller vanes are most commonly used in centrifugal type compressors?
A. Forward curved
B. Radial
C. Backward curved

D. Tangential
ANSWER: C

16. Which one of the following statements is correct?
A. Reciprocating compressors are used to supply large quantities of air at a lower pressure ratio
B. Centrifugal compressors are used to supply large quantities of air at a lower pressure ratio
C. Centrifugal compressors are used to supply small quantities of air at a lower pressure ratio
D. Centrifugal compressors cannot be run at high speed because of impeller, diffuser and casing.
ANSWER: B

17. In a centrifugal compressor an increase in speed at a given pressure ratio causes
A. Increase in flow and increase in efficiency
B. Increase in flow and decrease in efficiency
C. Decrease in flow and increase in efficiency
D. Decrease in flow and decrease in efficiency
ANSWER: B

18. The specific speed of a centrifugal compressor is generally
A. less than that of reciprocating compressor
B. independent of compressor type, but depends only on size of compressor
C. higher than that of axial compressor
D. more than specific speed of reciprocating compressor but less than axial compressor
ANSWER: C

19. For a multistage compressor, the polytropic efficiency is
A. the efficiency of all stages combined together
B. the efficiency of one stage
C. Constant throughout for all the stages
D. a direct consequence of the pressure ratio
ANSWER: C

20. Surging basically implies
A. Unsteady, periodic and reversed flow
B. Forward motion of air at a speed above sonic velocity
C. The surging action due to the blast of air produced in a compressor
D. Forward movement of aircraft
ANSWER: A

21. Which one of the following type of compressor is mostly used for supercharging of I.C engine
A. Radial flow compressor
B. Axial flow compressor
C. Root blower
D. Reciprocating compressor.
ANSWER: C

22. In centrifugal compressor terminology, vaneless space refers to the space between
A. The inlet and blade inlet edge
B. Blades in the impeller

C. Diffuser exit and volute casing
D. Impeller tip and diffuser inlet edge
ANSWER: D

23. Reciprocating compressor are provided with
A. Simple disc/plate valve
B. Poppet valve
C. Spring-loaded disc valve
D. Solenoid valve.
ANSWER: A

24. Work input to the air compressor with n as index of compression
A. Increases with increase in value of n
B. Decrease with increase in value of n
C. remains same whatever the value of n
D. first increase and then decreases with increase of value of n.
ANSWER: A

25. In reciprocating air compressor the clearance ratio is given by
A. $\frac{Total\ volume\ of\ cylinder}{Clearance\ volume}$
B. $\frac{Swept\ volume\ of\ cylinder}{Clearance\ volume}$
C. $\frac{Clearance\ volume}{Swept\ volume\ of\ cylinder}$
D. $\frac{Clearance\ volume}{Total\ volume\ of\ cylinder}$
ANSWER: C

26. With suction pressure being atmospheric, increase in delivery pressure with fixed clearance volume
A. increase volumetric efficiency
B. decrease volumetric efficiency
C. does not change volumetric efficiency
D. First increase volumetric efficiency and then decrease it
ANSWER: B

27. Volumetric efficiency of a compressor without clearance volume
A. Increases with increase in compression ratio
B. Decreases wit increase in compression ratio
C. Not dependent upon compression ratio
D. Unpredictable
ANSWER: C

28. In multi stage 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
ANSWER: C

29. Compressor at high altitude will draw
A. More power
B. Less power
C. Same power
D. Unpredictable
ANSWER: B

30. Volumetric efficiency of air compressor is of the order of
A. 20% to 30 %
B. 40% to 50%
C. 60% to 70%
D. 70% to 90%
ANSWER: D

31. 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. Unpredictable
ANSWER: B

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
ANSWER: B

33. The capacity of the compressor will be highest when its intake temperature is
A. Lowest
B. highest
C. Atmospheric
D. Unpredictable
ANSWER: C

35. In a four stage compressor, if the pressure at the first and third stage are 1 bar and 16 bar, then the delivery pressure at the fourth stage will be
A. 1 bar
B. 16 bar
C. 64 bar
D. 256 bar
ANSWER: C

36. In a single acting reciprocating compressor, the suction, compression and delivery of air takes place in
A. One stroke

B. Two stroke
C. Three stroke
D. Four stroke
ANSWER: B

37. The capacity of a compressor is expressed in
A. $\frac{kg}{m^2}$
B. $\frac{kg}{m^3}$
C. $\frac{m^3}{min}$
D. $\frac{m^3}{kg}$
ANSWER: C

38. The maximum delivery pressure in a rotary air compressor is
A. 10 bar
B. 20 bar
C. 30 bar
D. 50 bar
ANSWER: A

39. Intercooling in multistage compression is done
A. To cool the air during compression
B. To cool the air at delivery
C. To enable compression in two stages
D. To minimize the work of compression
ANSWER: D

40. The ratio of work done per cycle to the stroke volume of the compressor is known as
A. Compressor capacity
B. Compression ratio
C. Compressor efficiency
D. Mean effective pressure
ANSWER: D

41. The volume of air delivered by the compressor is called
A. Free air delivery
B. Compressor capacity
C. Swept volume
D. Mean effective pressure
ANSWER: B

42. Rotary compressors are used for delivering
A. Small quantities of air at high pressure
B. Large quantities of air at high pressure
C. Small quantities of air at low pressure
D. Large quantities of air at low pressure

ANSWER: D

43. In a centrifugal compressor, an increase in speed at a given pressure ratio causes
A. Increase in flow
B. Decrease in flow
C. Increase in efficiency
D. Increase in flow and decrease in efficiency
ANSWER: D

44. A large clearance volume in a reciprocating compressor results in
A. Reduced volume flow rate
B. Increased volume flow rate
C. Lower suction pressure
D. Lower delivery pressure
ANSWER: A

45. The ratio of indicated power to shaft power of the engine required to drive the compressor is called
A. Compressor efficiency
B. Volumetric efficiency
C. Isothermal efficiency
D. Mechanical efficiency
ANSWER: D

46. Clearance volume in 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
ANSWER: B

47. Separators are generally installed in compressor
A. After the intercooler
B. Before the intercooler
C. Before the receiver
D. After the intercooler
ANSWER: A

48. Compressor mostly used for supercharging of IC engine is
A. Radial flow compressor
B. Axial flow compressor
C. Root blower compressor
D. Reciprocating compressor
ANSWER: A

49. 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.
ANSWER: B

50. The compressor performance at higher altitude compare to sea level will be
A. Same
B. Higher
C. Lower
D. Unpredictable
ANSWER: C

**THERMAL ENGINEERING**

IC PART 2

1. Reference fuels for knock rating of SI engine fuels would include
   (a) Iso octane alpha methyl naphthalene
   (b) Normal octance and aniline
   (c) Isooctance and n octane
   (d) N heptane and iso octane
   Ans : d
2. A gas engine has a volume of 300 cc and clearance volume of 25 cc. Its volumetric efficiency is 0.8 and mech efficiency is 0.9. What is the volume of the mixture taken in per stroke?
   (a) 248 cc
   (b) 252 cc
   (c) 264 cc
   (d) 286 cc
   Ans :c

3. The two reference fuel used for cetane rating are
   (a) Cetane and iso octane
   (b) Cetane and tetra ethyl lead
   (c) Cetance and n-heptane
   (d) Cetane and α- methyl naphthalene
   Ans :d

4. By higher octane number of SI fuel, it is meant that the fuel has
   (a) Higher heating value
   (b) Higher flash point
   (c) Lower volatility
   (d) Longer ignition delay
   Ans :d

5. Keeping other parameters constant brake power of diesel engine can be increased by
   (a) Decreasing the density of intake air

(b) Increasing the temperature of intake air
(c) Increasing the pressure of intake air
(d) Decreasing the pressure of intake air
Ans :c

6. The method of determination of indicated power of multi cylinder SI engine is by use of
(a) Morse test
(b) Prony brake test
(c) Motoring test
(d) Heat balance test
Ans :a

7. Ratio of actual indicated work to hypothetical indicated work in a steam engine is the
(a) Indicated thermal efficiency
(b) Friction factor
(c) Mechanical efficiency
(d) Diagram factor
Ans :d

8. Which one of the following types of compressor is mostly used for supercharging of IC engines?
(a) Radial flow compressor
(b) Axial flow compressor
(c) Root blower
(d) Reciprocating compressor
Ans :c

9. A two stroke engine has a speed of 750 rpm. A four stroke engine having an identical cylinder size runs at 1500 rpm. The theoretical output of the two stroke engine will
(a) Be twice that of the four stroke engine
(b) Be half that of the four stroke engine
(c) Be the same as that of the four stoke
(d) Depend upon whether it is a CI or SI engine
Ans :c

10. For same power output and same r, as compared to 2- stroke engines, four stroke SI engines have
(a) Higher fuel consumption
(b) Lower thermal efficiency
(c) Highest exhaust temperatures
(d) Higher thermal efficiency
Ans :d

11. In a SI engine, which one of the following is the correct order of the fuels with increasing detonation tendency?

(a) Paraffins, olefins, naphthenes, aromatics
(b) Aromatics, naphthenes, paraffins, olefins
(c) Naphthenes, olefins, aromatics, paraffins
(d) Aromatics, naphthenes, olefins, paraffins
Ans :d

12. Velocity of flame propagation in SI engine is maximum for a fuel air mixture which is
(a) 10% richer than stoichiometric
(b) Equal to stoichiometric
(c) More than 10% richer than stoichiometric
(d) 10% leaner than stoichiometric
Ans :a

13. In a variable speed SI engine, the maximum torque occurs at the maximum
(a) Speed
(b) Brake power
(c) Indicated power
(d) Volumetric efficiency
Ans :d

14. In a morse test for a 2 cylinder, 2 S SI engine, the brake power was 9 kW. Whereas the brake power of individual cylinders with spark cut off were 4.25 kW and 3.75 kW. The mecheffic of the engine is
(a) 90%
(b) 80%
(c) 45.5%
(d) 52.5%
Ans :a

15. In a 4 S diesel engine, the term 'squish' refers to the
(a) Injection of fuel in the precombustion chamber
(b) Discharge of gases from the precombustion chamber
(c) Entry of air into the combustion chamber
(d) Stripping of fuel from the core
Ans :c

16. In SI engines knocking can be reduced by
(a) Increasing the compression ratio
(b) Increasing the cooling water temperature
(c) Retarding the spark advance
(d) Increasing the inlet air temperature
Ans :c

17. The tendency of knocking in CI engine reduces by

(a) High self ignition temperature of fuel
(b) Decrease in jacket water temperature
(c) Injection of fuel just before TDC
(d) Decrease in injection pressure

Ans :c

18. If the performance of diesel engine of different sizes, cylinder dimensions and power rating are to be compared, which of the following parameters can be used for such comparison?

(a) Swept volume
(b) Air fuel ratio
(c) Specific brake fuel consumption
(d) Volumetric efficiency

Ans :c

19. Which of the following factors increases the tendency of knocking in the CI engines?
    (a) Increasing both the r and coolant temperatures
    (b) Increasing both the speed and the injection advance
    (c) Increasing the speed, injection advance and coolant temperature
    (d) Increasing the compression ratio

    Ans :c

20. The stoichiometric air fuel ration for petrol is 15:1 . What is the air fuel ratio required for maximum power?

(a) 16:1 – 18:1
(b) 15:1
(c) 12:1 – 14:1
(d) 9:1 – 11:1

Ans :c

21. A 4S diesel engine, when running at 2000 rpm has an injection duration of 1.5 ms.What is the corresponding of the crank angle in degrees?
    (a) 18°
    (b) 9°
    (c)36°
    (d) 15°

    Ans :a

22. An engine produces 10 kW brake power while working with a brake thermal efficiency of 30%. If the calorific value of the fuel used is 40000 kJ/kg, then what is the fuel consumption?
    (a) 1.5 kg/hour
    (b) 3 kg/hour
    (c) 0.3 kg/hour
    (d) 1 kg/hour

Ans :b

23. Which one of the following cannot be controlled by a 3 way catalytic converter?
    (a) HC emission
    (b) CO emission
    (c) NOx emission
    (d) SPM emission
    Ans :d

24. A 40 kW engine has a mechanical efficiency of 80 %. If the frictional power is assumed to be constant with load, what is the approximate value of the mechanical efficiency at 50 % of the rated load?
    (a) 45%
    (b) 55 %
    (c) 65%
    (d) 75%
    Ans :c

25. The knocking tendency in CI engines increases with
    (a) Increase of coolant water temperature
    (b) Increase of temperature of inlet air
    (c) Decrease of compression ratio
    (d) Increase of compression ratio
    Ans :c

26. Hydrogen gas has less than _____ the density of air.
a) 1/12th
b) 1/10th
c) 2/3rd
d) 1/3rd
View Answer

Answer: b
Explanation: None.

27. The heating value per unit volume of hydrogen gas is less than _____ that of air.
a) 1/12th
b) 1/10th
c) 2/3rd
d) 1/3rd
View Answer

Answer: d
Explanation: None

28. The normal heptane($C_7H_{16}$) is given a rating of _____ octane number.
a) 0
b) 50
c) 100
d) 120
View Answer

Answer: a
Explanation: None.

29. A fuel of an octane number rating of 75 matches in knocking intensity as a mixture of
a) 75% iso-octane and 25% normal heptane
b) 75% normal heptane and 25% iso-octane
c) 75% petrol and 25% diesel
d) 75% diesel and 25% petrol
View Answer

Answer: a
Explanation: None.

30. A mixture containing 65% of iso-octane and 35% of normal heptane will have
a) cetane number 65
b) octane number 65
c) cetane number 35
d) octane number 35
View Answer

Answer: b
Explanation: A mixture containing 65% of iso-octane and 35% of normal heptane will have octane number 65 as octane number is the number percentage containing iso-octane.

31. A fuel of cetane number 40 has the same ignition quality as a mixture of
a) 40% cetane and 60% alpha methyl naphthalene
b) 40% alpha methyl naphthalene and 60% cetane
c) 40% petrol and 60% diesel
d) 40% diesel and 60% petrol
View Answer

Answer: a
Explanation: A fuel of cetane number 40 has the same ignition quality as a mixture of 40% cetane and 60% alpha methyl naphthalene as cetane number is counted on cetane percentage.

32. Anti-knock for compression ignition engines is
a) napthene

b) tetra ethyl lead
c) amyl nitrate
d) hexadecane
View Answer

Answer: c
Explanation: Amyl nitrate is the anti-knock for compression ignition engines.

33. Which of the following fuel has little tendency towards detonation?
a) Benzene
b) Iso-octane
c) Normal heptane
d) Alcohol
View Answer

Answer: b
Explanation: Benzene has little tendency towards detonation.

34. Which of the following fuel detonates readily?
a) Benzene
b) Iso-octane
c) Normal heptane
d) Alcohol
View Answer

Answer: c
Explanation: Normal heptane detonates readily.

35. Disadvantage of hydrogen as a fuel in IC engine is
a) storage is safe
b) low $NO_x$
c) detonating tendency
d) easy handling
View Answer

Answer: c
Explanation: None.

36. Major constituent of natural gas is
a) ethane
b) methane
c) butane
d) propane
View Answer

Answer: b
Explanation: Only methane is the major constituent of natural gas.

37. Octane of natural gas is
a) 60-80
b) 80-100
c) >100
d) <60
View Answer

Answer: c
Explanation: The octane number of natural gas is always > 100.

38. L-MPFI system uses
a) port injection
b) direct injection
c) manifold injection
d) throttle body injection
View Answer

Answer: a
Explanation: L-MPFI system uses port injection while multi-point fuel injection system uses port injection and throttle body injection while D-MPFI system uses direct injection.

39. D-MPFI system uses
a) port injection
b) direct injection
c) manifold injection
d) throttle body injection
View Answer

Answer: b
Explanation: D-MPFI system uses direct injection and L-MPFI system uses port injection while multi-point fuel injection system uses port injection and throttle body injection.

40. Common rail injection system uses injection pressures of the order
a) 100-200 bar
b) 200-400 bar
c) 400-600 bar
d) 1500 bar
View Answer

Answer: d
Explanation: Generally, common rail injection system uses injection pressures of the order 1500 bar.

41. Continuous injection system usually has
a) plunger pump

b) rotary pump
c) gear pump
d) vane pump
View Answer

Answer: b
Explanation: In common use continuous injection system usually has rotary pump.

42. With EFI of diesel engines
a) sharp start and stop is not possible
b) very high injection pressure can be obtained
c) sudden cylinder cut-off is impossible
d) diagnostic properties are poor
View Answer

Answer: b
Explanation: Generally, with EFI of diesel engines very high injection pressure can be obtained.

43. _____ senor senses the amount of oxygen in the engine exhaust and calculates air-fuel ratio.
a) Engine temperature
b) Exhaust gas
c) Air flow
d) Air inlet temperature
View Answer

Answer: b
Explanation: Exhaust gas senor senses the amount of oxygen in the engine exhaust and calculates air-fuel ratio while engine temperature sensor senses the temperature of the engine coolant, and from this data the computer adjusts the mixture strength to rich side for cold starting.

44. In _____ sensor, output voltage changes in proportion to air-fuel ratio.
a) engine temperature
b) exhaust gas
c) air flow
d) air inlet temperature
View Answer

Answer: b
Explanation: Only in exhaust gas sensor, output voltage changes in proportion to air-fuel ratio.

45. The _____ sensor senses the temperature of the engine coolant, and from this data the computer adjusts the mixture strength to rich side for cold starting.
a) engine temperature
b) exhaust gas
c) air flow

d) air inlet temperature
View Answer

Answer: a
Explanation: The engine temperature sensor senses the temperature of the engine coolant, and from this data the computer adjusts the mixture strength to rich side for cold starting while the air flow sensor, monitors mass or volume of air flowing into the intake manifold for adjusting the quantity of fuel and exhaust gas senor senses the amount of oxygen in the engine exhaust and calculates air-fuel ratio.

46 The _____ sensor, monitors mass or volume of air flowing into the intake manifold for adjusting the quantity of fuel.
a) engine temperature
b) exhaust gas
c) air flow
d) air inlet temperature
View Answer

Answer: c
Explanation: The air flow sensor, monitors mass or volume of air flowing into the intake manifold for adjusting the quantity of fuel while exhaust gas senor senses the amount of oxygen in the engine exhaust and calculates air-fuel ratio.

47. The _____ sensor, checks the temperature of the ambient air entering the engine for fine tuning the mixture strength.
a) engine temperature
b) exhaust gas
c) air flow
d) air inlet temperature
View Answer

Answer: d
Explanation: The air inlet temperature sensor, checks the temperature of the ambient air entering the engine for fine tuning the mixture strength whereas the engine temperature sensor senses the temperature of the engine coolant, and from this data the computer adjusts the mixture strength to rich side for cold starting while the air flow sensor, monitors mass or volume of air flowing into the intake manifold for adjusting the quantity of fuel and exhaust gas senor senses the amount of oxygen in the engine exhaust and calculates air-fuel ratio.

48. The _____ sensor, senses the movement of the throttle plate so that the mixture flow can be adjusted for engine speed and acceleration.
a) throttle position
b) manifold pressure
c) camshaft position
d) knock
View Answer

Answer: a
Explanation: The throttle position sensor, senses the movement of the throttle plate so that the mixture flow can be adjusted for engine speed and acceleration while the manifold pressure sensor, monitors vacuum in the engine intake manifold so that the mixture strength can be adjusted with changes in engine load and the camshaft position sensor, senses rotation of engine camshaft for speed and timing of injection.

49. The _____ sensor, monitors vacuum in the engine intake manifold so that the mixture strength can be adjusted with changes in engine load.
a) throttle position
b) manifold pressure
c) camshaft position
d) knock
View Answer

Answer: b
Explanation: The manifold pressure sensor, monitors vacuum in the engine intake manifold so that the mixture strength can be adjusted with changes in engine load and the camshaft position sensor, senses rotation of engine camshaft for speed and timing of injection.

50. The _____ sensor, senses rotation of engine camshaft for speed and timing of injection.
a) throttle position
b) manifold pressure
c) camshaft position
d) knock
View Answer

Answer: c
Explanation: The camshaft position sensor, senses rotation of engine camshaft for speed and timing of injection whereas the throttle position sensor, senses the movement of the throttle plate so that the mixture flow can be adjusted for engine speed and acceleration while the manifold pressure sensor, monitors vacuum in the engine intake manifold so that the mixture strength can be adjusted with changes in engine load.

51. The _____ sensor,is a microphone type sensor that detects ping or pre-ignition noise so that the ignition timing can be retarded.
a) throttle position
b) manifold pressure
c) camshaft position
d) knock
View Answer

Answer: d
Explanation: The knock sensor,is a microphone type sensor that detects ping or pre-ignition noise so that the ignition timing can be retarded while the camshaft position sensor, senses rotation of engine camshaft for speed and timing of injection whereas the throttle position sensor, senses the movement of the throttle plate so that the mixture flow can be adjusted for engine speed and acceleration while

the manifold pressure sensor, monitors vacuum in the engine intake manifold so that the mixture strength can be adjusted with changes in engine load.

52. In electronic fuel injection, there is improvement in the _____ efficiency due to comparatively less resistance in the intake manifolds which will cause less pressure losses.
a) mechanical
b) volumetric
c) overall
d) none of the mentioned
View Answer

Answer: b
Explanation: In electronic fuel injection, there is improvement only in the volumetric efficiency due to comparatively less resistance in the intake manifolds which will cause less pressure losses and no other efficiencies are hindered.

53. The methods used on fuel injection are :
a) air injection
b) mechanical injection
c) solid fuel injection
d) all of the mentioned
View Answer

Answer: d
Explanation: The methods used on fuel injection are air injection, mechanical injection and solid fuel injection.

54. Removal of air from the pipeline is termed as _____ in injection system.
a) bleeding
b) wound
c) sweating
d) none of the mentioned
View Answer

Answer: a
Explanation: Generally, the removal of air from the pipeline is termed as bleeding in injection system.

55. The usual types of diesel injectors are :
a) single hole injector
b) multi hole injector
c) long stem injector
d) all of the mentioned
View Answer

Answer: d
Explanation: The types of diesel injectors are single hole injector, multi hole injector and long stem injector.

56. In pre-chamber and swirl type of combustion system _____ is used.
a) single hole injector
b) multi hole injector
c) long stem injector
d) pintle nozzle
View Answer

Answer: d
Explanation: In pre-chamber and swirl type of combustion system pintle nozzle is used and not the other nozzles.

57. _____ is used to enable cold starting, with out the use of a heater plug.
a) Pintaux nozzle
b) Multi hole injector
c) Long stem injector
d) Pintle nozzle
View Answer

Answer: a
Explanation: Generally, intaux nozzle is used to enable cold starting, with out the use of a heater plug.

58. If one or more nozzles are not spraying correctly then _____ occurs.
a) dripping
b) misfiring
c) cold firing
d) none of the mentioned
View Answer

Answer: b
Explanation: If one or more nozzles are not spraying correctly then misfiring occurs and not cold firing.

59. Solid injection is also called _____
a) air injection
b) mechanical injection
c) compression fuel injection
d) none of the mentioned
View Answer

Answer: b
Explanation: Generally, solid injection is also called mechanical injection.

60. Fuel is injected into the cylinder at the end of _____ stroke.
a) suction

b) compression
c) expansion
d) exhaust
View Answer

Answer: b
Explanation: Fuel is injected into the cylinder at the end of compression stroke and not at suction or expansion stroke.

61. In _____ injection system only one pump is sufficient for multi-cylinder engine.
a) air
b) mechanical
c) compression fuel
d) common rail
View Answer

Answer: d
Explanation: None.

62. Which of the following statement is not correct with respect to alcohols as alternate fuel in IC engines
a) anti-knock characteristics of alcohol is poor
b) alcohol contains about half the heat energy of gasoline/litre
c) alcohol does not vaporize as easily as gasoline
d) alcohols are corrosive in nature
View Answer

Answer: a
Explanation: Anti-knock characteristics of alcohol is good.

63. Gasohol is a mixture of
a) 90% ethanol + 10% gasoline
b) 10% ethanol + 90% gasoline
c) 40% ethanol + 60% gasoline
d) 50% ethanol + 50% gasoline
View Answer

Answer: b
Explanation: 10% ethanol + 90% gasoline makes gashol.

64. Small amount of gasoline is added to alcohol to
a) reduce the emission
b) to increase the power output
c) to increase the efficiency
d) to improve cold weather starting
View Answer

Answer: d
Explanation: None.

65. Alcohols alone cannot be used in CI engines as
a) their self ignition temperature is high
b) latent heat of vaporization is high
c) all of the mentioned
d) none of the mentioned
View Answer

Answer: c
Explanation: None.

66. Paraffins are generally represented by
a) $C_nH_n$
b) $C_nH_{2n}$
c) $C_nH_{2n+2}$
d) $C_nH_{2n-6}$
View Answer

Answer: c
Explanation: Paraffins are generally represented by $C_nH_{2n+2}$ while olefins are generally represented by $C_nH_n$ .

67. Paraffins have molecular structure of
a) chain saturated
b) chain unsaturated
c) ring saturated
d) ring unsaturated
View Answer

Answer: a
Explanation: None.

68. Olefins are generally represented by
a) $C_nH_n$
b) $C_nH_{2n}$
c) $C_nH_{2n+2}$
d) $C_nH_{2n-6}$
View Answer

Answer: a
Explanation: Olefins are represented by $C_nH_n$ and paraffins are generally represented by $C_nH_{2n+2}$.

69. Hydrocarbons are decomposed into smaller hydrocarbons by
a) reforming
b) refining

c) cracking
d) polymerization
View Answer

Answer: c
Explanation: Hydrocarbons are decomposed into smaller hydrocarbons by cracking while the molecular structure of the straight-run gasoline is changed by reforming.

70. The molecular structure of the straight-run gasoline is changed by
a) reforming
b) refining
c) cracking
d) boiling
View Answer

Answer: a
Explanation: The molecular structure of the straight-run gasoline is changed by reforming and hydrocarbons are decomposed into smaller hydrocarbons by cracking.

71. For S.I. engines fuel most preferred are
a) aromatics
b) paraffins
c) olefins
d) napthenes
View Answer

Answer: a
Explanation: For S.I. engines fuel most preferred are aromatics while for C.I. engines fuel most preferred are paraffins.

72. For C.I. engines fuel most preferred are
a) aromatics
b) paraffins
c) olefins
d) napthenes
View Answer

Answer: b
Explanation: For C.I. engines fuel most preferred are paraffins and for S.I. engines fuel most preferred are aromatics.

73. In spark ignition engines, the knocking tendency can be decreased by
a) decreasing compression ratio
b) controlling intake throttle
c) controlling ignition timing
d) adding dopes like tetraethyl lead and ethylene dibromide
View Answer

Answer: d
Explanation: None.

74. In two stroke engine, which of the following functions are performed at the same time?

a. Compression and exhaust
b. Intake and Expansion
c. Intake and exhaust
d. Intake and compression

(Ans:c)

**75. The compression ratio in a Compression Ignition (CI) engine is generally in between**

a. 8 to 13
b. 14 to 23
c. 20 to 28
d. 25 to 32

(Ans:b)

**76. The compression ratio in a Spark Ignition (SI) engine is generally in between**

a. 7 to 10
b. 10 to 14
c. 14 to 18
d. 18 to 22

(Ans:a)

**77. Which of the following is not true for two stroke engine as compared to four stroke engine?**

a. Less cooling is required
b. Greater lubrication is required
c. More uniform torque on crankshaft
d. Complete exhaust of products of combustion

(Ans:a)

**78. The relation between Indicated power (ip), Friction power (fp) and Brake power (bp) is**

a. ip = fp – bp
b. ip = fp + bp
c. bp = ip + fp
d. bp = ip / fp

(Ans:b)

**79. Which of the following is not true for internal combustion engine as compare to external combustion engine?**

a. It has lower ratio of weight to output
b. They are self starting
c. Higher overall efficiency

d. Mechanical simplicity

(Ans:b)

**80. Heat engine uses _____ energy to produce mechanical work.**

a. Thermal
b. Fluid
c. Kinetic
d. Electric

(Ans:a)

**81. Which of the following is not an internal Combustion (IC) engine?**

a. Gas engine
b. Wankel engine
c. Jet engine
d. Stirling engine

(Ans:d)

**82. The energy of expanding gas is transferred by piston to connecting rod through**

a. Crank pin
b. Gudgeon pin
c. Bearing
d. Crankcase

(Ans:b)

**83. Which of the following is not used in four stroke compression-ignition (CI) engines?**

a. Fuel pump
b. Spark plug
c. Fuel injector
d. Inlet and outlet Valves

(Ans:b)

**84.In compression ignition (CI) engine, the compression ratio is**

a. Cylinder volume / Clearance volume
b. Swept Volume / Cylinder Volume
c. Clearance volume / Cylinder volume
d. Cylinder volume / Swept volume

(Ans:a)

**85. In two stroke engine there is one power stroke in _____ of crankshaft rotation.**

a. 90°
b. 180°
c. 270°
d. 360°

(Ans:d)

**86. In four stroke engine there is one power stroke in _____ of crankshaft rotation.**

a. 180°
b. 360°
c. 540°
d. 720°

(Ans:d)

**87. The ascending order of strokes in four stroke engine is**

a. Suction stroke – Expansion stroke – Compression stroke – Exhaust stroke
b. Suction stroke – Compression stroke – Expansion stroke –Exhaust stroke
c. Suction stroke – Expansion stroke – Exhaust stroke – Compression stroke
d. Suction stroke – Compression stroke – Exhaust stroke – Expansion stroke

(Ans:b)

**88. In four stroke engine which of the following is also known as power stroke**

a. Suction stroke
b. Compression stroke
c. Expansion stroke
d. Exhaust stroke

(Ans:c)

## Applied Thermal Engineering
## Multiple Choice Questions

| | |
|---|---|
| Measurements of fuel and air consumption, brake power and in-cylinder pressure. Tutorials on engine performance parameters. Heat balance sheet. Engine performance curves. | |

1. The increase in intake air temperature into IC engine,_____its efficiency
   A. increase
   B. decrease
   C. does not alter
   D. unpredictable on

ANSWER: B

2. An engine indicator is used to determine the following
   A. Speed
   B. Temperature
   C. M.E.P
   D. Volume of cylinder

ANSWER: C

3. In a typical medium speed 4- stroke Diesel engine, the inlet valve

A. opens 20°before top dead centre and closes at 35°afterthebottomdead centre.
B. opens up at top dead centre and closes at bottomdead centre
C. may open orcloseanywhere
D. remains open for 200°

ANSWER: A

4. Combustion in compressionignitionengineis
A. homogeneous
B. hetrogeneous
C. Bothhomogeneous and hetrogeneous
D. Laminar

ANSWER: B

5. The specific fuel consumption for diesel engine is approximately
A. 0.15 kg/kWh
B. 0.2 kg/kWh
C. 28 kg/kWh
D. 0.36 kg/kWh

ANSWER: B

6. The air requirement of a petrol engine during starting compared to the theoretical air requirement for complete combustion is
A. more
B.unpredictable
C. same
D. less

ANSWER: D

7. If one cylinder of a diesel engine receives more fuel than others , then for that cylinder the
A. exhaust will be smoky
B. scavenging occurs
C. exhaust temperature will be high
D. engine starts overheating

ANSWER: B

8. The output of a diesel engine can be increased without increasing the engine speed or size in the following way
A. feeding more fuel
B. increasing the flywheel size
C. heating intake air
D. supercharging

ANSWER: D

9. The process of breaking up or liquid into fine droplets by spraying is
A. vaporization
B. atomization
C. condensation
D. evaporation

ANSWER: B

10. As a result of detonation in an I.C engine, following parameter attains a high value
A. peak temperature
B. peak pressure

C. rate of pressure rise
D. rate of temperature rise

ANSWER: C

11. The accumulation of carbon in a cylinder results in increase of
A. clearance volume
B. volumetric efficiency
C. ignition time
D. effective compression ratio

ANSWER: D

12. Which of the following is compressed in a diesel engine cylinder
A. air
B. fuel
C. air and fuel
D. air and lub oil

ANSWER: A

13. The air-fuel ratio of the petrol engine is governed by
A. fuel pump
B. governor
C. carburetor
D. injector

ANSWER: C

14. In diesel engine the fuel injected would burn instantaneously at about compressed air temperature of
A. 1000°C
B. 250°C
C. 450°C
D. 2000°C

ANSWER: A

15. Whencrudeoilisheated, which of thefollowinghydrocarbonisgiven off first
A. kerosene
C. gasolene
C. natural gas
D. paraffin

ANSWER: C

16. A 100 cc engine has thefollowingparameter as 100 cc
A. fuel tankcapacity
B. sweptvolume
C. luboilcapacity
D. clearence volumen

ANSWER: B

17. Whenthecrankshaft of 4-stroke running at 1500 rpm thecamshaftwillrun at
A. 3000 rpm
B. 6000 rpm
C. 1500 rpm
D. 750 rpm

ANSWER: D

18. Engine pistons are usually made of aluminium alloy because it
    A. is lighter
    B. wears less
    C. Stronger
    D. absorbs shocks

ANSWER: A

19. The specific fuel consumption of a petrol engine compared to diesel engine of same H.P is
    A. same
    B.more
    C. less
    D. unpredictable

ANSWER: B

20. A diesel engine compared to petrol engine, running at full load is
    A. less efficient
    B. equally efficient
    C. more efficient
    D. other factors will decide it

ANSWER: C

21. Morse test is conducted on the engine to calculate the mechanical efficiency of
    A. single cylinder CI engine
    B. single cylinder SI engine
    C. only on two stroke engines
    D. multi cylinder engine

ANSWER: D

22. Motoring test is conducted on IC engines to determine
    A. brake power
    B. indicated power
    C. friction power
    D. fuel consumption at full load

ANSWER: C

23. Supercharging of an IC engine is done so that the
    A. thermal efficiency increases
    B. power output increases
    C. speed of the engine increases
    D. power output decreases

ANSWER: B

24. By supercharging the power output of an engine is expected to increase by
    A. 20%
    B. 45%
    C. 75%
    D. 50%

ANSWER: A

25. Super charging by Roots blower means
    A. the cost will be very high
    B. the life would be short
    C. creating balancing problems at high speeds

D. handling large volume of air without being too bulky

ANSWER: D

26. A reciprocating compressor is not suitable for use as a supercharger because:

A. it runs at lower rpm

B. the pressure ratio is high

C. volumetric efficiency is high

D. it is bulky and can handle small quantity of air

ANSWER: D

27. Ignition timing of a multi-cylinder SI engine can be adjusted by

A. rotating the cam shaft

B. adjusting the generator pulley

C. rotating the distributor

D. adjusting the pump pulley

ANSWER: C

28. The sparking voltage of the spark plug is

A. 6 to 12 V

B. 100 to 450 V

C. 1 to 2 kV

D. 20 to 30kV

ANSWER: D

29. In a cycle the spark lasts roughly for

A. 1 sec

B. 0.1 sec

C. 0.0001 sec

D.001 sec

ANSWER: C

30. The critical spark energy required to ignite a given mixture

A. decreases with decreasing sparking voltage

B. increases with decreasing sparking voltage

C. increases with increasing sparking voltage

D. decreases with increasing sparking voltage

ANSWER: D

31. In a battery ignition system, the intensity of spark is

A. minimum at low engine speed

B. minimum at low engine speed and increases with engine speed

C. maximum al low engine speed and decreases with engine speed

D. maximum at low engine speed

ANSWER: C

32. Solid injection in CI engine means injection of

A. solid fuel only

B. liquid fuel only

C. liquid fuel and air

D. solid fuel and air

ANSWER: B

33. In a carburetor the level of the fuel in the float chamber as compared to the level of the main jet in the venture is

A. lower
B. same
C. higher
D. same or higher

ANSWER: A

34. In a simple carburetor, the air-fuel ratio increases when the
A. density of air increases
B. velocity of air increases
C. velocity of air decreases
D. density of air decreases

ANSWER: B

35. HUCR is the highest compression ratio at which the
A. engine can be run
B. engine gives maximum output
C. engine is most efficient
D. fuel can be used in a test engine without detonation

ANSWER: D

36. Octane number of gasoline is obtained by comparing the performance of the engine when running on a mixture of the following hydrocarbons
A. ethane and methane
B. normal heptane and iso-octane
C. iso-heptane and octane
D. iso-octane and TEL

ANSWER: B

37. Most high speed compression ignition engine operate on
A. dual cycle
B. otto cycle
C. diesel cycle
D.Carnot cycle

ANSWER: A

38. The size of inlet valve of an engine in comparison to exhaust valve is
A. more
B. less
C. same
D. varies from design to design

ANSWER: B

39. The fuel air ratio in a petrol engine fitted with suction carburetor, operating with dirty air filter as compared to clean filter will be
A. higher
B. lower
C. remain unaffected
D. unpredictable

ANSWER: A

40. The actual volume of fresh charge admitted in 4-stroke petrol engine is
A. equal to stroke volume
B. equal stroke volume and clearance volume

C. less than stroke volume
D. more than stroke volume

ANSWER: C

41. The reason for supercharging in any engine is to be
A. increase efficiency
B. increase power
C. effect fuel economy
D. reduce weight and bulk for a given output

ANSWER: D

42. Supercharging is essential in
A. aircraft engines
B. petrol engines
C. gas turbines
D. diesel engines

ANSWER: A

43. Which of the following is the lightest and most volatile liquid fuel
A. diesel
B. kerosene
C. fuel oil
D. gasoline

ANSWER: D

44. The theoretically correct air fuel ratio of a petrol engine is of the order of
A. 6:1
B. 10:1
C. 15:1
D. 20:1

ANSWER: C

45. Air fuel ratio for idling speed of a petrol engine is approximately
A. 1:1
B. 5:1
C. 20:1
D. 10:1

ANSWER: D

46. Air fuel ratio at which a petrol engine cannot work is
A. 8:1
B. 12:1
C. 15:1
D. 20:1 and less

ANSWER: D

47. A 5 BHP engine running at full load would consume diesel of the order of
A. 0.3 kg/hr
B. 1 kg/hr
C. 3 kg/hr
D. 5 kg/hr

ANSWER; B

48. The knock in diesel engine occurs due to

A. instantaneous and rapid burning of the first part of the charge
B. instantaneous auto ignition of the last part of the charge
C. delayed burning of the last part of the charge
D. reduction of delay period

ANSWER: A

49. In a naturally aspirated diesel engine, the air is supplied by a
A. supercharger
B. centrifugal pump
C. movement of engine piston
D. reciprocating pump

ANSWER: C

50. In two stroke engine one power occurs in _____ of crank rotation
A. 180°
B. 360°
C. 270°
D. 720°

ANSWER: B

## THERMAL ENGINEERING

## PSYCHROMETRY

01. Which of the following statement is true?
A. the chart is plotted for pressure equal to 760mm Hg
B. the constant wbt line represents adiabatic saturation process
C. the constant wbt line coincides with constant enthalpy line
D. all of the mentioned

ANSWER : D

02. In sensible heating or cooling,
A. work done remains constant
B. dry bulb temperature or air remains constant
C. both of the mentioned
D. none of the mentioned

ANSWER : A

03. When humidity ratio of air ____ air is said to be dehumidified.
A. increases
B. decreases
C. remains constant
D. none of the mentioned

ANSWER : B

04. Air can be cooled and dehumidified by
A. circulating chilled water in tube across air flow
B. placing evaporator coil across air flow
C. spraying chilled water to air
D. all of the mentioned

ANSWER : D

05. Cooling and dehumidification of air is done in summer air conditioning.
A. true
B. false

ANSWER : A

06. Heating and humidification is done in
A. summer air conditioning
B. winter air conditioning
C. both of the mentioned
D. none of the mentioned
ANSWER : B

07. Which of the following is an absorbent?
A.silica gel
B. activated alumina
C. both of the mentioned
D. none of the mentioned
ANSWER : C

08. When air passes through silica gel,
A. it absorbs water vapour molecules
B. latent heat of condensation is released
C.dbt of air increases
D. all of the mentioned
ANSWER : D

09. In adiabatic evaporative cooling, heat transfer between chamber and surroundings is ____
A. zero
B. high
C. low
D. none of the mentioned
ANSWER : A

10. The cooling tower uses the phenomenon of evaporative cooling to cool warm water above the dbt of air.
A. true
B. false
ANSWER : B

11. Cooling towers are rated in terms of
A. approach
B. range
C. both of the mentioned
D. none of the mentioned
ANSWER :C

12. What is the temperature at which the water vapour in the mixture of water vapour in air, starts condensing called?

A. condensation temperature
B. dew point temperature
C. vaporization temperature
D. all of the above

ANSWER : B

13. The temperature of air recorded by thermometer when the bulb is covered by a cotton wick saturated by water is called as

A. dry bulb temperature
B. wet bulb temperature
C. stream temperature
D. psychrometric temperature

ANSWER : B

14. Which temperature can be measured by an instrument called psychrometer?

A. dry bulb temperature
B. wet bulb temperature
C. both a. and b.
D. none of the above

ANSWER : C

15. When dry bulb temperature (DBT) and wet bulb temperature (WBT) are measured, greater the difference between DBT and WBT,

A. greater the amount of water vapour held in the mixture
B. smaller the amount of water vapour held in the mixture
C. same the amount of water vapour held in the mixture
D. none of the above

ANSWER : B

16. What is sensible cooling of air?

A. the cooling in which sensible heat of air is removed in order to reduce temperature
B. the cooling in which temperature of air is reduced without changing in its moisture content
C. both a. and b.
D. none of the above

ANSWER : C

17. When the humidity ratio of air increases the air is said to be

A. dehumidified
B. humidified
C. heated
D. cooled

ANSWER : B

18. The temperature at which the air cannot hold all the water vapour mixed in it and some vapour starts condensing is called as

A. humidification temperature
B. dehumidification temperature
C. dew point temperature
D. none of the above
ANSWER : C

**19.** A Mixture of dry air and water,the formation of fog starts when,

A. air temperature is equal to the dew point temperature
B. air temperature is greater than the dew point temperature
C. both a. and b.
D. none of the above

ANSWER : A

20. When the dew point temperature is equal to the air temperature then the relative humidity is

A. 0%
B. 50%
C. 100%
D. unpredictable

ANSWER : C

21. On psychrometric chart, wet bulb temperature lines are

A. horizontal with uniformly spaced
B. horizontal with non-uniformly spaced
C. inclined with uniformly spaced
D. inclined with non-uniformly spaced

ANSWER :C

22. What is the perfect condition for dehumidification of air?

A. air is heated above its dew point temperature
B. air is cooled up to its dew point temperature
C. air is heated below its dew point temperature
D. air is cooled below its dew point temperature

ANSWER : D

23. When the rate of evaporation of water is zero, the relative humidity of the air is

A. 0%
B. 100%
C. 50%
D. unpredictable

ANSWER : B

24. When,
H1 = Total heat of air entering the coil (heating or cooling)
H2 = Total heat of air leaving the coil (heating or cooling)
H3 = Total heat of air at the end of the process (humidification or dehumidification)
then, the sensible heat factor (H2 – H1) / (H3 – H1) represents the process of

A. cooling and humidification
B. cooling and dehumidification
C. heating and humidification
D. heating and dehumidification

ANSWER : C

25. The dew point temperature is less than the wet bulb temperature for

A. saturated air
B. unsaturated air
C. both saturated and unsaturated air
D. none of the above
ANSWER : B

26. At 100% relative humidity, the wet bulb temperature is

A. lower than the dew point temperature
B. higher than the dew point
temperature
C. equal to the dew point temperature
D. none of the above

ANSWER : C

27. Humidification is the process of addition moisture in air at

A. constant wet bulb temperature
B. constant dry bulb temperature
C. constant latent heat
D. none of the above

ANSWER : B

28. Air at dry bulb temperature Td1 is passed through the heating coil and some amount of air is by passed unaffected and leaves with dry bulb temperature Tb2 and the temperature of heated air is Td3 (where Td2 < Td3), what is the correct formula for by pass factor (The amount of air by passed unaffected)?

A. Bypass Factor = (Td3 – Td2) / (Td3 – Td1)
B. Bypass Factor = (Td3 – Td1) / (Td3 – Td2)
C. Bypass Factor = (Td2 – Td1) / (Td2 – Td3)
D. Bypass Factor = (Td2 – Td3) / (Td2 – Td1)

ANSWER : D

29. The horizontal line in psychrometric chart joining the change of state of air represents

A. humidification
B. sensible cooling or heating
C. sensible cooling or heating with humidification
D. sensible cooling or heating with dehumidification

ANSWER : B

30. The moisture content lines in psychrometric chart are also called as

A. relative humidity lines
B. specific humidity lines
C. both a. and b.
D. none of the above

ANSWER : B

31. At any point on the saturation curve in psychometric chart, the dry bulb temperature is always

A. less than the corresponding wet bulb temperature
B. more than the corresponding wet bulb temperature
C. equal to the corresponding wet bulb temperature
D. cannot predict

ANSWER : C

32..The dry-bulb temperature scale is read on a psychrometric chart along the:

a. Left vertical axis
b. Right vertical axis
c. Saturation line and sloping downward to the right
d. Top horizontal axis
e. Horizontal axis on the bottom of the chart

ANSWER: E

33.Absolute or specific humidity is
a) the actual mass of moisture present in a specific amount of air
b) the maximum mass of moisture that a specific amount of air can hold
c) the ratio of the mass of moisture contained in a specific amount of air to the maximum amount of moisture this specific amount of air can contain

d) the mass of moisture present in a specific amount of air at that absolute temperature
e) a specific amount of air saturated with moisture

ANSWER: A

34.The heat content of air is called the _____ of the air.

a. Temperature
b. Humidity
c. Enthalpy
d. Psychrometry
e. Entropy

ANSWER: C

35.Relative humidity is

a) the ratio of water vapour in the air compared to the total amount water vapour the air could contain at a given temperature
b) equal to the dry bulb temperature divided by the wet bulb temperature
c) equal to the wet bulb temperature divided by the dry bulb temperature
d) the ratio of the mass of water vapour divided by the mass of dry air
e) the ratio of the mass of water vapour divided by the mass of wet air

ANSWER: A

36.The term "relative humidity" applies to

a) the percentage of moisture in the air as compared to the amount of moisture the air can hold at a specific temperature
b) the weight of the moisture in the air
c) the dryness fraction of the air
d) the amount of moisture in the air
e) the amount of humidity in the air

ANSWER: A

37.Dew point can be best defined as the:

a. Absolute temperature at which air, upon heating, will evaporate moisture
b. . Percentage of moisture that air can hold at a given temperature and pressure
c. . Temperature that air will begin to evaporate moisture
d. . Temperature at which air, upon cooling, becomes saturated, causing moisture to condense should the temperature drop further
e. . Atmospheric pressure at which air will condense moisture
Answer: D

38.Dry-bulb temperature is:

a. The absolute temperature corresponding to the atmospheric pressure
b. The same as the wet-bulb temperature if the relative humidity is less than 100%
c. Not required to find the relative humidity
d. The temperature of the air measured with an ordinary thermometer
e. The dew point temperature

Answer: D

39.Standard air is the:

a. Mass of 1 cubic meter of dry air at 20°C and atmospheric pressure
b. Mass of a cubic meter of air at atmospheric conditions
c. Volume of air at ambient temperature and atmospheric pressure
d. Volume of 1 kg of dry air at 21°C and atmospheric pressure at sea level or 101.325 kPa
e. Volume of 1 kg of air at 15°C and 100 kPa

Answer: D

40.The specific humidity scale on a psychrometric chart is along the:

a. Bottom horizontal axis
b. Right side vertical axis
c. Top horizontal axis at the top of the chart
d. Left saturation line
e. Left-side vertical axis and left side

Answer: B

41.A device for measuring relative humidity is called:

a. A dew point analyzer
b. An R. H. gauge
c. An aspirating gauge
d. A psychrometer
e. A chronometer
Answer: D

42.Wet-bulb temperature is:

a. The temperature indicated by a thermometer whose bulb covered by a water-wetted wick and exposed to a rapidly moving stream of air
b. The same as the dry-bulb temperature if the relative humidity is less than 100%
c. The dew point temperature
d. Always less than the dry-bulb temperature
e. Not required to find the relative humidity

Answer: A

43.The specific volume of air is expressed as the volume of:

a. 1 kg of air at 101.325 kPa in cm3
b. 0.833 kg of air at standard pressure and temperature in m3
c. 1 kg of air at 101.325 kPa and 21 degrees Celsius in m3
d. 1 g of air occupied at any temperature and pressure
e. 1 kg of air, regardless of temperature and pressure

Answer: C

44.The specific volume on a psychrometric chart:

a. Is plotted on vertical lines and read on the horizontal scale at the bottom of the chart
b. Is plotted on horizontal lines and read on the vertical scale on the left side of the chart
c. Is plotted on horizontal lines and read on the vertical scale on the right side of the chart
d. Has its lines originate on the volume scale along the saturation line which slope steeply down to the right of the chart
e. Is plotted on vertical lines and read on the horizontal scale at the top of the chart

Answer: D

45.The volume of standard air is _____ m3/kg of dry air.

a. 0.533
b. 0.633
c. 0.733
d. 0.833
e. 0.933
Answer: D

46.The dew point is the:

a. Dry bulb temperature on a psychrometer
b. Temperature at which water vapour will start to be absorbed into the air
c. Temperature below which water vapour will start to condense out of the air
d. Pressure below which water vapour will start to condense out of the air
e. Temperature at which water will start to evaporate

Answer: C

47. The degree of saturation varies between

A. 1 to infinity
B. 0 to infinity
C. 0 to 1
D. none of the above

ANSWER : C

48. What is the degree of saturation?

A. the ratio of the actual relative humidity to the saturated specific humidity at the same temperature
B. the ratio of the actual specific humidity to the saturated specific humidity at the same temperature
C. the ratio of the saturated specific humidity to the actual specific humidity at the same temperature
D. none of the above

ANSWER : B

49. What is the relative humidity for a saturated air?

A. 0%
B. 50%
C. 100%
D. cannot say

ANSWER : C

50. What is the specific humidity?

A. the ratio of the mass of water vapour to the mass of the total mixture of air and water vapour
B. the ratio of the mass of dry air to the mass of the total mixture of air and water vapour
C. the ratio of the mass of dry air to the mass of water vapour in a mixture of air and water vapour
D. the ratio of the mass of water vapour to the mass of dry air in a mixture of air and water vapour

ANSWER : D

51. The ratio of partial pressure of water vapour in a mixture to the saturation pressure of water at the same temperature of the mixture is called as

A. humidity
B. partial humidity
C. specific humidity
D. relative humidity

ANSWER : D

52. Dry air does NOT contain

A. krypton
B. argon
C. neon
D. none of the above

ANSWER : D

53. In sensible cooling process the relative humidity:

A. decreases

B. increases

C. remains constant

D. none of the above

ANSWER : B

54. In psychrometric chart, dew point temperature lines are

A. horizontal

B. vertical

C. curved

D. straight lines slopping downwards to the right

ANSWER : A

55. In psychrometric chart, specific humidity lines are:

A. vertical

B. horizontal

C. inclined

D. curved lines

ANSWER : B

55. An air washer can work as:

A. Humidifier

B. Dehumidifier

C. Filter

D. All of the above

ANSWER : D

56. Sling psychrometer is used to measure

A. only dry bulb temperature

B. only wet bulb temperature

C. dry and wet bulb temperature

D. relative humidity

ANSWER : C

## THERMAL ENGINEERING

## REFRIGERATION

1. A standard ice point temperature corresponds to the temperature of

(a) water at 0°C

(b) ice at - 4°C

(c) mixture of ice, water and vapour under equilibrium conditions under NTP conditions

(d) mixture of ice and water Under equilibrium conditions.

Ans: D

2. Vapour compression refrigeration is some what like

(a) Carnot cycle

(b) Rankine cycle

(c) reversedCamot cycle

(d) reversed Rankine cycle

Ans: C

3. Which of the following cycles uses air as the refrigerant?

(a) Ericsson

(b) Stirling

(c) Carnot

(d) Bell-coleman

Ans: d

4. Ammonia-absorption refrigeration cycle requires

(a) very little work input

(b) maximum work input

(c) nearly same work input as for vapour compression cycle

(d) zero work input

Ans: a

5. An important characteristic of absorption system of refrigeration is

(a) noisy operation

(b) quiet operation

(c) very little power consumption

(d) its input only in the form of heating.

Ans: D

6.The relative coefficient of performance is

(a) actual COP/theoretical COP

(b) theoretical COP/actual COP

(c) actual COP x theoretical COP

(d) 1-actual COP x theoretical COP

Ans: a

7. Clapeyron equation is a relation between

(a) temperature, pressure and enthalpy

(b) specific volume and enthalpy

(c) temperature and enthalpy

(d) temperature, pressure, specific vapour and enthalpy.

Ans: D

8. Clapeyron equation is applicable for registration at

(a) saturation point of vapour

(b) saturation point of liquid

(c) sublimation temperature

(d) triple point.

Ans: a

9. In vapour compression cycle, the condition of refrigerant is saturated liquid

(a) after passing through the condenser

(b) before passing through the condenser

(c) after passing through the expansion throttle valve

(d) before entering the expansion valve

Ans: a

10. In vapour compression cycle, the condition of refrigerant is very wet vapour

(a) after passing through the condenser

(b) before passing through the condenser

(c) after passing through the expansion or throttle valve

(d) before entering the expansion valve

Ans: c

11. In vapour compression cycle, the condition of refrigerant is high pressure saturated liquid

(a) after passing through the condenser

(b) before passing through the condenser

(c) after passing through the expansion or throttle valve

(d) before entering the expansion valve

Ans: d

12. In vapour compression cycle the condition of refrigerant is superheated vapour

(a) after passing through the condenser

(b) before passing through the condenser

(c) after passing through the expansion or throttle valve

(d) beforeentering the expansion valve

Ans: b

13. In vapour compression cycle the condition off refrigerant is dry saturated vapour

(a) after passing through the condenser

(b) before passing through the condenser

(c)before entering the expansion valve

(d) before entering the compressor

Ans: D

14. The boiling point of ammonia is

(a) -100°C

(b) -50°C

(c) - 33.3°C

(d) 33.3°C.

Ans: c

15. One ton of refrigeration is equal to the refrigeration effect corresponding to melting of 1000 kg of ice

(a) in 1 hour

(b) in 1 minute

(c) in 24 hours

(d) in 12 hours

Ans: c

16. One tonrefrigeration corresponds to

(a) 50 kcal/min

(b) 50 kcal/kr

(c) 80 kcal/min

(d) 80 kcal/hr

Ans: a

17. In S.J. unit, one ton of refrigeration is equal to

(a) 210 kJ/min

(b) 21 kJ/min

(c) 3.5 kJ/min

(d) 2.4 kJ/min

Ans: a

18. The vapour compression refrigerator employs the following cycle

(a) Rankine

(b) Carnot

(c) Reversed Carnot.

(d) Brayton

Ans: c

19. Allowable pressure on high-pressure side or ammonia absorption system is of the order of

(a) atmospheric pressure

(b) slightly above atmospheric pressure

(c) 2-4 bars

(d) 5-6 bars

Ans: d

20. The moisture in a refrigerant is removed by

(a) evaporator

(b) safety relief valve

(c) dehumidifier

(d) driers

Ans: d

21. The condensing pressure due to the presence of non-condensable gases, as compared to that actually required forcondensing temperatures without non-condensable gases,

(a) will be higher

(b) will be lower

(c) will remain unaffected

(d) may be higher or lower depending upon the nature of non-condensable gases

Ans: a

22. Critical pressure of a liquid is the pressure

(a) above which liquid will remain liquid

(b) above which liquid becomes gas

(c) above which liquid becomes vapour

(d) above which liquid becomes solid

Ans: a

23. Critical temperature is' the temperature above which

(a) a gas will never liquefy

(b) a gas will immediately liquefy

(c) water will evaporate

(d) water will never evaporate

Ans: a

24. The refrigerant for a refrigerator should have

(a) high sensible heat

(b) high total heat

(c) high latent heat

(d) low latent heat

Ans: c

25. Rating of a domestic refrigerator is of the order of

(a) 0.1 ton

(b) 5 tons

(c) 10 tons

(d) 40 tons

Ans: a

26. The COP of a domestic refrigerator

(a) is less than 1

(b) is more than 1

(c) is equal to 1

(d)depends upon the weather conditions.

Ans: b

27. The domestic refrigerator uses following type of compressor

(a) centrifugal

(b) axial

(c) miniature sealed unit

(d) piston type reciprocating

Ans: d

28. Presence of moisture in a refrigerant affects the working of

(a) compressor

(b) condenser

(c) evaparator

(d) expansion valve.

Ans: a

29. Refrigeration in aeroplanes usually employs the following refrigerant

(a) $Co_2$

(b) Freon-11

(c) Freon-22

(d) Air

Ans: d

30. Domestic refrigerator working on vapour compression cycle uses the following type of

expansion device

(a) electrically operated throttling valve

(b) manually operated valve

(c) thermostatic valve

(d) capillary tube

Ans: d

31. Air refrigeration operates on

(a) Carnot cycle

(b) Reversed Carnot cycle

(c) Rankine cycle

(d) Brayton cycle.

Ans: d

32. Air refrigeration cycle is used in

(a) domestic refrigerators

(b) commercial refrigerators

(c) air conditioning

(d) gas liquefaction

Ans: d

33. In a vapour compression cycle, the refrigerant immediately after expansion valve is

(a) liquid

(b) sub-cooled liquid

(c) saturated liquid

(d) wet vapour

Ans: d

34. The vapour pressure of refrigerant should be

(a) lower than atmospheric pressure

(b) higher than atmospheric pressure

(c) equal to atmospheric pressure

(d) could be anything

Ans: b

35. For better COP of refrigerator, the pressure range corresponding to temperature in evaporator and condenser must be

(a) small

(b) high

(c) equal

(d) anything

Ans: a

36. The bank of tubes at the back of domestic refrigerator are

(a) condenser tubes

(b) evaporator tubes

(c) refrigerant cooling tubes

(d) capillary tubes

Ans: a

37. The higher temperature in vapour compression cycle occurs at

(a) compressor discharge.

(b) expansion valve

(c) evaporator

(d) condenser discharge

Ans: a

38. Highest temperature encountered in refrigeration cycle should be

(a) near critical temperature of refrigerant

(b) above critical temperature

(c) atcritica. temperature

(d) much below critical temperature

Ans: d

39. In refrigerator, liquid receiver is required between condenser and flow controlling device, if quantity of refrigerant for

system is

(a) less than 2 kg

(b) more than or equal to 3.65 kg

(c) more than 10 kg

(d) there is no such consideration

Ans: b

40. Absorption system normally uses the following refrigerant

(a) Freon-11

(b) Freon-22

(c) $C0_2$

(d) ammonia.

Ans: e

41. One of the purposes of sub-cooling the liquid refrigerant is to

(a) reduce compressor overheating

(b) reduce compressor discharge temperature

(c) increase cooling effect

(d) ensure that only liquid and not the vapour enters the expansion (throttling) valve

Ans: d

42. The value of COP in vapour compression cycle is usually

(a) always less than unity

(b) always more than unity

(c) equal to unity

(d) any one of the above

Ans: b

43. In a refrigeration system, heat absorbed in comparison to heat rejected is

(a) more

(b) less

(c) less for small capacity and more for high capacity.

(d) more for small capacity and less for high capacity

Ans: b

44. Condensing temperature in a refrigerator is the temperature

(a) of cooling medium

(b) of freezing zone

(c) of evaporator

(d) at which refrigerant gas becomes liquid

Ans: d

45. Formation of frost on evaporator in refrigerator

(a) results in loss of heat due to poor heat transfer

(b) increases heat transfer rate

(c) decreases compressor power.

(d) can be avoided by proper design

Ans: a

46. In refrigerators, the temperature difference between the evaporating refrigerant and the

medium being cooled should be

(a) high, of the order of 25°

(b) as low as possible (3 to 11°C)

(c) zero

(d) any value

Ans: b

47. In a flooded evaporator refrigerator, an accumulator at suction of compressor is used to

(a) collect liquid refrigerant and prevent it from going to compressor

(b) detect liquid in vapour

(c) superheat the vapour

(d) increase refrigeration effect

Ans: a

48. Accumulators should have adequate volume to store refrigerant charge at least

(a) 10%

(b) 25%

(c) 50%

(d) 75%

Ans: c

49. At lower temperatures and pressures, the latent heat of vaporization of a refrigerant

(a) decreases

(b) increases

(c) remains same

(d) depends on other factors

Ans: b

50. A refrigeration cycle operates between condenser temperature of + 27°C and evaporator temperature of- 23°C. TheCarnot coefficient of performance of cycle will be

(a) 0.2

(b) 1.2

(c) 5

(d) 6

Ans: c

51. Which of the following is not a desirable property of a refrigerant

(a) highmisibility with oil

(b) low boiling point

(c) good electrical conductor

(d) large latent heat

Ans: c

52. In vapour compression refrigeration system, refrigerant occurs as liquid between

(a) condenser and expansion valve

(b) compressor and evaporator

(c) expansion valve and evaporator

(d) compressor and condenser

Ans: c

53. Pick up the correct statement about giving up of heat from one medium to other in ammonia absorption system

(a) strong solution to weak solution

(b) weak solution to strong solution

(c) strong solution to ammonia vapour

(d) ammonia vapour to strong solution.

Ans: b

54. Efficiency of a Carnot engine is given as 80%. If the- cycle direction be reversed, what will be the value of COP ofreversed Carnot cycle

(a) 1.25

(b) 0.8

(c) 0.5

(d) 0.25

Ans: d

55. Highest pressure encountered in a refrigeration system should be

(a) critical pressure of refrigerant

(b) much below critical pressure

(c) much above critical pressure

(d) near critical pressure

Ans: b

56. If a heat pump cycle operates between the condenser temperature of +27°C and evaporator temperature of - 23°C,then the Carnot COP will be

(a) 0.2

(b) 1.2

(c) 5

(d) 6

Ans: d

57. A certain refrigerating system has a normal operating suction pressure of 10 kg/cm gauge and condensing pressure ofabout 67 kg/cm. The refrigerant used is

(a) Ammonia

(b) Carbon dioxide

(c) Freon

(d) Brine

Ans: b

58. Aqua ammonia is used as refrigerant in the following type of refrigeration system

(a) compression

(b) direct

(c) indirect

(d) absorption

Ans: d

59. If the evaporator temperature of a plant is lowered, keeping the condenser temperature constant, the h.p. of compressorrequired will be

(a) same

(b) more

(c) less

(d) more/less depending on rating

Ans: b

60. In a refrigeration cycle, the flow of refrigerant is controlled by

(a) compressor

(b) condenser

(c) evaporator

(d) expansion valve

Ans: d

61. Where does the lowest temperature occur in a vapour compression cycle ?

(a) condenser

(b) evaporator

(c) compressor

(d) expansion valve

Ans: b

62. The leaks in a refrigeration system using Freon are detected by

(a) halide torch which on detection produces greenish flame lighting

(b) sulphur sticks which on detection gives white smoke

(c) using reagents

(d) sensing reduction in pressure.

Ans: a

63. Pick up the incorrect statement

(a) lithium bromide used in vapour absorption cycle is nonvolatile

(b) lithium bromide plant can't operate below 0°C

(c) a separator is used in lithium bromide plant to remove the unwanted water vapour by condensing

(d) concentration of solution coming out of lithium bromide generator is more in comparison to that entering the generator

Ans: c

64. The lower horizontal line of the refrigeration cycle plotted on pressure-enthalpy-diagram represents

(a) condensation of the refrigerant vapour

(b) evaporation of the refrigerant liquid

(c) compression of the refrigerant vapour

(d) metering of the refrigerant liquid

Ans: b

65. Mass flow ratio of $NH_3$ in comparison to Freon-12 for same refrigeration load and same temperature limits is of the orderof

(a) 1 : 1

(b) 1 : 9

(c) 9 : 1

(d) 1 : 3

Ans: b

66. Freon group of refrigerants are

(a) inflammable

(d) toxic

(c) non-toxic and non-inflammable

(d) non-toxic and inflammable

Ans: c

67 Ammonia is

(a) non-toxic

(b) non-inflammable

(c) toxic and non-inflammable

(d) highly toxic and inflammable

Ans: d

68. In vapour compression cycle using $NH_3$ as refrigerant, initial charge is filled at

(a) suction of compressor

(b) delivery of compressor

(c) high pressure side close to receiver

(d) low pressure side near receiver

Ans: c

69. Short horizontal lines on pressure-enthalpy chart show

(a) constant pressure lines

(b) constant temperature lines

(c) constant total heat lines

(d) constant entropy lines

Ans: a

70. On the pressure-enthalpy diagram, condensation and de-superheating is represented by a horizontal line because theprocess

(a) takes place at constant pressure (b) takes place at constant temperature

(c) takes place at constant entropy

(d) takes place at constant enthalpy

Ans: a

71. One ton of the refrigeration is

(a) the standard unit used in refrigeration problems

(b) the cooling effect produced by melting 1 ton of ice

(c) the refrigeration effect to freeze 1 ton of water at 0°C into ice at 0°C in 24 hours

(d) the refrigeration effect to produce 1 ton of ice at NTP conditions

Ans: c

72. Superheating in a refrigeration cycle

(a) increases COP

(b) decreases COP

(c) COP remains unaltered

(d) other factors decide COP

Ans: b

73. For proper refrigeration in a cabinet, if the temperature and vapour pressure difference between cabinet and atmosphereis high, then

(a) bigger cabinet should be used

(b) smaller cabinet should be used

(c) perfectly tight vapour seal should be used

(d) refrigerant with lower evaporation temperature should be used

Ans: c

74. Choose the correct statement

(a) A refrigerant should have low latent heat

(b) If operating temperature of system is low, then refrigerant with low boiling point should be used

(c) Pre-cooling and sub-cooling bf refrigerant are same

(d) Superheat and sensible heat of a. refrigerant are same

Ans: b

75. The suction pipe diameter of refrigerating unit compressor in comparison to delivery side is

(a) bigger

(b) smaller

(c) equal

(d) smaller/bigger depending on capacity

Ans: a

76. Moisture in freon refrigeration system causes

(a) ineffective refrigeration

(b) high power consumption

(c) freezing automatic regulating valve

(d) corrosion of whole system

Ans: c

77. The advantage of dry compression is that

(a) it permits higher speeds to be used

(b) it permits complete evaporation in the evaporator

(c) it results in high volumetirc and mechanical efficiency

(d) all of the above

Ans: d

78. Choose the wrong statement

(a) Temperature of medium being cooled must be below that of the evaporator

(b) Refrigerant leaves the condenser as liquid

(c) All solar thermally operated absorption systems are capable only of intermittent operation

(d) frost on evaporator reduces heat transfer

Ans: a

79. Under-cooling in a refrigeration cycle

(a) increases COP

(b) decreases COF

(c) COP remains unaltered

(d) other factors decide COP

Ans: a

80. For obtaining high COP, the pressure range of compressor should be

(a) high

(b) low

(c) optimum

(d) any value

Ans: b

81. The coefficient of performance is the ratio of the refrigerant effect to the

(a) heat of compression

(b) work done by compressor

(c) enthalpy increase in compressor

(d) all of the above

Ans: d

82. The C.O.P of a refrigeration cycle with increase in evaporator temperature, keeping condenser temperature constant, will

(a) increase

(b) decrease

(c) remain unaffected

(d) may increase or decrease depending on the type of refrigerant used

Ans: a

83. Vertical lines on pressure-enthalpy chart show constant

(a) pressure lines

(b) temperature lines

(c) total heat lines

(d) entropy lines

Ans: c

84. Most of the domestic refrigerators work on the following refrigeration system

(a) vapour compression

(b) vapour absorption

(c) carnot cycle

(d) electrolux refrigerator

Ans: a

85. The general rule for rating refrigeration systems (excepting for $CO_2$ system) is to approximate following h.p. per ton of Refrigeration

(a) 0.1 to 0.5 h.p. per ton of refrigeration

(b) 0.5 to 0.8 h.p. per ton of refrigeration

(c) 1 to 2 h.p. per ton of refrigeration

(d) 2 to 5 h.p. per ton of refrigeration

Ans: c

86. Reducing suction pressure in refrigeration cycle

(a) lowers evaporation temperature

(b) increases power required per ton of refrigeration

(c) lowers compressor capacity because vapour is lighter

(d) all of the above.

Ans: d

87. Cooling water is required for following equipment in ammonia absorption plant

(a) condenser

(b) evaporator

(c) condenser and absorber

(d) condenser, absorber and separator (rectifier).

Ans: d

88. The refrigeration effect in a dry evaporator compared to flooded evaporator in a similar plant is

(a) same

(b) more

(c) less

(d) more or less depending on ambient conditions

Ans: c

89. The C.O.P. of a refrigeration cycle with lowering of condenser temperature, keeping the evaporator temperatureconstant, will

(a) increase

(b) decrease

(c) may increase or decrease depending on the type of refrigerant used

(d) remain unaffected

Ans: a

90. Which of the following refrigerants has lowest freezing point

(a) Freon-12

(b) $NH_3$

(c) $CO_2$

(d) Freon-22

Ans: d

91. The COP of a vapour compression plant in comparison to vapour absorption plant is

(a) more

(b) less

(c) same

(d) more/less depending on size of plant

Ans: a

92. The C.O.P. of a domestic refrigerator in comparison to domestic air conditioner will be

(a) same

(b) more

(c) less

(d) dependent on weather conditions

Ans: c

93. The evolution of heat of solution takes place in ammonia absorption plant when

(a) ammonia vapour goes into solution

(b) ammonia vapour is driven out of solution

(c) lithium bromide mixes with ammonia

(d) weak solution mixes with strong solution

Ans: a

94. The change in evaporator temperature in a refrigeration cycle, as compared to change in condenser temperature, influences the value of C.O.P.

(a) more

(b) less

(c) equally.

(d) unpredictable

Ans: a

95. The characteristic equation of gases pv = mRT holds good for

(a) mono atomic gases

(b) diatomic gases

(c)real gases

(d) ideal gases

Ans: c

96. Air refrigeration cycle is used in

(a) domestic refrigerators

(b) gas liquefaction

(c)commercial refrigerators

(d) Chillers

Ans: b

97. The condition of refrigerant before entering the expansion or throttle valve, in a vapour compression system

(a) dry vapour

(b) wet vapour

(c)liquid-vapour mixture

(d) high pressure saturated liquid

Ans: d

98. In a refrigeration cycle, the super heating……..C.O.P

(a)decreases

(b)does not change

(c) increases

(d)none of the above

Ans: a

99. In milk chilling plant, the usual secondary refrigerant is

(a)ammonia

(b)sodium silicate

(c) glycol

(d) brine

Ans: d

100. For ammonia refrigerating systems, the tubes of a shell and tube condenser are made of
(a) copper
(b) aluminium
(c) steel
(d) brass

Ans: c

101. The formation of frost on cooling coils in a refrigerator
(a) increases heat transfer
(b) improves C.O.P. of the system
(c) increases power consumption
(d) reduces power consumption

Ans: c

102. The freon group of refrigerants are
(a) halo-carbon refrigerants
(b) azeotrope refrigerants
(c) inorganic refrigerants
(d) hydro-carbon refrigerants

Ans: a