PART–II

OBJECTIVE TYPE QUESTIONS AND ANSWERS

1

Thermodynamics

1.1. Which of the following variables controls the physical properties of a perfect gas
(a) pressure (b) temperature
(c) volume (d) all of the above
(e) atomic mass.

1.2. Which of the following laws is applicable for the behaviour of a perfect gas
(a) Boyle's law (b) Charles' law
(c) Gay-Lussac law
(d) all of the above
(e) Joule's law.

1.3. The unit of temperature in S.I. units is
(a) Centigrade (b) Celsius
(c) Fahrenheit (d) Kelvin
(e) Rankine.

1.4. The unit of mass in S.I. units is
(a) kilogram (b) gram
(c) tonne (d) quintal
(e) newton.

1.5. The unit of time in S.I. units is
(a) second (b) minute
(c) hour (d) day
(e) year.

1.6. The unit of length in S.I. units is
(a) metre (b) centimetre
(c) kilometre (d) millimetre.

1.7. The unit of energy in S.I. units is
(a) watt (b) joule
(c) joule/s (d) joule/m
(e) joule m.

1.8. According to Charles' law for a perfect gas
(a) $\frac{T_2}{T_2}=\frac{P_2}{P_1}$, if V is kept constant
(b) $\frac{T_2}{T_1}=\frac{V_2}{V_1}$, if P is kept constant
(c) both (a) and (b) above
(d) $\frac{P_2}{P_1}=\frac{V_1}{V_2}$, if T is kept constant
(e) $\frac{PV}{T}=$ constant.

1.9. According to Gay-Lussac law for a perfect gas, the absolute pressure of given mass varies directly as
(a) temperature (b) absolute
(c) absolute temperature, if volume is kept constant
(d) volume, if temperature is kept constant
(e) remains constant, if volume and temperature are kept constant.

1.10. An ideal gas as compared to a real gas at very high pressure occupies
(a) more volume (b) less volume
(c) same volume
(d) unpredictable behaviour
(e) no such correlation.

1.11. General gas equation is
(a) $PV=nRT$ (b) $PV=mRT$
(c) $PV=\frac{1}{3}nRT$ (d) $PV^n=C$
(e) $C_p-C_v=R/J$.

1.12. Gas laws are applicable to
(a) gases as well as vapours

(P = pressure, V = Volume, T = Temperature, m = mass, R = gas constant, J = Joule's coefficient, C_p = specific heat at constant pressure, C_v = specific heat at constant volume, C and n = constant)

(b) gases alone and not to vapours
(c) gases and steam
(d) gases and vapours under certain conditions
(e) steam and vapours.

1.13. According to Dalton's law, the total pressure of the mixture of gases is equal to
(a) greater of the partial pressures of all
(b) average of the partial pressures of all
(c) sum of the partial pressures of all
(d) sum of the partial pressures of all divided by average molecular weight
(e) atmospheric pressure.

1.14. Which of the following can be regarded as gas so that gas laws could be applicable, within the commonly encountered temperature limits.
(a) O_2, N_2, steam, CO_2
(b) O_2, N_2, water vapour
(c) SO_2, NH_3, CO_2, moisture
(d) O_2, N_2, H_2, air
(e) steam vapours, H_2, CO_2.

1.15. The unit of pressure in S.I. units is
(a) kg/cm^2
(b) mm of water column
(c) pascal
(d) dynes per square cm
(e) bars

1.16. In a polytropic process, the perfect gas equation $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$ can be used only to determine
(a) one property at one of the states, provided all other properties are known
(b) to relate the end states of a process
(c) the intermediate properties during the process
(d) the nature of gas
(e) the gas constant.

1.17. A closed system is one in which
(a) mass does not cross boundaries of the system, though energy may do so
(b) mass crosses the boundary but not the energy
(c) neither mass nor energy crosses the boundaries of the system
(d) both energy and mass cross the boundaries of the system
(e) thermodynamic reactions take place.

1.18. Temperature of a gas is produced due to
(a) its heating value
(b) kinetic energy of molecules
(c) repulsion of molecules
(d) attraction of molecules
(e) surface tension of molecules.

1.19. According to kinetic theory of gases, the absolute zero temperature is attained when
(a) volume of the gas is zero
(b) pressure of the gas is zero
(c) kinetic energy of the molecules is zero
(d) specific heat of gas is zero
(e) mass is zero.

1.20. Kinetic theory of gases assumes that the collisions between the molecules are
(a) perfectly elastic
(b) perfectly inelastic
(c) partly elastic
(d) partly inelastic
(e) partly elastic and partly inelastic.

1.21. The pressure of a gas in terms of its mean kinetic energy per unit volume E is equal to
(a) $E/3$ (b) $E/2$
(c) $3E/4$ (d) $2E/3$
(e) $5E/4$.

1.22. Kinetic energy of the molecules in terms of absolute temperature (T) is proportional to
(a) T (b) $\frac{1}{T}$
(c) T^2 (d) $\sqrt{T}$
(e) $1/\sqrt{T}$.

1.23. Superheated vapour behaves
(a) exactly as gas
(b) as steam
(c) as ordinary vapour
(d) approximately as a gas
(e) as average of gas and vapour.

1.24. According to Boyle's law for a perfect gas
(a) $\frac{T_2}{T_1} = \frac{P_2}{P_1}$, if V is kept constant
(b) $\frac{T_2}{T_1} = \frac{V_2}{V_1}$, if P is kept constant
(c) both (a) and (b) above
(d) $\frac{P_2}{P_1} = \frac{V_1}{V_2}$, if T is kept constant
(e) $\frac{PV}{T} = \text{constant}$.

1.25. Absolute zero pressure will occur
(*a*) at sea level
(*b*) at the centre of the earth
(*c*) when molecular momentum of the system becomes zero
(*d*) under vacuum conditions
(*e*) at a temperature of – 273 °K

1.26. No liquid can exist as liquid at
(*a*) – 273 °K (*b*) vacuum
(*c*) zero pressure (*d*) centre of earth
(*e*) in space.

1.27. The unit of power in S.I. units is
(*a*) newton (*b*) pascal
(*c*) erg (*d*) watt
(*e*) joule.

1.28. The condition of perfect vacuum, *i.e.*, absolute zero pressure can be attained at
(*a*) a temperature of – 273.16°C
(*b*) a temperature of 0°C
(*c*) a temperature of 273 °K
(*d*) a negative pressure and 0°C temperature
(*e*) can't be attained.

1.29. Intensive property of a system is one whose value
(*a*) depends on the mass of the system, like volume
(*b*) does not depend on the mass of the system, like temperature, pressure, etc.
(*c*) is not dependent on the path followed but on the state
(*d*) is dependent on the path followed and not on the state
(*e*) remains constant.

1.30. Specific heat of air at constant pressure is equal to
(*a*) 0.17 (*b*) 0.21
(*c*) 0.24 (*d*) 1.0
(*e*) 1.41.

1.31. Characteristic gas constant of a gas is equal to
(*a*) C_p/C_v (*b*) C_v/C_p
(*c*) $C_p - C_v$ (*d*) $C_p + C_v$
(*e*) $C_p \times C_v$

1.32. The behaviour of gases can be fully determined by
(*a*) 1 law (*b*) 2 laws
(*c*) 3 laws (*d*) 4 laws
(*e*) 5 laws.

1.33. The equation $\left(p + \frac{a}{v^2}\right)(v - b) = R$ is known as
(*a*) real gas equation
(*b*) Maxwell's equation
(*c*) Van der Waal's equation
(*d*) Avogadro's equation
(*e*) Kinetic theory of gases equation.

1.34. The ratio of two specific heats of air is equal to
(*a*) 0.17 (*b*) 0.24
(*c*) 0.1 (*d*) 1.41
(*e*) 2.71.

1.35. Boyle's law *i.e.* pV = constant is applicable to gases under
(*a*) all ranges of pressures
(*b*) only small range of pressures
(*c*) high range of pressures
(*d*) steady change of pressures
(*e*) atmospheric conditions.

1.36. Which law states that the internal energy of a gas is a function of temperature
(*a*) Charles' law (*b*) Joule's law
(*c*) Regnault's law (*d*) Boyle's law
(*e*) there is no such law.

1.37. The same volume of all gases would represent their
(*a*) densities (*b*) specific weights
(*c*) molecular weights
(*d*) gas characteristic constants
(*e*) specific gravities.

1.38. Which law states that the specific heat of a gas remains constant at all temperatures and pressures
(*a*) Charles' Law (*b*) Joule's Law
(*c*) Regnault's Law
(*d*) Boyle's Law
(*e*) there is no such law.

1.39. An open system is one in which
(*a*) mass does not cross boundaries of the system, though energy may do so
(*b*) neither mass nor energy crosses the boundaries of the system
(*c*) both energy and mass cross the boundaries of the system
(*d*) mass crosses the boundary but not the energy
(*e*) thermodynamic reactions do not occur.

1.40. According to which law, all perfect gases change in volume by 1/273th of their original volume at 0°C for every 1°C change in temperature when pressure remains constant
(*a*) Joule's law (*b*) Boyle's law
(*c*) Regnault's law (*d*) Gay-Lussac law
(*e*) Charles' law.

1.41. Gases have
(*a*) only one value of specific heat
(*b*) two values of specific heat
(*c*) three values of specific heat
(*d*) no value of specific heat
(*e*) under some conditions one value and sometimes two values of specific heat.

1.42. According to Avogadro's Hypothesis
(*a*) the molecular weights of all the perfect gases occupy the same volume under same conditions of pressure and temperature
(*b*) the sum of partial pressure of mixture of two gases is sum of the two
(*c*) product of the gas constant and the molecular weight of an ideal gas is constant
(*d*) gases have two values of specific heat
(*e*) all systems can be regarded as closed systems.

1.43. Extensive property of a system is one whose value
(*a*) depends on the mass of the system, like volume
(*b*) does not depend on the mass of the system, like temperature, pressure, etc.
(*c*) is not dependent on the path followed but on the state
(*d*) is dependent on the path followed and not on the state
(*e*) is always constant.

1.44. Work done in a free expansion process is
(*a*) + ve (*b*) −ve
(*c*) zero (*d*) maximum
(*e*) minimum.

1.45. The statement that molecular weights of all gases occupy the same volume is known as
(*a*) Avogadro's hypothesis
(*b*) Dalton's law
(*c*) Gas law
(*d*) Law of thermodynamics
(*e*) Joule's law.

1.46. To convert volumetric analysis to gravimetric analysis, the relative volume of each constituent of the flue gases is
(*a*) divided by its molecular weight
(*b*) multiplied by its molecular weight
(*c*) multiplied by its density
(*d*) multiplied by its specific weight
(*e*) divided by its specific weight.

1.47. If a gas is heated against a pressure, keeping the volume constant, then work done will be equal to
(*a*) + v (*b*) − ve
(*c*) zero (*d*) pressure × volume
(*e*) any where between zero and infinity.

1.48. An isolated system is one in which
(*a*) mass does not cross boundaries of the system, though energy may do so
(*b*) neither mass nor energy crosses the boundaries of the system
(*c*) both energy and mass cross the boundaries of the system
(*d*) mass crosses the boundary but not the energy
(*e*) thermodynamic reactions do not occur.

1.49. Properties of substances like pressure, temperature and density, in thermodynamic coordinates are
(*a*) path functions
(*b*) point functions
(*c*) cyclic functions
(*d*) real functions
(*e*) thermodynamic functions.

1.50. Which of the following quantities is not the property of the system
(*a*) pressure (*b*) temperature
(*c*) specific volume(*d*) heat
(*e*) density.

1.51. According to Avogadro's law, for a given pressure and temperature, each molecule of a gas
(*a*) occupies volume proportional to its molecular weight
(*b*) occupies volume proportional to its specific weight
(*c*) occupies volume inversely proportional to its molecular weight
(*d*) occupies volume inversely proportional to its specific weight
(*e*) occupies same volume.

1.52. Mixture of ice and water form a
(*a*) closed system
(*b*) open system
(*c*) isolated system
(*d*) heterogeneous system
(*e*) thermodynamic system.

1.53. Which of the following is the property of a system
(*a*) pressure and temperature
(*b*) internal energy
(*c*) volume and density
(*d*) enthalpy and entropy
(*e*) all of the above.

1.54. On weight basis, air contains following parts of oxygen
(*a*) 21 (*b*) 23
(*c*) 25 (*d*) 73
(*e*) 79.

1.55. Which of the following is not the intensive property
(*a*) pressure (*b*) temperature
(*c*) density (*d*) heat
(*e*) specific volume.

1.56. Which of the following items is not a path function
(*a*) heat (*b*) work
(*c*) kinetic energy (*d*) $\int vdp$
(*e*) thermal conductivity.

1.57. Work done in an adiabatic process between a given pair of end states depends on
(*a*) the end states only
(*b*) particular adiabatic process
(*c*) the value of index n
(*d*) the value of heat transferred
(*e*) mass of the system.

1.58. Heat and work are
(*a*) point functions (*b*) system properties
(*c*) path functions
(*d*) intensive properties
(*e*) extensive properties.

1.59. Which of the following parameters is constant for a mole for most of the gases at a given temperature and pressure
(*a*) enthalpy (*b*) volume
(*c*) mass (*d*) entropy
(*e*) specific volume.

1.60. Which of the following quantities do not represent the property of the system
(*a*) $\int pdv$ (*b*) $\int vdp$
(*c*) cyclic $\int pdv$ (*d*) cyclic $\int vdp$
(*e*) none of the above.

1.61. A reversible polytropic process can be described by the equation
(*a*) $PV^n = C$ (*b*) $(PV)^n = C$
(*c*) $\left(\frac{P}{V}\right)^n = C$ (*d*) $PV^{-n} = C$
(*e*) $P^nV = C$.

1.62. Which is true for reversible polytropic process
(*a*) temperature remains constant
(*b*) entropy remains constant
(*c*) internal energy remains constant
(*d*) enthalpy remains constant
(*e*) some heat transfer takes place.

1.63. Specific heat of air at constant volume C_v is equal to
(*a*) 0.17 (*b*) 0.21
(*c*) 0.24 (*d*) 1.0
(*e*) 1.41.

1.64. The relationship between two specific heats C_p and C_v is given as follows
(*a*) $C_p/c_v = \gamma$ (*b*) $C_p - C_v = R/J$
(*c*) $\frac{C_p - C_v}{J} = R$ (*d*) $C_v - C_p = R/J$
(*e*) $C_v + C_p = R/J$.

1.65. The value of C_v for oxygen is 5 cal/mole °K and the ratio of specific heats is 1.4. The difference between C_p and C_v is
(*a*) 1.4 (*b*) 2
(*c*) 2.4 (*d*) 3.2
(*e*) 3.4.

1.66. The value of polytropic exponent n in the reversible polytropic process usually varies between
(*a*) 0.1 to 1 (*b*) 1 to 1.2
(*c*) 1.2 to 1.4 (*d*) 1.5 to 2.0
(*e*) none of the above.

1.67. If the value of n is high in the polytropic process, then the compressor work between given pressure limits will be
(*a*) less (*b*) more
(*c*) no effect (*d*) zero
(*e*) infinite.

1.68. The value of $n = 1$ in the polytropic process indicates it to be
(*a*) reversible process
(*b*) isothermal process
(*c*) adiabatic process
(*d*) irreversible process
(*e*) free expansion process.

1.69. The adiabatic equation of a perfect gas is
(*a*) pV = constant (*b*) pV^n = constant
(*c*) pV^{γ} = constant (*d*) $pV^{\frac{n-1}{n}}$ = constant
(*e*) $pV^{\frac{1}{\gamma}}$ = constant

1.70. Solids and liquids have
(*a*) one value of specific heat
(*b*) two values of specific heat
(*c*) three values of specific heat
(*d*) no value of specific heat
(*e*) one value under some conditions and two values under other conditions.

1.71. A perfect gas at 27°C is heated at constant pressure till its volume is double. The final temperature is
(*a*) 54°C (*b*) 327°C
(*c*) 108°C (*d*) 654°C
(*e*) 600°C

1.72. Curve *A* in Fig. 1.1 compared to curves *B* and *C* shows the following type of expansion
(*a*) $pV^n = C$ (*b*) isothermal
(*c*) adiabatic (*d*) free expansion
(*e*) throttling.

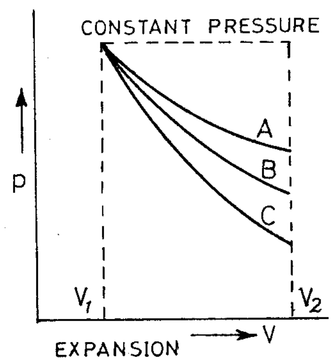

Fig. 1.1.

1.73. Curve *B* in Fig. 1.1 compared to curves *A* and *C* shows the following type of expansion
(*a*) $pV^n = C$ (*b*) isothermal
(*c*) adiabatic (*d*) free expansion
(*e*) throttling.

1.74. Curve *C* in Fig. 1.1 compared to curves *A* and *B* shows the following type of expansion
(*a*) $pV^n = C$ (*b*) isothermal
(*c*) adiabatic (*d*) free expansion
(*e*) throttling.

1.75. If value of n is infinitely large in a polytropic process $pV^n = C$, then the process is known as constant
(*a*) volume (*b*) pressure
(*c*) temperature (*d*) enthalpy
(*e*) entropy.

1.76. The index of compression n tends to reach ratio of specific heats γ when
(*a*) flow is uniform and steady
(*b*) process is isentropic
(*c*) process is isothermal
(*d*) process is isentropic and specific heat does not change with temperature
(*e*) process is isentropic and specific heat changes with temperature.

1.77. Change in enthalpy of a system is the heat supplied at
(*a*) constant pressure
(*b*) constant temperature
(*c*) constant volume
(*d*) constant entropy
(*e*) N.T.P. condition.

1.78. The term N.T.P. stands for
(*a*) nominal temperature and pressure
(*b*) natural temperature and pressure
(*c*) normal temperature and pressure
(*d*) normal thermodynamic practice
(*e*) normal thermodynamic pressure.

1.79. A heat exchange process in which the product of pressure and volume remains constant is known as
(*a*) heat exchange process
(*b*) throttling process
(*c*) isentropic process
(*d*) adiabatic process
(*e*) hyperbolic process.

1.80. The internal energy of a system is a function of only
(*a*) pressure
(*b*) temperature (absolute)
(*c*) volume

(*d*) pressure and temperature
(*e*) pressure, temperature and volume.

1.81. In an isothermal process, the internal energy of gas molecules
(*a*) increases (*b*) decreases
(*c*) remains constant
(*d*) may increase/decrease depending on the properties of gas
(*e*) shows unpredictable behaviour.

1.82. Zeroth law of thermodynamics
(*a*) deals with conversion of mass and energy
(*b*) deals with reversibility and irreversibility of process
(*c*) states that if two systems are both in equilibrium with a third system, they are in thermal equilibrium with each other
(*d*) deals with heat engines
(*e*) does not exist.

1.83. If a certain amount of dry ice is mixed with same amount of water at 80°C, the final temperature of mixture will be
(*a*) 80°C (*b*) 0°C
(*c*) 40°C (*d*) 20°C
(*e*) 60°C.

1.84. The basis for measuring thermodynamic property of temperature is given by
(*a*) zeroth law of thermodynamics
(*b*) first law of thermodynamics
(*c*) second law of thermodynamics
(*d*) third law of thermodynamics
(*e*) Avogadro's hypothesis.

1.85. One watt is equal to
(*a*) 1 Nm/s (*b*) 1 N/mt
(*c*) 1 Nm/hr (*d*) 1 kNm/hr
(*e*) 1 kNm/mt.

1.86. Work done is zero for the following process
(*a*) constant volume
(*b*) free expansion
(*c*) throttling (*d*) all of the above
(*e*) none of the above.

1.87. For which of the following substances, the gas laws can be used with minimum error
(*a*) dry steam (*b*) wet steam
(*c*) saturated steam (*d*) superheated steam
(*e*) steam at atmospheric pressure.

1.88. One calorie in kgm is equal to
(*a*) 0.427 (*b*) 4.27
(*c*) 42.7 (*d*) 427
(*e*) 4270.

1.89. The expression $\int pdV$ can be used for obtaining work of
(*a*) non-flow reversible process
(*b*) steady flow reversible process
(*c*) adiabatic irreversible process
(*d*) throttling process
(*e*) all of the above.

1.90. In a non-flow reversible process for which $p = (-3V + 15) \times 10^5 \text{N/m}^2$, V changes from 1 m^3 to 2 m^3. The work done will be about
(*a*) 100×100^5 joules
(*b*) 1×10^5 joules
(*c*) 10×10^5 joules
(*d*) 10×10^5 kilo joules
(*e*) 10×10^4 kilo*joules*.

1.91. The value of the product of molecular weight and the gas characteristic constant for all the gases in M.K.S. unit is
(*a*) 29.27 $kg_f m$/mol°K
(*b*) 8314 $kg_f m$/mol°K
(*c*) 848 $kg_f m$/mol°K
(*d*) 427 $kg_f m$/mol°K
(*e*) 735 $kg_f m$/mol°K.

1.92. On volume basis, air contains following parts of oxygen
(*a*) 21 (*b*) 23
(*c*) 25 (*d*) 77
(*e*) 79.

1.93. Universal gas constant is defined as equal to product of the molecular weight of the gas and
(*a*) specific heat at constant pressure
(*b*) specific heat at constant volume
(*c*) ratio of two specific heats
(*d*) gas constant
(*e*) unity.

1.94. The value of the product of molecular weight and the gas characteristic constant for all the gases in S.I. units is
(*a*) 29.27 J/kmol °K
(*b*) 83.14 J/kmol °K
(*c*) 848 J/kmol °K
(*d*) 427 J/kmol °K
(*e*) 735 J/kmol °K.

1.95. The molecular weight expressed in gm (*i.e.* 1 gm mole) of all gases at N.T.P. occupies a volume of
(*a*) 22.4 litres (*b*) 29.27 litres
(*c*) 427 litres (*d*) 8.48 litres
(*e*) 1 litre.

1.96. Strictly speaking all engineering processes are
(*a*) quasi-static
(*b*) thermodynamically in equilibrium
(*c*) reversible
(*d*) irreversible
(*e*) based on first and second laws of thermodynamics.

1.97. For which of the following substances, the internal energy and enthalpy are the functions of temperature only
(*a*) any gas (*b*) saturated steam
(*c*) water (*d*) perfect gas
(*e*) superheated steam.

1.98. In a free expansion process
(*a*) work done is zero
(*b*) heat transfer is zero
(*c*) both (*a*) and (*b*) above
(*d*) work done is zero but heat increases
(*e*) work done is zero but heat decreases.

1.99. If a gas vapour is allowed to expand through a very minute aperture, then such a process is known as
(*a*) free expansion
(*b*) hyperbolic expansion
(*c*) adiabatic expansion
(*d*) parabolic expansion
(*e*) throttling.

1.100. The specific heat of air increases with increase in
(*a*) temperature
(*b*) pressure
(*c*) both pressure and temperature
(*d*) variation of its constituents
(*e*) air flow

1.101. If a fluid expands suddenly into vacuum through an orifice of large dimension, then such a process is called
(*a*) free expansion
(*b*) hyperbolic expansion
(*c*) adiabatic expansion
(*d*) parabolic expansion
(*e*) throttling.

1.102. Which of the following property remains constant during throttling process
(*a*) internal energy (*b*) pressure
(*c*) entropy (*d*) enthalpy
(*e*) volume.

1.103. Which of the following processes are thermodynamically reversible
(*a*) throttling
(*b*) free expansion
(*c*) constant volume and constant pressure
(*d*) hyperbolic and $pV^n = C$
(*e*) isothermal and adiabatic.

1.104. Which of the following processes is irreversible process
(*a*) isothermal (*b*) adiabatic
(*c*) throttling (*d*) all of the above
(*e*) none of the above.

1.105. In order that a cycle be reversible, following must be satisfied
(*a*) free expansion or friction resisted expansion/compression process should not be encountered
(*b*) when heat is being absorbed, temperature of hot source and working substance should be same
(*c*) when heat is being rejected, temperature of cold source and working substance should be same
(*d*) all of the above
(*e*) none of the above.

1.106. For a thermodynamic process to be reversible, the temperature difference between hot body and working substance should be
(*a*) zero (*b*) minimum
(*d*) maximum (*d*) infinity
(*e*) there is no such criterion.

1.107. Minimum work in compressor is possible when the value of adiabatic index n is equal to
(*a*) 0.75 (*b*) 1
(*c*) 1.27 (*d*) 1.35
(*e*) 2.

1.108. 2 kg of substance receives 500 kJ and undergoes a temperature change from 100°C to 200°C The average specific heat of substance during the process will be
(*a*) $5 \frac{kJ}{kg\ °K}$ (*b*) $2.5 \frac{kJ}{kg\ °K}$

(c) $10 \frac{kg}{kg\ °K}$ (d) $25 \frac{kJ}{kg\ °K}$
(e) $15 \frac{kJ}{kg\ °K}$

1.109. The specific work input during a compression cycle from p_1 to p_2, if compression is isothermal, is given by
(a) $p_1 v_1 \log_e \frac{p_2}{p_1}$
(b) $\frac{p_2 v_2 - p_1 v_1}{n-1}$
(c) $\frac{n}{n-1}(p_2 v_2 - p_1 v_1)$
(d) $\frac{n}{n-1}\left[\left(\frac{p_2}{p_1}\right)^{\frac{n-1}{n}} - 1\right]$
(e) $p_1 v_1 \log_e \frac{p_1}{p_2}$.

1.110. Air is to be compressed from atmospheric condition to 7 ata pressure. In which case the heat transferred will be minimum
(a) isothermal (b) adiabatic
(c) polytropic (d) isochoric
(e) $pv^{1.35} = C$

1.111. 1 m^3 of air at a pressure of 10 kg/cm^2 is allowed to expand freely to a volume of 10 m^3. The work done will be
(a) zero (b) – ve
(c) + ve (d) 10^5 kg m
(e) 9×10^4 kg m.

1.112. Molecular volume of any perfect gas at 600×10^3 N/m^2 and 27°C will be
(a) 4.17 m^3/kg mol
(b) 400 m^3/kg mol
(c) 0.15 m^3/kg mol
(d) 41.7 m^3/kg mol
(e) 417 m^3/kg mol.

1.113. A gas is compressed in a cylinder by a movable piston to a volume one-half its original volume. During the process 300 kJ heat left the gas and internal energy remained same. The work done on gas in Nm will be
(a) 300 Nm (b) 300,000 Nm
(c) 30 Nm (d) 3000 Nm
(e) 30,000 Nm.

1.114. The law pv^{γ} is not applicable for
(a) adiabatic expansion of steam in turbine
(b) adiabatic expansion of steam in reciprocating steam engine
(c) ideal compression of air
(d) adiabatic compression of air
(e) free expansion of an ideal gas.

1.115. The more effective way of increasing efficiency of Carnot engine is to
(a) increase higher temperature
(b) decrease higher temperature
(c) increase lower temperature
(d) decrease lower temperature
(e) keep lower temperature constant.

1.116. Entropy change depends on
(a) heat transfer (b) mass transfer
(c) change of temperature
(d) thermodynamic state
(e) change of pressure and volume.

1.117. For reversible adiabatic process, change in entropy is
(a) maximum (b) minimum
(c) zero (d) unpredictable
(e) negative.

1.118. Isochoric process is one in which
(a) free expansion takes place
(b) very little mechanical work is done by the system
(c) no mechanical work is done by the system
(d) all parameters remain constant
(e) mass and energy transfer do not take place.

1.119. Polytropic index n is given by
(a) $\frac{\log (p_2/p_1)}{\log (v_1/v_2)}$ (b) $\frac{\log (p_1/p_2)}{\log (v_1/v_2)}$
(c) $\frac{\log (v_1/v_2)}{\log (p_2/p_1)}$ (d) $\frac{\log (v_2/v_1)}{\log (p_2/p_1)}$
(e) $\log \left(\frac{p_1 v_2}{p_2 v_2}\right)$.

1.120. When a gas flows through a very long pipe of unifrom cross section, the flow is approximately
(a) isentropic (b) isobaric
(c) isothermal (d) adiabatic
(e) isochoric.

1.121. The work done in the expansion of a gas from volume V_1 to V_2 under constant pressure p is equal to
(*a*) zero (*b*) $p(V_2 - V_1)$
(*c*) $p(V_2 + V_1)$ (*d*) $p/(V_2 - V_1)$
(*e*) $p(V_1 - V_2)/2$.

1.122. An expansion process as per law pV = constant is known as
(*a*) parabolic expansion
(*b*) hyperbolic expansion
(*c*) isentropic expansion
(*d*) adiabatic expansion
(*e*) free expansion.

1.123. Under ideal consitions, isothermal, isobaric, isochoric and adiabatic processes are
(*a*) static processes
(*b*) dynamic processes
(*c*) quasi-static processes
(*d*) stable processes
(*e*) thermodynamic processes.

1.124. Reversible abiabatic process may be expressed as T_1/T_2 equal to
(*a*) $(V_2 - V_1)^{\gamma-1}$ (*b*) $(p_1/p_2)^{\gamma-1/\gamma}$
(*c*) $(V_2/V_1)^{\gamma-1/\gamma}$ (*d*) $(p_1/p_2)^{\gamma-1}$
(*e*) (*a*) and (*b*) above

1.125. Which of the following parameters remains constant during ideal throttling process
(*a*) pressure (*b*) temperature
(*c*) volume (*d*) entropy
(*e*) enthalpy

1.126. Curve *A* in Fig. 1.2 compared to curves *B* and *C* shows the following type of compperssion

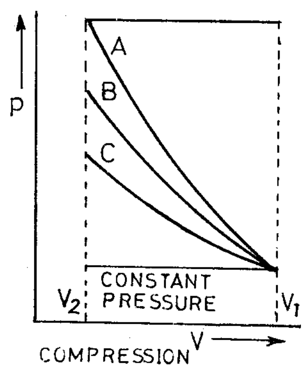

Fig. 1.2.

(*a*) isentropic (*b*) $pV^n = C$
(*c*) adiabatic (*d*) isothermal
(*e*) none of the above.

1.127. Curve *B* in Fig. 1.2 compared to curves *A* and *C* shows following type of compression
(*a*) isentropic (*b*) $pV^n = C$
(*c*) adiabatic (*d*) isothermal
(*e*) none of the above.

1.128. Curve *C* in Fig. 1.2 compared to curves *A* and *B* shows following typs of compression
(*a*) isentropic (*b*) $pV^n = C$
(*c*) adiabatic (*d*) isothermal
(*e*) none of the above.

1.129. When a liquid boils at constant pressure, the following parameter increases
(*a*) temperature (*b*) heat of vaporisation
(*c*) kinetic energy (*d*) entropy
(*e*) free energy.

1.130. Maximum work by an expansion of a gas in a closed system is possible when process takes place at constant
(*a*) pressure (*b*) temperature
(*c*) volume (*d*) enthalpy
(*e*) entropy.

1.131. Which is flase statement about enthalpy
(*a*) Enthalpy is the sum of internal energy and the pressure volume product.
(*b*) It is the same as heat transfer during constant pressure process.
(*c*) It is the function of specific heat at constant pressure.
(*d*) It is the function of specific heat at constant volume.
(*e*) It is the extensive property of the system.

1.132. If '*H*' be the heat supplied to a system to do work '*W*' with change in internal energy of ΔU, then
(*a*) $H = \Delta U + W$ (*b*) $\Delta U = H + W$
(*c*) $W = H + \Delta U$ (*d*) $H = W/\Delta U$
(*e*) $H = \Delta U/W$.

1.133. Heat energy stored in the gas and used for raising temperature of a gas is known as
(*a*) thermal energy
(*b*) internal energy
(*c*) molecular energy.

(*d*) enthalpy
(*e*) none of the above.

1.134. According to first law of thermodynamics
(*a*) work done by a system is equal to heat transferred by the system
(*b*) total internal energy of a system during a process remains constant
(*c*) internal energy, enthalpy and entropy during a process remain constant
(*d*) total energy of a system remains constant
(*e*) entropy of a system remains constant.

1.135. Energy can neither be created nor destroyed but can be converted from one form to other is inferred from
(*a*) zeroth low of thermodynamic
(*b*) first law of thermodynamics
(*c*) second law to thermodynamics
(*d*) basic law of thermodynamics
(*e*) claussius statement.

1.136. First law of thermodynamics furnishes the relationship between
(*a*) heat and work
(*b*) heat, work and properties of the system
(*c*) various properties of the system
(*d*) various thermodynamic processes
(*e*) heat and internal energy.

1.137. Change in enthalpy in a closed system is equal to heat transferred if the reversible process takes place at constant
(*a*) pressure (*b*) temperature
(*c*) volume (*d*) internal energy
(*e*) entropy.

1.138. In an isothermal process, the internal energy
(*a*) increases (*b*) decreases
(*c*) remains constant
(*d*) first increases and then decreases
(*e*) first decreases and then increases.

1.139. Change in internal energy in a closed system is equal to heat transferred if the reversible process takes place at constant
(*a*) pressure (*b*) temperature
(*c*) volume (*d*) internal energy
(*e*) entropy.

1.140. The first law of thermodynamics was developed by
(*a*) Charles (*b*) Carnot
(*c*) Eienstin (*d*) Kelvin
(*e*) Joule.

1.141. According to first law of thermodynamics
(*a*) mass and energy are mutually convertible
(*b*) Carnot engine is most efficient
(*c*) heat and work are mutually convertible
(*d*) mass and light are mutually convertible
(*e*) heat flows from hot substance to cold substance.

1.142. Total heat of a substance is also known as
(*a*) internal energy
(*b*) entropy
(*c*) thermal capacity
(*d*) enthalpy
(*e*) thermal conductance.

1.143. First law of thermodynamics
(*a*) enables to determine change in internal energy ot the system
(*b*) does not help to predict whether the system will or not undergo a change
(*c*) does not enable to determine change in entropy
(*d*) provides relationship between heat, work and internal energy
(*e*) all of the above.

1.144. Addition of heat at constant pressure to a gas results in
(*a*) raising its temperature
(*b*) raising its pressure
(*c*) raising its volume
(*d*) raising its temperature and doing external work
(*e*) doing external work.

1.145. Work done in reversible adiabatic process is given by
(*a*) $\frac{p_2V_2 - p_1V_1}{1-n}$ (*b*) $\frac{p_2V_2 - p_1V_1}{\gamma - 1}$
(*c*) $\frac{p_2V_2 - p_1V_1}{1-\gamma}$ (*d*) $\frac{(\gamma-1)}{J}(p_2V_2 - p_1V_1)$
(*e*) $\frac{J}{\gamma-1}(p_1V_1 - p_2V_2)$.

1.146. The temperature in a process in which work is done by expanding a gas under adiabatic condition will
(*a*) increase
(*b*) decrease

(*c*) remain unchanged
(*d*) decrease/increase depending on properties of gas
(*e*) first increase and then decrease.

1.147. The work given out during expansion process in a closed system will increase when the value of n (the index of compression)
(*a*) increases
(*b*) decreases
(*c*) remains same
(*d*) first increases and then decreases
(*e*) first decreases and then increases.

1.148. The work required for compression in a closed system increases when the value of n (the index of compression)
(*a*) increases (*b*) decreases
(*c*) remains same
(*d*) first increases and then decreases
(*e*) first decreases and then increases.

1.149. In a polytropic process, heat rejected is given by
(*a*) $\frac{\gamma}{\gamma-1} \times$ Work done on the system
(*b*) $\frac{\gamma-n}{\gamma-1} \times$ Work done on the system
(*c*) $\frac{\gamma-n}{\gamma} \times$ Work done on the system
(*d*) $\frac{\gamma-n}{n} \times$ Work done on the system
(*e*) work done on the systems.

1.150. Heat transfer during polytropic process is given by
(*a*) $\frac{n-\gamma}{1-\gamma} C_v (T_2 - T_1)$
(*b*) $\frac{\gamma-n}{\gamma-1} C_v(T_2 - T_1)$
(*c*) $\frac{\gamma-n}{1-\gamma} C_v(T_2 - T_1)$
(*d*) $\frac{\gamma}{\gamma-1} C_v(T_2 - T_1)$
(*e*) $\frac{\gamma-1}{\gamma} C_v(T_2 - T_1)$.

1.151. Which is false statement about Carnot cycle?
(*a*) All the thermal engines are based on Carnot cycle.
(*b*) It is represented as a standard of perfection.
(*c*) It provides concept of maximising work output between two temperature limits.
(*d*) The degree of perfection of other engines can be compared with Carnot cycle.
(*e*) η of Carnot cycle $= \frac{T_1 - T_2}{T_1}$

1.152. Carnot cycle has maximum efficiency for
(*a*) reversible engine
(*b*) irreversible engine
(*c*) new engine
(*d*) petrol engine
(*e*) diesel engine.

1.153. Measurement of temperature is based on
(*a*) thermodynamic properties
(*b*) zeroth law of thermodynamics
(*c*) first law of thermodynamics
(*d*) second law of thermodynamics
(*e*) joule's law.

1.154. Carnot cycle efficiency depends upon
(*a*) properties of the medium/substance used
(*b*) condition of engine
(*c*) working condition
(*d*) temperature range of operation
(*e*) effectiveness of insulating material around the engine.

1.155. Carnot cycle efficiency is maximum when
(*a*) initial temperature is 0°K
(*b*) final temperature is 0°K
(*c*) difference between initial and final temperature is 0°K
(*d*) final temperature is 0°C
(*e*) initial temperature is minimum possible.

1.156. An engine operates between temperatures of 900°K and T_2 and another engine between T_2 and 400°K For both to do equal work, value of T_2 will be
(*a*) 650°K (*b*) 600°K
(*c*) 625°K (*d*) 700°K
(*e*) 750°K.

1.157. Steady flow system work can be determined by the experssion
(*a*) $\int_1^2 pdV$ (*b*) $-\int_1^2 Vdp$

(c) $-\int_1^2 pdV$ (d) $\int_1^2 Vdp$

(e) $\int_1^2 dVdp$.

1.158. If a heat engine attains 100% thermal efficiency, it violates
(a) zeroth law of thermodynamics
(b) first law of thermodynamics
(c) second law of thermodynamics
(d) law of conservation of energy
(e) all of the above laws.

1.159. According to Clausius Inequality statement for any cycle of processes, reversible or irreversible
(a) cyclic $\int \frac{\delta Q}{T} > 0$ (b) cyclic $\int \frac{\delta Q}{T} = 0$
(c) cyclic $\int \frac{\delta Q}{T} < 0$ (d) cyclic $\int \frac{\delta Q}{T} \leq 0$
(e) cyclic $\int \frac{\delta Q}{T}$ is always maximum.

1.160. According to James Joule
(a) $J = Q/W$ (b) $W = Q/J$
(c) $Q = W/J$ (d) $W = J/Q$
(e) $Q = J/W$.
where J= Joule's constant or mechanical equivalent of heat, W=work done, and Q=heat transferred.

1.161. If heat be exchanged in a reversible manner, which of the following property of the working substance will change accordingly
(a) temperature
(b) enthalpy
(c) internal energy
(d) entropy
(e) all of the above.

1.162. If a system after undergoing a series of processes, returns to the initial state then
(a) process is thermodynamically in equilibrium
(b) process is executed in closed system cycle
(c) its entropy will change due to irreversibility
(d) sum of heat and work transfer will be zero
(e) no work will be done by the system.

1.163. According of Clausius statement
(a) heat flows from hot substance to cold substance
(b) heat flows from hot substance to cold substance, unaided
(c) heat can not flow from cold substance to hot substance
(d) heat can flow from cold substance to hot substance with the aid of external work
(e) (b) and (d) above.

1.164. Which of the following represents the perpetual motion of the first kind
(a) engine with 100% thermal efficiency
(b) a fully reversible engine
(c) transfer of heat energy from low temperature source to high temperature source
(d) a machine that continuously creates its own energy
(e) production of energy by temperature differential in sea water at different levels.

1.165. An actual engine is to be designed having same efficiency as the Carnot cycle. Such a proposition is
(a) feasible (b) impossible
(c) possible
(d) possible, but with lot of sophistications
(e) desirable.

1.166. A manufacturer claims to have a heat engine capable of developing 20 h.p. by receiving heat input of 400 kcal/mt and working between the temperature limits of 227° C and 27° C. His claim is
(a) justified (b) not possible
(c) may be possible with lot of sophistications
(d) cost will be very high
(e) theroretically possible.

1.167. In a Carnot cycle, heat is transferred at
(a) constant pressure
(b) constant volume
(c) constant temperature
(d) constant enthaply
(e) any one of the above.

1.168. An inventor claims that his heat engine has the following specification :
Power developed - 50 kW
Fuel burned per hour - 3 kg

Heating value of fuel - 75,000 kJ per kg
Temperature limits - 627 and 27°C
His heat engine is
(*a*) reality (*b*) impossible
(*c*) costly (*d*) cheaper
(*e*) imaginary.

1.169. Joule-Kelvin coefficient is denoted by
(*a*) $\left(\frac{\delta T}{\delta p}\right)_h$ (*b*) $\left(\frac{\delta T}{\delta v}\right)_p$
(*c*) $\left(\frac{\delta S}{\delta p}\right)_T$ (*d*) $\left(\frac{\delta p}{\delta S}\right)_v$
(*e*) $\left(\frac{\delta T}{\delta v}\right)_s$.

1.170. For an irreversible process, entropy change is
(*a*) greater than $\frac{\delta Q}{T}$
(*b*) equal to $\frac{\delta Q}{T}$
(*c*) less than $\frac{\delta Q}{T}$
(*d*) equal to zero
(*e*) less than or greater than $\frac{\delta Q}{T}$.

1.171. The value of $\Sigma\frac{dQ}{T}$ for reversible process is equal to
(*a*) + ve value (*b*) – ve value
(*c*) zero
(*d*) any one of the above
(*e*) unity.

1.172. Change of entropy depends upon
(*a*) change of mass
(*b*) change of temperature
(*c*) change of specific heats
(*d*) change of pressure and volume
(*e*) change of heat.

1.173. The value of $\Sigma\frac{dQ}{T}$ for an irreversible process is
(*a*) equal to zero (*b*) greater than zero
(*c*) less than zero
(*d*) any one of the above
(*e*) unity.

1.174. For polytropic process $pV^n = C$ for a perfect gas, change in entropy is given as
(*a*) $C_v\frac{\gamma-n}{1-n}\log_e\frac{T_2}{T_1}$
(*b*) $\frac{\gamma-n}{\gamma-1}R\log_e\frac{V_2}{V_1}$
(*c*) $\frac{\gamma-n}{\gamma-1}R\log_e\frac{T_2}{T_1}$
(*d*) $\frac{\gamma-n}{\gamma}R\log_e\frac{V_2}{V_1}$
(*e*) (a) and (b) above.

1.175. The value of Joule-Kelvin coefficient for an ideal gas is
(*a*) 1 (*b*) some – ve value
(*c*) some + ve value
(*d*) zero
(*e*) may have any value.

1.176. A closed gaseous system unaergoes a reversible process during which 200 kcal are rejected, the volume changing from 4 m^3 to 2 m^3 and the pressure remaining constant at 4.27 kg/cm^2. The change of internal energy will be
(*a*) + 10 kcal (*b*) – 10 kcal
(*c*) 0 (*d*) + 5 kcal
(*e*) – 5 kcal.

1.177. An engine operates between temperature limits of 900°K and T_2 and another between T_2 and 400°K. For both to be equally efficient, T_2 will be equal to
(*a*) 600°K (*b*) 650°K
(*c*) 625°K (*d*) 700°K
(*e*) 750°K.

1.178. The value of entropy at 0°C is taken as
(*a*) 1 (*b*) zero
(*c*) –1 (*d*) some other value
(*e*) any value.

1.179. An engine is supplied with 1130 kcal/mt of heat, the heat source and sink being maintained at 565°K and 315°K respectively. If heat rejected is 630 kcal/mt, then applying Clausius inequality, determine, whether the process is
(*a*) reversible (*b*) irreversible
(*c*) impossible (*d*) imaginary
(*e*) unstable.

1.180. If in previous problem, the heat rejected is 315 kcal/mt, then process will be
(*a*) reversible (*b*) irreversible
(*c*) impossible (*d*) hypothetical

(*e*) unstable.

1.181. If in above problem, the heat rejected is 945 kcal/mt then process will be
(*a*) reversible (*b*) irreversible
(*c*) impossible (*d*) hypothetical
(*e*) unstable.

1.182. A heat engine is suplied heat at the rate of 30,000 J/s and gives and output of 9 kW. The thermal efficiency of engine will be
(*a*) 30% (*b*) 33%
(*c*) 40% (*d*) 50%
(*e*) 55%.

1.183. In the above example, heat rejected will be
(*a*) 2.1 kJ/s (*b*) 21 kJ/s
(*c*) 210 kJ/s (*d*) 2100 kJ/s
(*e*) 21000 kJ/s.

1.184. If Q_1 is the heat transfer between hot temperature source and machine and Q_2 between cold temperature source and machice, then for heat pump, COP will be equal to
(*a*) $\frac{Q_1}{Q_1 - Q_2}$ (*b*) $\frac{Q_2}{Q_1 - Q_2}$
(*c*) $\frac{Q_1}{Q_2 - Q_1}$ (*d*) $\frac{Q_2}{Q_2 - Q_1}$
(*e*) $\frac{Q_1 - Q_2}{Q_1}$

1.185. In case of refrigeration machine, COP will be equal to
(*a*) $\frac{Q_2}{Q_1 - Q_2}$ (*b*) $\frac{Q_1}{Q_1 - Q_2}$
(*c*) $\frac{Q_1 - Q_2}{Q_1}$ (*d*) $\frac{Q_2 - Q_1}{Q_1}$
(*e*) $\frac{Q_2 - Q_1}{Q_2}$

1.186. The efficiency of a carnot engine is 0.75. It cycle direction is reversed, COP of reversed carnot cycle will be
(*a*) 0.25 (*b*) 0.5
(*c*) 1.25 (*d*) 1.33
(*e*) 0.33.

1.187. A house requires 60 M cal/hr in winter for heating. Heat pump absorbs heat form cold air outside and requires 8 M cal/hr of work. The COP will be
(*a*) 0.75 (*b*) 6.5
(*c*) 7.5 (*d*) 10
(*e*) 15.

1.188. If the house in above problem is to be cooled and heat requirements of house are same and work to be done is also 8 M cal/hr, then COP will be
(*a*) 0.75 (*b*) 6.5
(*c*) 7.5 (*d*) 13
(*e*) 3.75.

1.189. On a pressure volume diagram, the process line $pV^n = C$ (as the value of n increases) will
(*a*) come closer to *y*-axis
(*b*) come closer to *x*-axis
(*c*) come closer to 45° inclined line
(*d*) remain in same position
(*e*) change the quadrant.

1.190. Heat added in a reversible adiabatic process is equal to
(*a*) $p_1 V_1 \log \frac{V_1}{V_2}$
(*b*) $C_v \left(\frac{\gamma - n}{1 - n}\right)(T_2 - T_1)$
(*c*) zero (*d*) $C_v (T_2 - T_1)$
(*e*) + ve value.

1.191. The slope of constant pressure line on temperature entropy diagram is given by
(*a*) C_p/T (*b*) T/C_p
(*c*) S/T (*d*) T/S
(*e*) $T(\gamma - 1)$

1.192. In a cycle, the heat is rejected at
(*a*) constant temperature
(*b*) constant pressure
(*c*) constant volume
(*d*) constant enthalpy
(*e*) any one of the above.

1.193. Steam flow through a nozzle is considered as
(*a*) constant flow (*b*) isothermal flow
(*c*) adiabatic flow
(*d*) constant volume flow
(*e*) constant pressure flow.

1.194. Efficiency of a carnot engine with $t_1 = 200°C$, $t_2 = 30°C$, is
(*a*) 85% (*b*) 36%
(*c*) 80% (*d*) 12%
(*e*) 15%.

1.195. Internal energy of a substance depends on
(*a*) volume (*b*) pressure

(*c*) temperature (*d*) entropy
(*e*) enthalpy.

1.196. A diathermic wall is one which
(*a*) prevents thermal interaction
(*b*) permits thermal interaction
(*c*) encourages thermal interaction
(*d*) discourages thermal interaction
(e) does not exist.

1.197. An adiabatic wall is one which
(*a*) prevents thermal interaction
(*b*) permits thermal interaction
(*c*) encourages thermal interaction
(*d*) discourages thermal interaction
(*e*) dos not exist.

1.198. The door of a running refrigerator inside a room was left open. Which of the following statements is correct?
(*a*) The room will be cooled to the temperature inside the refrigerator.
(*b*) The room will be cooled very slightly.
(*c*) The room will be gradually warmed up.
(*d*) The temperature of the air in room will remain unaffected.
(*e*) any one of above is possible depending on the capacity.

1.199. Compressed air coming out from a punctured football
(*a*) becomes hotter
(*b*) becomes cooler
(*c*) remains at the same temperature
(*d*) may become hotter or cooler depending upon the humidity of the surrounding air
(*e*) attains atmospheric temperature.

1.200. Water contained in a beaker can be made to boil by passing steam through it
(*a*) at atmospheric pressure
(*b*) at a pressure below the atmospheric pressure
(*c*) at a pressure greater than atmospheric pressure
(*d*) any pressure
(*e*) not possible.

1.201. The only false statement in the following ones is
(*a*) heat can be converted into work
(*b*) heat rays can be converged at one point by concave mirror
(*c*) water expands when cooled below 4°C
(*d*) heat rays cannot pass through vacuum
(*e*) heat may transfer by any of three modes.

1.202. During throttling process
(*a*) heat exchange does not take place
(*b*) no work is done by expanding steam
(*c*) there is no change of internal energy of steam
(*d*) all of the above
(*e*) entropy decreases.

1.203. The energy of molecular motion appears as
(*a*) heat (*b*) potential energy
(*c*) surface tension (*d*) friction
(*e*) increase in pressure.

1.204. A sudden fall in the barometer reading is a sign of approaching
(*a*) fine weather (*b*) rains
(*c*) storm (*d*) cold wave
(*e*) hot wave.

1.205. The unit of universal gas constant is
(*a*) watts/°K (*b*) dynes/°C
(*c*) ergs cm/°K (*d*)erg/°K
(*e*) none of the above.

1.206. Calorie is a measure of
(*a*) specific heat (*b*) quantity of heat
(*c*) thermal capacity (*d*)entropy
(*e*) work.

1.207. I kgf/cm^2 is equal to
(*a*) 760 mm Hg (*b*) zero mm Hg
(*c*) 735.6 mm Hg (*d*) 1 mm Hg
(*e*) 100 mm Hg.

1.208. Barometric pressure is equal to
(*a*) 760 mm Hg (*b*) zero mm Hg
(*c*) 735.6 mm Hg (*d*) 1 mm Hg
(*e*) 100mm Hg.

1.209. One barometric pressure or 1 atmospheric pressure is equal to
(*a*) 1 kgf/cm^2 (*b*) 1.033 kgf/cm^2
(*c*) 0 kgf/cm^2
(*d*) 1.0197 kgf/cm^2
(*e*) 100 kgf/cm^2.

1.210. Thr value of 1 bar in S.I. units is equal to
(*a*) 1N/m^2 (*b*) I kN/m^2
(*c*) 1×10^4 N/m^2 (*d*) 1×10^5 N/m^2
(*e*) 1×10^6 N/m^2

1.211. Change of entropy for a heat exchange process is given by

(a) $\Delta H \times T$ (b) $\frac{\Delta H}{T}$

(c) $\frac{\Delta H}{\Delta T}$ (d) $\frac{T}{\Delta H}$

(e) $\frac{\Delta T}{\Delta H}$.

1.212. One bar is equal to

(a) 1.0197 kgf/cm^2 or 750.06 mm Hg

(b) 1 kgf/cm^2 or 735.6 mm Hg

(c) 1.033 kgf/cm^2 or 760 mm Hg

(d) zero kgf/cm^2

(e) 100 kgf/cm^2.

1.213. A perfect gas at 27°C was heated until its volume was doubled. The temperature of the gas will now be

(a) 270°C (b) 540°C

(c) 327°C (d) 729°C

(e) 420°C.

1.214. Change in the internal energy of small temperature change ΔT for ideal gas is expressed by the relation

(a) $\Delta U = C_v \times \Delta T$ (b) $\Delta U = C_p \times \Delta T$

(c) $\Delta U = \frac{C_p}{C_v} \times \Delta T$ (d) $\Delta U = (C_p - C_v)\,\Delta T$

(e) $\Delta U = \frac{C_p - C_v}{C_p} \times \Delta T$.

1.215. Change in enthalpy for small temperature change ΔT for ideal gas is expressed by the relation

(a) $\Delta H = C_v \times \Delta T$ (b) $\Delta H = C_p \times \Delta T$

(c) $\Delta H = \frac{C_p}{C_v} \times \Delta T$ (d) $\Delta H = (C_p - C_v)\,\Delta T$

(e) $\Delta H = \frac{C_p - C_v}{C_p} \times \Delta T$

1.216. Real gases follows the relation

(a) $PV = nRT$

(b) $(PV) \times$ Compressibility factor $= nRT$

(c) $(PV)^n = C$ (d) $PV^n = C$

(e) $PV^n = RT$.

1.217. In case of steady flow system, work can be evaluated using an expression

(a) $W = \int_{\text{Initial}}^{\text{Final}} PdV$

(b) $W = \int_{\text{Initial}}^{\text{Final}} VdP$

(c) $W = \int_{\text{Initial}}^{\text{Final}} - VdP$

(d) $W = \Delta Q - \Delta E$

(e) $W = \int_{\text{Initial}}^{\text{Final}} - PdV$

1.218. The first law of thermodynamics is the law of

(a) conservation of mass

(b) conservation of energy

(c) conservation of momentum

(d) conservation of heat

(e) conservation of temperature.

1.219. A perpetual motion machine is

(a) a thermodynamic machine

(b) a non-thermodynamic machine

(c) a hypothetical machine

(d) a hypothetical machine whose operation would violate the laws of thermodynamics

(e) an inefficient machine.

1.220. Kelvin Planck's law deals with

(a) conservation of heat

(b) conservation of work

(c) conversion of heat into work

(d) conversion fo work into heat

(e) conservation of mass.

1.221. According to Clausis statement of second law of thermodynamics

(a) heat can't be transferred from low temperature source to high temperature source

(b) heat can be transferred for low temperature to high temperature source by using refrigeration cycle.

(c) heat can be transferred from low temperature to high temperature source if COP of process is more than unity

(d) heat can't be transferred from low temperature to high temperature source without the aid of external energy

(e) all of the above.

1.222. A frictionless heat engine can be 100% efficient only if its exhaust temperature is

(a) below surroundings

(b) 0°C (c) 0°K
(d) equal to inlet temperature
(e) it is never possible.

1.223. Net flow work done in a polytropic process is equal to
(a) $p(V_2 - V_1)$ (b) zero
(c) $p_1V_1 \log\frac{p_2}{p_1}$ (d) $p_1V_1 \log\frac{V_2}{V_1}$
(e) $\frac{p_2V_2 - p_1V_1}{1-n}$

1.224. Carnot cycle consists of following four processes
(a) two isothermals and two isentropics
(b) two isentropics and two constant volumes
(c) two isentropics, one constant volume and one constant pressure
(d) two isentropics and two constant pressures
(e) one isothermal, one isentropic, one constant volume and one constant pressure.

1.225. The ratio of actual cycle efficiency to that of the ideal cycle efficiency is called
(a) effectiveness (b) work ratio
(c) efficiency ratio
(d) isentropic efficiency
(e) net efficiency.

1.226. The constant volume cycle is also called
(a) Carnot cycle (b) Joule cycle
(c) Diesel cycle (d) Otto cycle
(e) Rankine cycle.

1.227. Air refrigerators work on
(a) Carnot cycle (b) Otto cycle
(c) Atkinson cycle (d) Stirling cycle
(e) Reversed joule cycle.

1.228. The air standard efficiency of an Otto cycle is equal to
(a) $-\frac{1}{\gamma+1}$ (b) $r^{\gamma-1} - 1$
(c) $1 - r^{\gamma-1}$ (d) $1 - \frac{1}{r^{\gamma-1}}$
(e) $\frac{1}{r^{\gamma-1} - 1}$.
(where r = compression ratio
and γ = ratio of specific heats)

1.229. Rankine cycle consists of
(a) four processes (b) five processes
(c) six processes (d) three processes
(e) none of the above.

1.230. Relative efficiency of a gas power cycle is given as the ratio of
(a) actual thermal efficiency to air standard efficiency
(b) theoretical thermal efficiency to air standard efficiency
(c) air standard efficiency to actual thermal efficiency
(d) brake thermal efficiency to air standard efficiency
(e) indicated thermal effiiency to air standard efficiency.

1.231. It is proposed to make a direct heat-to-work converter out of an elementary system which absorbs heat while doing isothermal work exactly equal to the heat absorbed, thereby keeping internal energy constant. Such a system is
(a) not possible (b) possible
(c) not desirable (d) commendable
(e) possible only with lot of sophistication.

1.232. Maxwell's thermodynamic relations are applicable to
(a) reversible processes
(b) irreversible processes
(c) mechanical system in equilibrium
(d) thermodynamic processes
(e) chemical system in equilibrium.

1.233. Pick up the correct statement. An engine working between positive temperatures
(a) can be a heat pump
(b) can not be a heat pump
(c) must be a heat pump
(d) can be a heat pump only if frictionless machine is used
(e) can be a heat pump only with lot of sophistications.

1.234. Pick up the correct statement. A refrigerator working between positive temperaures
(a) can pump work into work reservoir
(b) can pump work into work reservoir with frictionless machine
(c) must take work out of work reservoir
(d) can not take work out of work reservoir

(*e*) can take work out of work reservoir only under certain limitations.

1.235. Thermal power plant works on
(*a*) Carnot cycle (*b*) Joule cycle
(*d*) Rankine cycle (*d*) Otto cycle
(*e*) Brayton cycle.

1.236. Which of the following is an irreversible cycle
(*a*) carnot (*b*) stirling
(*c*) ericsson (*d*) all of the above
(*e*) none of the above.

1.237. Otto cycle consists of following four processes
(*a*) two isothermals and two isentropics
(*b*) two isentropics and two constant volumes
(*c*) two isentropics, one constant volume and one constant pressure
(*d*) two isentropics and two constant pressures
(*e*) none of the above.

1.238. The efficiency of a Carnot engine depends on
(*a*) working substance
(*b*) design of engine
(*c*) size of engine
(*d*) type of fuel fired
(*e*) temperatures of source and sink.

1.239. For same compression ratio and for same heat added
(*a*) Otto cycle is more efficient than Diesel cycle
(*b*) Diesel cycle is more efficient than Otto cycle
(*c*) efficiency depends on other factors
(*d*) both Otto and Diesel cycles are equally efficient
(*e*) none of the above.

1.240. The efficiency of Carnot cycle is maximum for
(*a*) gas engine
(*b*) well lubricated engine
(*c*) petrol engine
(*d*) steam engine
(*e*) reversible engine.

1.241. For the same compression ratio, the efficiency of dual combustion cycle is
(*a*) greater than otto cycle
(*b*) less than diesel
(*c*) less than otto cycle and greater than diesel cycle
(*d*) greater than both otto and diesel
(*e*) lesser than both otto and diesel.

1.242. Carnot cycle is
(*a*) a reversible cycle
(*b*) an irreversible cycle
(*c*) a semi-reversible cycle
(*d*) a quasi static cycle
(*e*) an adiabatic irreversible cycle.

1.243. Diesel cycle consists of following four processes
(*a*) two isothermals and two isentropics
(*b*) two isentropics, and two constant volumes.
(*c*) two isentropics, one constant volume and one constant pressure
(*d*) two isentropics and two constant pressures
(*e*) none of the above.

1.244. If both Stirling and Carnot cycles operate within the same temperature limits, then efficiency of Stirling cycle as compared to Carnot cycle
(*a*) more (*b*) less
(*c*) equal
(*d*) depends on other factors
(*e*) none of the above.

1.245. Stirling and Ericsson cycles are
(*a*) reversible cycles
(*b*) irreversible cycles
(*c*) quasi-static cycles
(*d*) semi-reversible cycles
(*e*) adiabatic irreversible cycles.

1.246. If T_{max} and T_{min} be the maximum and minimum temperatures in an otto cycle, then for the ideal conditions, the temperature after compression should be
(*a*) $\frac{T_{max} + T_{min}}{2}$ (*b*) $\sqrt{T_{max}/T_{min}}$
(*c*) $\sqrt{T_{max} \times T_{min}}$ (*d*) $T_{min} + \frac{T_{max} - T_{min}}{2}$
(*e*) $T_{min} - \frac{T_{max} - T_{min}}{2}$

1.247. The working substance for a Carnot cycle is
(*a*) atmospheric air
(*b*) air fuel mixture

(c) steam
(d) ideal gas
(e) real gas.

1.248. A cycle consisting of two adiabatics and two constant pressure processes is known as
(a) Otto cycle (b) Ericsson cycle
(c) Joule cycle (d) Stirling cycle
(e) Atkinson cycle.

1.249. Reversed joule cycle is called
(a) Carnot cycle
(b) Rankine cycle
(c) Brayton cycle
(d) Bell Coleman cycle
(e) Dual cycle.

1.250. Brayton cycle consists of following four processes
(a) two isothermals and two isentropics
(b) two isentropics and two constant volumes
(c) two isentropics, one constant volume and one constant pressure
(d) two isentropics and two constant pressures
(e) none of the above.

1.251. Which of the following cycles is not a reversible cycle
(a) Carnot (b) Ericsson
(c) Stirling (d) Joule
(e) none of the above.

1.252. The cycle in which heat is supplied at constant volume and rejected at constant pressure is known as
(a) Dual combustion cycle
(b) Diesel cycle
(c) Atkinson cycle
(d) Rankine cycle
(e) Stirling cycle.

1.253. The efficiency of Diesel cycle with decrease in cut off
(a) increases (b) decreases
(c) remains unaffected
(d) first increases and then decreases
(e) first decreases and then increases.

1.254. Which of the following cycles has maximum efficiency
(a) Rankine (b) Stirling
(c) Carnot (d) Brayton
(e) Joule.

1.255. The ideal efficiency of a Brayton cycle without regeneration with increase in pressure ratio will
(a) increase (b) decrease
(c) remain unchanged
(d) increase/decrease depending on application
(e) unpredictable.

1.256. The ideal efficiency of a Brayton cycle with regeneration, with increase in pressure ratio will
(a) increase (b) decrease
(c) remain unchanged
(d) increase/decrease depending on application
(e) unpredictable.

1.257. The following cycle is used for air craft refrigeration
(a) Brayton cycle
(b) Joule cycle
(c) Carnot cycle
(d) Bell-Coleman cycle
(e) Reversed-Brayton cycle.

1.258. Gas turbine cycle consists of
(a) two isothermals and two isentropics
(b) two isentropics and two constant volumes
(c) two isentropics, one constant volume and one constant pressure
(d) two isentropics and two constant pressures
(e) none of the above.

1.259. The thermodynamic difference between a Rankine cycle working with saturated steam and the Carnot cycle is that
(a) carnot cycle can't work with saturated steam
(b) heat is supplied to water at temperature below the maximum temperature of the cycle
(c) a rankine cycle receives heat at two places
(d) rankine cycle is hypothetical
(e) none of the above.

1.260. The heat addition in dual combustion cycle is done at
(a) constant pressure
(b) constant volume
(c) partly at constant pressure and partly at constant volume

(*d*) constant temperature
(*e*) constant enthalpy.

1.261. Diesel cycle efficiency is maximum when the cut off is
(*a*) increased (*b*) decreased
(*c*) maximum (*d*) minimum
(*e*) zero.

1.262. The pressure ratio in case of Bell-Coleman cycle is of the order of
(*a*) 5—6 (*b*) 7—9
(*c*) 10—15 (*d*) 15—22
(*e*) 23—30.

1.263. Stirling cycle consists of following four processes
(*a*) two isothermals and two constant volumes
(*b*) two isothermals and two isentropics
(*c*) two isothermals and one constant volume and one constant pressure
(*d*) two isothermals and two constant volumes
(*e*) none of the above.

1.264. Atkinson gas engine has a special feature that
(*a*) isentropic compression and expansion are of equal stroke lengths
(*b*) isentropic compression is on a short stroke and the expansion on longer stroke
(*c*) isentropic compression is on a longer stroke and the expansion on a short stroke
(*d*) it employs shortest compression and expansion strokes
(*e*) none of the above.

1.265. The ideal efficiency of an Ericsson cycle with perfect regeneration and operating between two given temperature limits is
(*a*) equal to Joule cycle
(*b*) equal to Carnot cycle
(*c*) equal to Brayton cycle
(*d*) less than Carnot cycle
(*e*) more than Carnot cycle.

1.266. In a Carnot engine, when the working substance rejects its heat to sink, the temperature of sink
(*a*) increases (*b*) decreases
(*c*) remains same
(*d*) may increase/decrease depending on capacity of engine
(*e*) first increases and subsequently decreases.

1.267. The ideal efficiency of Joule cycle operating between two given temperature limits is
(*a*) equal to Joule cycle
(*b*) equal to Carnot cycle
(*c*) equal to Brayton cycle
(*d*) less than Carnot cycle
(*e*) more than Carnot cycle.

1.268. The ideal efficiency of a Striling cycle with perfect regeneration and operating between two given temperature limits is
(*a*) equal to Carnot cycle
(*b*) less than Carnot cycle
(*c*) equal to Brayton cycle
(*d*) equal to Joule cycle
(*e*) less than Brayton cycle.

1.269. The concept of regeneration is used in following cycles
(*a*) Rankine and Stirling
(*b*) Rankine and Ericsson
(*c*) Stirling and Ericsson
(*d*) Stirling and Brayton
(*e*) Ericsson and Brayton.

1.270. A Bell-Coleman cycle is a reversed
(*a*) Carnot cycle (*b*) Otto cycle
(*c*) Joule cycle (*d*) Stirling cycle
(*e*) Brayton cycle.

1.271. Ericsson cycle consists of the following four processes
(*a*) two isothermals and two isentropics
(*b*) two isothermals and two constant volumes
(*c*) two isothermals and two constant pressures
(*d*) two adiabatics and two constant pressures
(*e*) none of the above.

1.272. A petrol engine theoretically operates on
(*a*) constant pressure cycle
(*b*) constant volume cycle
(*c*) constant temperature cycle
(*d*) constant entropy cycle
(*e*) mixed cycle of constant pressure and constant volume.

1.273. A diesel engine theoretically operates on

(a) constant pressure cycle
(b) constant volume cycle
(c) constant temperature cycel
(d) constant entropy cycle
(e) mixed cycle of constant pressure and constant volume.

1.274. A high speed diesel engine theoretically operates on
(a) constant pressure cycle
(b) constant volume cycle
(c) constant temperature cycle
(d) constant entropy cycle
(e) mixed cycle of constant pressure and constant volume.

1.275. The constant pressure gas turbine works on the
(a) Rankine cycle
(b) Bell-Coleman cycle
(c) Carnot cycle
(d) Dual cycle
(e) Brayton cycle.

1.276. According to Kelvin Planck statement
(a) it is impossible to construct a heat engine which operates in a cycle and receives a given amount of heat from a high temperature body and does equal amount of work
(b) it is impossible to construct a device which operates in a cycle and produces no effect other than the transfer of heat from a cooler body to hotter body
(c) when two dissimilar metals are heated at one end and cooled at other, e.m.f. is developed proportional to difference of temperatures at two ends
(d) heat can be converted into work
(e) work can be converted into heat.

1.277. A steam nozzle converts
(a) kinetic energy into heat
(b) heat energy into potential energy
(c) potential energy into heat
(d) heat energy into useful energy
(e) heat energy into kinetic energy.

1.278. Which is true statement in connection with second law of thermodynamics.
(a) it is not possible for the heat energy to flow spontaneously from a body at a lower temperature to a body at higher temperature.
(b) it is not possible to construct perpetual motion machine of the second kind.
(c) it is not possible to construct an engine, which while operating in a cycle produces no other effect except to extract heat from single reservoir and do equivalent amount of work.
(d) Carnot engine as compared to all engines operating between given two temperature limits, is the most efficient.
(e) all of the above.

1.279. According to Clausius statement
(a) it is impossible to construct a heat engine which operates in a cycle and receives a given amount of heat from a high temperature body and does equal amount of work
(b) it is impossible to contruct a device which operates in a cycle and produces no effect other than the transfer of heat from cooler body to hotter body
(c) when two dissimilar metals are heated at one end and cooled at other, e.m.f. is developed proportional to difference of temperatures at two ends
(d) heat can be converted into work
(e) work can be converted into heat.

1.280. Under what condition it is possible that heat be abstracted from hot source, as well as cold source and positive work be done
(a) impossible
(b) hot reservoir is at negative temperature
(c) cold reservoir is at negative temperature
(d) both hot and cold reservoirs are at positive temperatures
(e) none of the above.

1.281. What should be the limitation of hot and cold reservoir temperatures, if a two-temperature machine pumps heat into hot reservoir as well as cold reservoir and work is done on the system
(a) cold reservoir must have +ve temperature
(b) cold reservoir must have – ve temperature
(c) hot reservoir must have + ve temperature

(*d*) hot reservoir must have – ve temperature
(*e*) none of the above.

1.282. What are the limitations to the signs of heat exchange form hot and cold reservoirs if a two-temperature machine operates between two positive temperatures
(*a*) heat must be rejected to hot source and abstracted from cold source
(*b*) heat must be abstracted from hot source and rejected to cold source
(*c*) heat must be rejected to both the sources
(*d*) heat must be abstracted from both the sources
(*e*) no limitation.

1.283. Which is the wrong assumption for calculation of air standard effciency
(*a*) all processes are reversible
(*b*) specific heat remains constant at all temperatures
(*c*) no account of the mechanism of heat transfer is considered
(*d*) gases dissociate at higher temperatures
(*e*) working substance is a perfect gas.

1.284. What are the limitations to the signs of heat exchange from hot and cold reservoirs if a two-temperature machine operates between two negative temperatures
(*a*) heat must be rejected to hot source and abstracted from cold source
(*b*) heat must be abstracted from hot source and rejected to cold source
(*c*) heat must be rejected to both the sources
(*d*) heat must be abstracted from both the sources
(*e*) no limitation.

1.285. An ideal gas at 27°C is heated at constant pressure till its volume becomes three times. The temperature of gas then will be
(*a*) 81°C (*b*) 900°C
(*c*) 627°C (*d*) 927°C
(*e*) 574°C.

1.286. According to Pettlier Thomson effect
(*a*) it is impossible to construct a heat engine which operates in a cycle and receives a given amount of heat from a high temperature body and does equal amount of work
(*b*) it is impossible to construct a device which operates in a cycle and produces no effect other than the transfer of heat from a cooler body to hotter body
(*c*) when two dissimilar metals are heated at one end and cooled at other, e.m.f. is developed proportional to difference of temperatures at two ends
(*d*) heat can be converted into work
(*e*) work can't be converted into heat.

1.287. All diesel cycles except slow speed engines use following cycle
(*a*) Diesel (*b*) Otto
(*c*) Joule (*d*) Mixed dual
(*e*) Reversed Joule.

1.288. Second law of thermodynamics defines
(*a*) entropy (*b*) enthalpy
(*c*) heat (*d*) work
(*e*) internal energy.

1.289. Gas turbines work on
(*a*) constant pressure cycle
(*b*) constant volume cycle
(*c*) constant temperature cycle
(*d*) constant enthalpy cycle
(*e*) dual combustion cycle.

1.290. Cycle used in thermal power plants is
(*a*) Carnot (*b*) Reversed Carnot
(*c*) Rankine (*d*) Brayton
(*e*) Ericsson.

1.291. Substance is flowing in a pipe of 200 mm inside diameter at an average velocity of 3 m/sec. At a given section of the pipe line the pressure is 1.5 MN/m^2 absolute. What is the flow work of 0.5 cubic meter, expressed in joules passing this section ?
(*a*) 1 J (*b*) 75,000 J
(*c*) 90,000 J (*d*) 100,000 J
(*e*) 25,000 J.

1.292. Calculate the enthalpy of 3 kg of fluid that occupies a volume of 1.5 m^3, if the internal energy is 3.5 M Joules/kg and the pressure is 0.3 MN/m^2
(*a*) 3.95 MJ (*b*) 3.65 MJ
(*c*) 10.95 MJ (*d*) 11.85 MJ
(*e*) none of the above.

1.293. An isentropic process on T-S diagram is represented by a
(*a*) horizontal line
(*b*) vertical line
(*c*) inclined line
(*d*) curved line
(*e*) none of the above.

1.294. Expansion in nozzle is a
(*a*) isobaric process
(*b*) isothermal process
(*c*) adiabatic process
(*d*) isochoric process
(*e*) parabolic process.

1.295. Air standard efficiency of a diesel cycle is dependent upon
(*a*) ratio of specific heats
(*b*) cut off ratio
(*c*) adiabatic compression ratio
(*d*) all of the above
(*e*) none of the above.

1.296. A system will be in thermodynamic equilibrium only if it is in
(*a*) thermal equilibrium
(*b*) mechanical equilibrium
(*c*) chemical equilibrium
(*d*) all of the above
(*e*) static state.

1.297. Choose the correct statement
A property of a system
(*a*) remains constant during a reversible process
(*b*) changes when a system after completing a cycle returns to its initial stage
(*c*) is always of intensive type
(*d*) is a path function
(*e*) is a point function.

1.298. Entropy is called the property of the system because
(*a*) its derivative is zero for any process
(*b*) it has same value at any two equilibrium states
(*c*) it has a signle value at each equilibrium state
(*d*) it has a constant value at each equilibrium state
(*e*) it depends upon the path followed by the system.

1.299. Isothermal compressibility of a substance is denoted by
(*a*) $\frac{1}{v}\left(\frac{\delta v}{\delta T}\right)_p$ (*b*) $\left(\frac{\delta T}{\delta v}\right)_s$
(*c*) $-\left(\frac{\delta p}{\delta S}\right)_v$ (*d*) $-\frac{1}{v}\left(\frac{\delta v}{\delta P}\right)_T$
(*e*) $-v\left(\frac{\delta p}{\delta v}\right)_t$
t = temperature, T = absolute temperature.

1.300. Average coefficient of volume expansion of a substance is denoted by
(*a*) $\frac{1}{v}\left(\frac{\delta v}{\delta T}\right)_p$ (*b*) $\left(\frac{\delta T}{\delta v}\right)_s$
(*c*) $-\left(\frac{\delta p}{\delta S}\right)_v$ (*d*) $-\frac{1}{v}\left(\frac{\delta v}{\delta P}\right)_T$
(*e*) $-v\left(\frac{\delta p}{\delta v}\right)_t$
t = temperature, T = absolute temperature.

1.301. Isothermal bulk modulus of a substance is denoted by
(*a*) $\frac{1}{v}\left(\frac{\delta v}{\delta T}\right)_p$ (*b*) $\left(\frac{\delta T}{\delta v}\right)_S$
(*c*) $-\left(\frac{\delta p}{\delta S}\right)_v$ (*d*) $-\frac{1}{v}\left(\frac{\delta v}{\delta p}\right)_T$
(*e*) $-v\left(\frac{\delta p}{\delta v}\right)_t$.
t = temperature, T= absolute temperature.

1.302. Temperature of the order of – 150°C can be accurately measured by
(*a*) mercury in galss thermometer
(*b*) thermocouple
(*c*) gas thermometer
(*d*) pyrometer
(*e*) alcohol thermometer.

1.303. When two gases suddenly mix up with each other then resultant entropy of the system will
(*a*) decrease
(*b*) increase
(*c*) remain same
(*d*) may increase or decrease depending upon the initial conditions of the gases
(*e*) attain negative value.

1.304. If hot water and cold water are mixed, then the entropy of the system will
(*a*) increase

(*b*) decrease
(*c*) remain same
(*d*) may increase/decrease depending on initial temperature of hot and cold water
(*e*) attain negative value.

1.305. When a process undergoes a complete cycle then the change of entropy will be
(*a*) + ve value (*b*) – ve value
(*c*) zero value
(*d*) + ve or – ve depending on initial condition
(*e*) none of the above.

1.306. If air is compressed adiabatically from atmospheric condition in a cylinder having compression ratio of 6, then pressure at the end of compression shall be
(*a*) 6 ata (*b*) less than 6 ata
(*c*) more than 6 ata
(*d*) less or more than 6 ata depending on temperature at the end of compression
(*e*) unpredictable.

1.307. A process which undergoes energy loss due to friction is called
(*a*) adiabatic process
(*b*) isentropic process
(*c*) reversible process
(*d*) irreversible process
(*e*) practical or real process.

1.308. Which of the following is extensive property
(*a*) entropy (*b*) internal energy
(*c*) kinetic energy (*d*) potential energy
(*e*) all of the above.

1.309. Which of the following is not an extensive property
(*a*) entropy
(*b*) enthalpy
(*c*) internal energy
(*d*) potential energy
(*e*) density.

1.310. The cyclic integral of $(\delta Q - \delta W)$ for a process is equal to
(*a*) positive (*b*) negative
(*c*) zero
(*d*) positive or negative depending upon the type of process
(*e*) unpredictable.

1.311. $(\delta Q - \delta W)$ for ideal gases is
(*a*) a path function
(*b*) dependent on temperature only
(*c*) dependent on pressure only
(*d*) dependent on pressure and temperature
(*e*) constant value.

1.312. Internal energy and enthalpy of an idle gas are functions of
(*a*) temperature only
(*b*) pressure only
(*c*) temperature and pressure
(*d*) pressure, temperature and specific volume
(*e*) temperature and specific volume.

1.313. A process occurs spontaneously if its entropy
(*a*) increases (*b*) decreases
(*c*) remains same
(*d*) becomes zero (*e*) becomes negative.

1.314. The area under curve on T-S diagram represents the
(*a*) heat transfer for all processes
(*b*) heat transfer for adiabatic processes
(*c*) heat transfer for reversible processes
(*d*) heat transfer for irreversible processes
(*e*) heat transfer for real processes.

1.315. Following relationship defines the Gibb's free energy G
(*a*) $G = H + TS$ (*b*) $G = H - TS$
(*c*) $G = U + TS$ (*d*) $F = U - TS$
(*e*) $G = U + pV$.

1.316. Following relationship defines the Helmholtz function F as
(*a*) $F = H + TS$ (*b*) $F = H - TS$
(*c*) $F = U + TS$ (*d*) $F = U - TS$
(*e*) $F = U + pV$.

1.317. If $M_1, M_2, M_3 \ldots$ be molecular weights of constituent gases and $m_1, m_2, m_3 \ldots$their corresponding mass fractions, then the molecular weight M of the mixture is equal to
(*a*) $m_1M_1 + m_2M_2 + m_3M_3 + \ldots$
(*b*) $\dfrac{1}{m_1M_1 + m_2M_2 + m_3M_3 + \ldots}$
(*c*) $\dfrac{1}{m_1M_1} + \dfrac{1}{m_2M_2} + \dfrac{1}{m_2M_3} + \ldots$
(*d*) $\dfrac{M_1}{m_1} + \dfrac{M_2}{m_2} + \dfrac{M_3}{m_3} + \ldots$

(*e*) $\frac{1}{\frac{m_1}{M_1}+\frac{m_2}{M_2}+\frac{m_3}{M_3}+\ldots}$.

1.318. Two gases with their molecular weights 28 and 44 expand at constant pressure through the same temperature range. The ratio of quantity of work done by the two gases is
(*a*) 7 : 11 (*b*) 11 :7
(*c*) 4 : 11 (*d*) 7 : 4
(*e*) 4 : 7.

1.319. How much mass of oxygen is required to convert 1 kg of carbon into $\frac{11}{3}$ kg of CO_2
(*a*) $\frac{3}{11}$ kg (*b*) $\frac{11}{3}$ kg
(*c*) $\frac{4}{3}$ kg (*d*) $\frac{8}{3}$ kg
(*e*) 1 kg.

1.320. Work done in compressing 1 kg of gas adiabatically from p_1, V_1, T_1 to $p_2 V_2, T_2$ is equal to
(*a*) $C_v (T_2 - T_1)$
(*b*) $C_p (T_2 - T_1)$
(*c*) $R (T_2 - T_1)$
(*d*) $p_1V_1 - p_2V_2$
(e) $p_1V_1/T_1 - p_2V_2/T_2$.

1.321. Work is considered to be a superior form of energy as compared to heat energy because
(*a*) work is direct energy
(*b*) work is useful form of energy
(*c*) while work can be fully converted into heat, heat can't be fully converted into work
(*d*) it is often required to convert heat into work and not vice versa
(*e*) there are no radiation losses in the work.

1.322. Triple point of a pure substance is a point at which
(*a*) liquid and vapour exist together
(*b*) solid and liquid exist together
(*c*) solid and vapur exist together
(*d*) solid, liquid and vapour phases exist together
(*e*) undefined.

1.323. A substance above critical temperature exists as
(*a*) solid (*b*) liquid
(*c*) gas (*d*) vapour
(*e*) supersaturated fluid.

1.324. Triple point of a pure substance on *p-V* diagram is represented by a
(*a*) point (*b*) line
(*c*) curve (*d*) triangle
(*e*) can't be represented on *p-v* diagram.

1.325. Triple point temperature and pressure for water are
(*a*) 1.00°C and 1 ata
(*b*) 0°C and 1 ata
(*c*) 100°C and 1 ata
(*d*) 0°C and 0.006028 ata
(*e*) 0.01°C and 0.006028 ata.

1.326. Pick up the correct relationship from the following
(*a*) $TdS = dH - Vdp$
(*b*) $TdS = dH + Vdp$
(*c*) $TdS = dH - pdV$
(*d*) $TdS = dU + Vdp$
(*e*) $TdS = dU - Vdp$.

1.327. One killowatt-hour of energy is equal to
(*a*) 1 kJ (*b*) 100 kJ
(*c*) 3600 J (*d*) 3600 kJ
(*e*) 36,000 kJ.

1.328. Which of the following is the unit of energy
(*a*) Joule (J)
(*b*) Watt (W) and Joule/metre^2(J/m^2)
(*c*) Joule-metre (Jm)
(*d*) J/m (*e*) Kw/hr.

1.329. Which of the following is the unit of power
(*a*) J (*b*) W
(*c*) Jm (*d*) J/m^2
(*e*) J/m.

1.330. Which of the following is the unit of entropy
(*a*) J/kg °K (*b*) J/°K
(*c*) Nm/kg sec (*d*) Nm/kg°K
(*e*) J/kg.

1.331. Which of the following is the unit of universal gas constant
(*a*) Nm/kg (*b*) Nm/°K
(*c*) Nm kg/°K (*d*) Nm/kg mole °K
(*e*) Nm/kg°K.

1.332. Pick up the correct statement from the following

(a) All the engines have same efficiency.
(b) All the reversible engines have same efficiency.
(c) All the reversible engines working between the same temperature limits have same efficiency.
(d) In order to obtain high efficiency all engines are designed as reversible.
(e) Irreversible engines have maximum efficency.

1.333. It is not possible to liquefy hydrogen at room temperature by application of pressure because
(a) its critical temperature is lower than room temperature
(b) it has low density
(c) it has three isotopes
(d) it has high thermal conductivity
(e) it is a diatomic molecule.

1.334. All gases behave ideally under
(a) vacuum conditions
(b) low pressure conditions
(c) high pressure conditions
(d) high pressure and high temperature conditions
(e) super critical pressure.

1.335. Pick up the correct statement from the following
(a) Diesel cycle is more efficient than Otto cycle for a given compression ratio
(b) Otto cycle is more efficient than Diesel cycle for a given compression ratio
(c) For a given compression ratio, both Otto and Diesel cycles have same efficiency
(d) In actual practice Otto cycle is more efficient than Diesel cycle
(e) Efficiency of Otto or Diesel cycle have nothing to do with compression ratio.

1.336. R.M.S velocity of hydrogen gas at N.T.P. is
(a) 189 m/sec (b) 526 m/sec
(c) 932 m/sec (d) 1356 m/sec
(e) 1839 m/sec.

1.337. Molecule is defined as the
(a) substance which has not been resolved into simpler form
(b) element made up of minute and chemically indivisible particles
(c) smallest quantity of a substance which can exist by itself in chemically recognised form
(d) indivisible particle
(e) smallest substance.

1.338. Atom is defined as the
(a) substance which has not been resolved into simpler form
(b) element made up of minute and chemically indivisible particles
(c) smallest quantity of a substance which can exist by itself in chemically recognised form
(d) lightest substance
(e) nucleus.

1.339. Element is defined as the
(a) substance which has not been resolved into simper form
(b) element made up of minute and chemically indivisible particles
(c) smallest quantity of a substance which can exist by itself in chemically recognised form
(d) smallest known particle
(e) neutral substance.

1.340. Work done during a process can be determined by $\int pdV$ when the process is
(a) isentropic (b) static
(c) isothermal (d) adiabatic
(e) quasi-static.

1.341. During a process on the closed system, its internal energy increases by twice the units than the heat added to it. It is possible due to
(a) radiation of heat from surroundings
(b) lowering of the temperature
(c) increasing of temperature
(d) performing of shaft work on the system
(e) increase in entropy of the system.

1.342. A gas is formed by mixing equal masses of oxygen and nitrogen gas. The ratio of nitrogen and oxygen by volume will be
(a) $\frac{32}{32+28}$ (b) $\frac{28}{32+28}$
(c) $\frac{28}{32}$ (d) $\frac{32}{28}$

(e) $\frac{\frac{28}{32}+\frac{32}{28}}{2}$

1.343. Partial pressure of a component in a mixture is
(a) the average of pressure of all the components
(b) the total pressure — its own pressure
(c) the pressure exerted by the component
(d) pressure of the component itself if it was present in the entire volume at the same temperature
(e) the partial volume occupied by the component.

1.344. Sublimation curve on p-t diagram for all substances possesses the following slope
(a) zero (b) infinity
(c) positive (d) negative
(e) variable.

1.345. Sublimation is the process of
(a) changing from solid state to direct gas state
(b) changing from gas state to direct solid state
(c) existence of liquid and gases together
(d) existence of solid, liquid and gas simultaneously
(e) supersaturation of vapour.

1.346. The process of sublimation is found to occur in the case of
(a) liquid nitrogen (b) solid CO_2
(c) solid O_2 (d) steel
(e) air.

1.347. Vaporisation curve on p-t diagram for all substances possesses the following slope
(a) zero (b) infinity
(c) positive (d) negative
(e) variable.

1.348. Fusion curve on *p-t* diagram for all substances possesses the following slope
(a) zero (b) infintiy
(c) positive (d) negative
(e) variable.

1.349. In a cyclic process, the net heat supplied is 70 kJ/sec. The work obtained from the cycle is equal to
(a) less than 70 kJ/sec
(b) more than 70 kJ/sec
(c) zero
(d) 70 kJ/sec
(e) would depend on change in internal energy.

1.350. 1 m^3 of methane combined with 2 m^3 of oxygen would produce CO_2 and H_2O in following quantities
(a) 1 m^3, 1 m^3 (b) 2 m^2, 2 m^3
(c) 1 m^3, 2 m^3 (d) 2 m^3, 1 m^3
(e) 1 m^3, 3 m^2

1.351. Which of the following is a compound
(a) oxygen (b) hydrogen
(c) helium (d) water
(e) sulphur.

1.352. When a vapour condenses into a liquid
(a) its temperature rises
(b) its temperature falls
(c) it evolves heat
(d) it absorbs heat
(e) enthalpy remains constant.

1.353. A closed system receives 50 kJ heat but the internal energy of the system decreases by 25 kJ. The work done by the system would be
(a) 75 kJ (b) -75 kJ
(c) 25 kJ (d) -25 kJ
(e) 50 kJ.

1.354. A constant volume closed system is found to undergo change in its internal energy by 50 kJ whereas it received only 25 kJ of heat. Such a situation is
(a) possible (b) impossible
(c) possible, if temperatue of system decreases
(d) imaginary
(e) possible, if process is cyclic and reversible.

1.355. A revesible engine working between the temperature limits of 600°K and 1200°K receives 50 kJ of heat. The work done by the engine will be
(a) 50 kJ (b) 100 kJ
(c) 25 kJ (d) – 25 kJ
(e) -50 kJ.

1.356. One kg of gas is compressed adiabatically from 1 kg/cm^2, 1 m^3 volume and 300°K to 5 kg/cm^2, 0.50 m^3 volume and 400°K. Work transfer in this process will be
(a) zero (b) 17.1 kcal

(*c*) 24 kcal (*d*) $5 \times 0.5 - 1 \times 1$ kcal
(*e*) 700 kcal.

1.357. The specific heats at constant volume and constant pressure for air are 711 J/kg°K and 1000 J/kg°K respectively. The gas constant for air is
(*a*) 1711 J/kg°K (*b*) 289 J/kg°K
(*c*) $\frac{289}{427}$ J/kg°K (*d*) data is incomplete
(*e*) none of the above.

1.358. 1 kg of carbon produces following quantity of CO
(*a*) 1 kg (*b*) $\frac{11}{3}$ kg
(*c*) $\frac{7}{3}$ kg (*d*) $\frac{3}{7}$ kg
(*e*) $\frac{3}{11}$ kg.

1.359. 1 kg of carbon would produce following percentage of CO_2 in flue gases
(*a*) 11% (*b*) 18%
(*c*) 23% (*d*) 29%
(*e*) 36%.

1.360. 1 kg of carbon produces following quantity of CO_2
(*a*) 1 kg (*b*) $\frac{4}{3}$ kg
(*c*) $\frac{8}{3}$ kg (*d*) $\frac{3}{7}$ kg
(*e*) $\frac{3}{11}$ kg

1.361. Sometimes ice is white in colour. It is due to
(*a*) cooling rapidly
(*b*) sub-cooling
(*c*) blowing air during freezing process
(*d*) presence of dissolved air/gases and impurities
(*e*) mixing of salt in water.

1.362. The ratio of air required for complete combustion of carbon to corbon-dioxide as compared to that required for combustion to carbon-monoxide is
(*a*) 1.5 : 1 (*b*) 2 : 1
(*c*) 2.3 : 1 (*d*) 3.0 : 1
(*e*) 3.3 : 1.

1.363. Bomb calorimeter is used to measure the calorific value of
(*a*) solid fuels (*b*) liquid fuels
(*c*) gaseous fuels (*d*) solid or liquid feul
(*e*) any one of the above.

1.364. Which of the following gases possesses maximum heat content at 100°C
(*a*) O_2 (*b*) CO_2
(*c*) H_2 (*d*) CH_4
(*e*) C_2H_2.

1.365. The following is concerned with the combustion of gaseous fuels
(*a*) Avogadro's hypothesis
(*b*) Krichhoff's law
(*c*) Dalton's law
(*d*) Mandeleef's periodic tables
(*e*) Charle's law.

1.366. The area under a curve on $T-s$ diagram represents
(*a*) heat transfer (*b*) enthalpy transfer
(*c*) heat transfer during reversible process
(*d*) heat transfer during irreversible process
(*e*) change of entropy.

1.367. Submerged combustion involves
(*a*) combustion inside the liquid medium
(*b*) combustion of liquid fuels
(*c*) combustion of liquid fuel under inert gases
(*d*) invisible combustion
(*e*) there is nothing like submerged combustion.

1.368. All the commercial liquid fules are derived from
(*a*) coal (*b*) crude oil
(*c*) gasoline (*d*) fuel oil
(*e*) kerosene.

1.369. 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 hr per BHP
(*e*) fuel consumed per hr per IHP.

1.370. Flameless combustion means
(*a*) inert gas combustion
(*b*) invisible combustion
(*c*) catalytic combustion
(*d*) combustion in vacuum
(*e*) there is nothing like flameless combustion.

2

I.C. Engines

2.1. The working cycle in case of four stroke engine is completed in following number of revolutions of crankshaft
(*a*) 1/2 (*b*) 1
(*c*) 2 (*d*) 4
(*e*) 8.

2.2. In a 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
(*e*) combustion chamber.

2.3. Scavenging air in diesel engine means
(*a*) air used for combustion sent under pressure
(*b*) forced air for cooling cylinder
(*c*) burnt air containing products of combustion
(*d*) air used for forcing burnt gases out of engine's cylinder during the exhaust period
(*e*) air fuel mixtre.

2.4. Supercharging is the process of
(*a*) supplying the intake of an engine with air at a density greater than the density of the surrounding atmosphere
(*b*) providing forced cooling air
(*c*) injecting excess fuel for raising more load
(*d*) supplying compressed air to remove combustion products fully
(*e*) raising exhaust pressure.

2.5. Does the supply of scavenging air at a density greater than that of atmosphere mean engine is supercharged ?
(*a*) yes (*b*) no
(*c*) to some extent
(*d*) unpredictable
(*e*) depends on other factors.

2.6. 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
(*e*) cycle efficiency.

2.7. Compression ratio of I.C. engines is
(*a*) the ratio of volumes of air in cylinder before compression stroke and after compression stroke
(*b*) volume displaced by piston per stroke and clearance volume in cylinder
(*c*) ratio of pressure after compression and before compression
(*d*) swept volume/cylinder volume
(*e*) cylinder volume/swept volume.

2.8. The air standard efficiency of an Otto cycle compared to diesel cycle for the given compression ratio is
(*a*) same
(*b*) less
(*c*) more
(*d*) more or less depending on power rating
(*e*) unpredictable.

2.9. The calorific value of gaseous fuels is expressed in terms of
(*a*) kcal (*b*) kcal/kg
(*c*) kcal/m^2 (*d*) kcal/m^3
(*e*) all of the above.

2.10. Indicated power of a 4-stroke engine is equal to

(a) $pLAN$ (b) $2pLAN$

(c) $\frac{pLAN}{2}$ (d) $4pLAN$

(e) $\frac{pLAN}{4}$

where p=mean effective pressure, L= stroke, A= Area of piston and N= rpm of engine.

2.11. If the intake air temperature of I.C. engine increases, its efficiency will

(a) increase (b) decrease

(c) remain same (d) unpredictable

(e) depend on other factors.

2.12. All heat engines utilise

(a) low heat value of oil

(b) high heat value of oil

(c) net claorific value of oil

(d) calorific value of fuel

(e) all of the above.

2.13. An engine indicator is used to determine the following

(a) speed (b) temperature

(c) volume of cylinder

(d) m.e.p. and I.H.P.

(e) BHP.

2.14. Fuel oil consumption guarantees for I.C. engine are usually based on

(a) low heat value of oil

(b) high heat value of oil

(c) net calorific value of oil

(d) calorific value of fuel

(e) all of the above.

2.15. Air standard Otto cycle efficiency is expressed as

(a) $1-\left(\frac{1}{r}\right)^{\frac{\gamma-1}{\gamma}}$ (b) $1-\left(\frac{1}{r}\right)^{\frac{\gamma}{\gamma-1}}$

(c) $1-\left(\frac{1}{r}\right)^{\gamma-1}$ (d) $1-\left(\frac{1}{r}\right)^{\gamma+1}$

(e) $\left(\frac{1}{r}\right)^{\frac{1}{\gamma-1}}$

2.16. If compression ratio of an engine working on Otto cycle is increased from 5 to 6, its air standard efficiency will increase by

(a) 1% (b) 20%

(c) 16.67% (d) 8%

(e) 25%.

2.17. If the compression ratio of an engine working on Otto cycle is increased from 5 to 7, the %age increase in efficiency will be

(a) 2% (b) 4%

(c) 8% (d) 14%

(e) 27%.

2.18. In case of gas turbines, the gaseous fuel consumption guarantees are based on

(a) high heat value

(b) low heat value

(c) net calorific value

(d) middle heat value

(e) calorific value.

2.19. In a typical medium speed 4-stroke cycle diesel engine the inlet valve

(a) opens at 20° before top dead centre and closes at 35° after the bottom dead centre

(b) opens at top dead centre and closes at bottom dead centre

(c) opens at 10° after top dead centre and closes 20° before the bottom dead centre

(d) may open or close anywhere

(e) remains open for 200°.

2.20. The pressure and temperature at the end of compression stroke in a petrol engine are of the order of

(a) 4 – 6 kg/cm^2 and 200 – 250°C

(b) 6 – 12 kg/cm^2 and 250 – 350°C

(c) 12 – 20 kg/cm^2 and 350 – 450°C

(d) 20 – 30 kg/cm^2 and 450 – 500°C

(e) 30 – 40 kg/cm^2 and 500 – 700°C.

2.21. The pressure at the end of compression in the case of diesel engine is of the order of

(a) 6 kg/cm^2 (b) 12 kg/cm^2

(c) 20 kg/cm^2 (d) 27.5 kg/cm^2

(e) 35 kg/cm^2.

2.22. 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

(e) 2500 – 3000°C

2.23. The thermal efficiecny of a diesel cycle having fixed compression ratio, with increase in cut-off ratio will

(*a*) increase
(*b*) decrease
(*c*) be independent
(*d*) may increase or decrease depending on other factors
(*e*) none of the above.

2.24. Pick up the wrong statement
(*a*) 2-stroke engine can run in any direction
(*b*) In 4-stroke engine, a power stroke is obtained in 4-strokes
(*c*) thermal efficiency of 4-stroke engine is more due to positive scavenging
(*d*) petrol engines work on otto cycle
(*e*) petrol engines occupy more space than diesel engines for same power output.

2.25. Combustion in compression ignition engines is
(*a*) homogeneous
(*b*) heterogeneous
(*c*) both (*a*) and (*b*)
(*d*) laminar
(*e*) turbulent.

2.26. The fuel in diesel engine is normally injected at pressure of
(*a*) 5-10 kg/cm^2 (*b*) 20-25 kg/cm^2
(*c*) 60-80 kg/cm^2 (*d*) 90-130 kg/cm^2
(*e*) 150-250 kg/cm^2.

2.27. The specific fuel consumption per BHP hour for diesel engine is approximately
(*a*) 0.15 kg (*b*) 0.2 kg
(*c*) 0.25 kg (*d*) 0.3 kg
(*e*) 0.35 kg.

2.28. The temperature of interior surface of cylinder wall in normal operation is not allowed to exceed
(a) 80°C (*b*) 120°C
(*c*) 180°C (*d*) 240°C
(*e*) 320°C.

2.29. Sensitivity of a governor is specified as
(*a*) $\frac{N_{max} - N_{min}}{N_{max} + N_{min}}$ (N = rpm)
(*b*) $\frac{N_{max} - N_{min}}{(N_{max} + N_{min})\, 200}$
(*c*) $\frac{200(N_{max} - N_{min})}{(N_{max} + N_{min})}$
(*d*) $\frac{(N_{max} + N_{min})}{2\,(N_{max} - N_{min})}$
(*e*) none of the above.

2.30. Crankcase explosion in I.C. engines usually occurs as
(*a*) first a mild explosion followed by a big explosion
(*b*) first a big explosion followed by a mild explosion
(*c*) both mild and big explosions occur simultaneously
(*d*) never occurs
(*e*) unpredictable.

2.31. Compression loss in I.C engines occurs due to
(*a*) leaking piston rings
(*b*) use of thick head gasket
(*c*) clogged air-inlet slots
(*d*) increase in clearance volume caused by bearing-bushing wear
(*e*) all of the above.

2.32. The specific fuel consumption per BHP hour for a petrol engine is approximately
(*a*) 0.15 kg (*b*) 0.2 kg
(*c*) 0.25 kg (*d*) 0.3kg
(*e*) 0.35 kg.

2.33. The air requirement of a petrol engine during starting compared to theoretical air required for complete combustion is
(*a*) more
(*b*) loss
(*c*) same
(*d*) may be more or less depending on engine capacity
(*e*) unpredictable.

2.34. The inlet value of a four stroke cycle I.C. engine remains open for nearly
(*a*) 180° (*b*) 125°
(*c*) 235° (*d*) 200°
(*e*) 275°.

2.35. Which of the following is not an internal combustion engine
(*a*) 2-stroke petrol engine
(*b*) 4-stroke petrol engine
(*c*) diesel engine
(*d*) gas turbine
(*e*) ssteam turbine.

2.36. Pick up the false statement
(*a*) Thermal efficiency of diesel engine is about 34%
(*b*) Theoretically correct mixture of air and petrol is approximately 15 : 1

(*c*) High speed compression engines operate on dual combustion cycle
(*d*) Diesel engines are compression ignition engines
(*e*) S.I. engines are quality-governed engines.

2.37. If one cylinder of a diesel engine receives more fuel than the others, then for that cylinder the
(*a*) exhaust will be smoky
(*b*) piston rings would stick into piston grooves
(*c*) exhaust temperature will be high
(*d*) engine starts overheating
(*e*) scavenging occurs.

2.38. The output of a diesel engine can be increased without increasing the engine revolution or size in following way
(*a*) feeding more fuel
(*b*) increasing flywheel size
(*c*) heating incoming air
(*d*) scavenging
(*e*) supercharging.

2.39. It the temperature of intake air in IC engines is lowered, then its efficiency will
(*a*) increae
(*b*) decrease
(*c*) remain same
(*d*) increase upto certain limit and then decrease
(*e*) decrease upto certain limit and then increase.

2.40. In a typical medium speed 4-stroke cycle diesel engine
(*a*) compression starts at 35° after bottom dead centre and ends at top dead centre
(*b*) compression starts at bottom dead centre and ends at top dead centre
(*c*) compression starts at 10° before bottom dead centre and ends just before top dead centre
(*d*) may start and end anywhere
(*e*) none of the above.

2.41. For the same compression ratio
(*a*) Otto cycle is more efficient than the Diesel
(*b*) Diesel cycle is more efficient than Otto
(*c*) both Otto and Diesel cycles are equally efficient
(*d*) compression ratio has nothing to do with efficiency
(*e*) which is more efficient would depend on engine capacity.

2.42. The precess of breaking up or a lipuid into fine droplets by spraying is called
(*a*) vaporisation (*b*) carburetion
(*c*) ionisation (*d*) injection
(*e*) atomisation.

2.43. As a result of detonation in an I.C. engine, following parameter attains very high value
(*a*) peak pressure
(*b*) rate of rise of pressure
(*c*) rate of rise of temperature
(*d*) peak temperature
(*e*) rate of rise of horse-power.

2.44. Which of the following statements is correct?
(a) All the irreversible engines have same efficiency
(*b*) All the reversible engines have same efficiency
(*c*) Both Rankine and Caront cycles have same efficiency between same temperature limits
(*d*) All reversible engines working between same temperature limits have same efficiency
(*e*) Between same temperature limits, both petrol and diesel engines have same efficiency.

2.45. Most high speed compression engines operate on
(*a*) Diesel cycle (*b*) Otto cycle
(*c*) Dual combustion cycle
(*d*) Special type of air cycle
(*e*) Carnot cycle.

2.46. In a four cylinder, four stroke, diesel engine operating at 1200 rpm, the duration of fuel injection is 20°. The time in seconds during which fuel is injected would be
(*a*) $\frac{1}{360}$ sec (*b*) $\frac{1}{720}$ sec
(*c*) $\frac{1}{180}$ (*d*) $\frac{1}{90}$ sec
(*e*) $\frac{1}{1440}$ sec

2.47. If one cylinder of a diesel engine receives more fuel than the others, it is a serious

condition for that cylinder and can be checked by
(*a*) checking incomplete combustion in that cylinder
(*b*) checking carbon built-up around piston rings
(*c*) judging piston seizure
(*d*) checking cylinder exhaust temperature with a pyrometer
(*e*) checking overheating of engine.

2.48. The accunmulation of carbon in a cylinder results in increase of
(*a*) clearance volume
(*b*) volumetric efficiency
(*c*) ignition time
(*d*) effective compression ratio
(*e*) valve travel time.

2.49. Which of the following medium is compressed in a Diesel engine cylinder
(*a*) air alone (*b*) air and fuel
(*c*) air and lub oil (*d*) fuel alone
(*e*) air, fuel and lub oil.

2.50. Fig. 2.1 shows the curves of efficiency versus compression ratio for various cycles in I.C engines. For constant-volume cycle, the curve applicable is

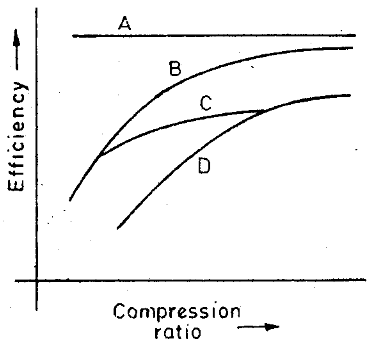

Fig. 2.1.

(*a*) A (*b*) B
(*c*) C (*d*) D
(*e*) none of the above.

2.51. Pick up the false statement
(*a*) I.C. engines have higher efficiency than steam engines
(*b*) Heavy oil engines run on diesel cycle
(*c*) Gas engine works on Otto cycle
(*d*) Injection of fuel by external means is not required in mixed cycle
(*e*) A two stroke engine has no valves.

2.52. For constant pressure cycle, the curve applicable in Fig. 2.1 is
(*a*) A (*b*) B
(*c*) C (*d*) D
(*e*) none of the above.

2.53. For mixed cycle (or limited pressur cycle), the curve applicable in Fig.2.1 is
(*a*) A (*b*) B
(*c*) C (*d*) D
(*e*) none of the above.

2.54. The air-fuel ratio of the petrol engine is controlled by
(*a*) fuel pump (*b*) governor
(*c*) injector (*d*) carburettor
(*e*) scavenging.

2.55. In a typical medium speed, 4-stroke cycle diesel engine
(*a*) fuel injection starts at 10° before top dead centre and ends at 20° after top dead centre
(*b*) fuel injection starts at top dead centre and ends at 20° after top dead centre
(*c*) fuel injection starts at just before top dead centre and ends just after top dead centre
(*d*) may start and end anywhere
(*e*) none of the above.

2.56. Diesel fuel, compared to petrol is
(*a*) less difficult to ignite
(*b*) just about the same difficult to ignite
(*c*) more difficult to ignite
(*d*) highly ignitable
(*e*) none of the above.

2.57. In diesel engine the diesel fuel injected into cylinder would burn instantly at about compressed air temperature of
(*a*) 250°C (*b*) 500°C
(*c*) 1000°C (*d*) 1500°C
(*e*) 2000°C.

2.58. When crude oil is heated, then which of the following hydrocarbon is given off first.
(*a*) kerosene (*b*) gasoline
(*c*) paraffin (*d*) diesel
(*e*) natural gas.

2.59. The rating of a diesel engine, with increase in air-intlet temperature, will
(*a*) increase linearly
(*b*) decrease linearly

(*c*) increase parabolically
(*d*) decrease parabolically
(*e*) first decrease linearly and then increase parabolically.

2.60. A 75 cc engine has following parameter as 75 cc
(*a*) fuel tank capacity
(*b*) lub oil capacity
(*c*) swept volume
(*d*) cylinder volume
(*e*) clearance volume.

2.61. A heat engine utilises the
(*a*) calorific value of oil
(*b*) low heat value of oil
(*c*) high heat value of oil
(*d*) mean heat value of oil
(*e*) all of the above.

2.62. Gaseous-fuel guarantees are based on
(*a*) calorific value of oil
(*b*) low heat value of oil
(*c*) high heat value of oil
(*d*) mean heat value of oil
(*e*) all of the above.

2.63. Fuel consumption of diesel engines is not guaranteed at one quarter load because at such low loads
(*a*) the friction is high
(*b*) the friction is unpredictable
(*c*) the small difference in cooling water temperature or in internal friction has a disproportionate effect
(*d*) the engine is rarely operated
(*e*) none of the above.

2.64. Polymerisation is a chemical process in which molecules of a compound become
(*a*) larger (*b*) slowed down
(*c*) smaller (*d*) liquid
(*e*) gaseous.

2.65. The term scavenging is generally associated with
(*a*) 2-stroke cycle engines
(*b*) 4-stroke cycle engines
(*c*) aeroplane engines
(*d*) diesel engines
(*e*) high efficiency engines.

2.66. In diesel engine, the compression ratio in comparison to expansion ratio is
(*a*) same (*b*) less
(*c*) more (*d*) variable
(*e*) more/less depending on engine capacity.

2.67. The cam shaft of a four stroke I.C. engine running at 1500 rmp will run at
(*a*) 1500 rpm (*b*) 750 rpm
(*c*) 3000 rpm
(*d*) any value independent of engine speed
(*e*) none of the above.

2.68. Engine pistons are usually made of aluminium alloy because it
(*a*) is lighter (*b*) wears less
(*c*) absorbs shocks
(*d*) is stronger
(*e*) does not react with fuel and lub oil.

2.69. Most high speed compression engines operate on
(*a*) Otto cycle (*b*) Diesel cycle
(*c*) Dual cycle (*d*) Carnot cycle
(*e*) Two stroke cycle.

2.70. The specific fuel consumption of a petrol engine compared to diesel engine of same H.P. is
(*a*) same (*b*) more
(*c*) less
(*d*) less or more depending on operating conditions
(*e*) unpredictable.

2.71. A diesel engine as compared to petrol engine (both running ar rated load) is
(*a*) more efficient
(*b*) less efficient
(*c*) equally efficient
(*d*) unperdictable
(e) other factors will decide it.

2.72. The size of inlet valve of an engine in comparison to exhaust valve is
(*a*) more (*b*) less
(*c*) same
(*d*) more/less depending on capacity of engine
(*e*) varies from design to design.

2.73. In a typical medium speed, 4 stroke cycle diesel engine
(*a*) expansion starts at 20° after top dead centre and ends at 35° before bottom dead centre
(*b*) expansion starts at top dead centre and ends just after bottom dead centre

(*c*) expansion starts just before top dead centre and ends just after tottom dead centre
(*d*) may start and end anywhere
(*e*) none of the above.

2.74. In a cycle the spark lasts roughly for
(*a*) 1 sec (*b*) 0.1 sec
(*c*) 0.01 sec (*d*) 0.001 sec
(*e*) 0.0001 sec.

2.75. Which of the following is false statement :

Excess quantities of sulphur in diesel fuel are objectionable because it may cause the following
(*a*) piston ring and cylinder wear
(*b*) formation of hard coating on piston skirts
(*c*) oil sludge in the engine crank case
(*d*) detonation
(*e*) forms corrosive acids.

2.76. Which of the following is false statement

Some of the methods used to reduce diesel smoke are as follows
(*a*) using additives in the fuel
(*b*) engine derating *i.e.* reducing the maximum flow of fuel
(*c*) increasing the compression ratio
(*d*) adherence to proper fuel specification
(*e*) avoidance of overloading.

2.77. The fuel air ratio in a petrol engine fitted with suction carburettor, operating with dirty air filter as compared to clean filter will be
(*a*) higher (*b*) lower
(*c*) remain unaffected
(*d*) unpredictable (*e*) none of the above.

2.78. Pick up the wrong statement about supercharging
(*a*) supercharging reduces knocking in diesel engines
(*b*) there can be limited supercharging in petrol engines because of detonation
(*c*) supercharging at high altitudes is essential
(*d*) supercharging results in fuel economy
(*e*) supercharging is essential in aircraft engines.

2.79. The actual volume of fresh charge admitted in 4-stroke petrol engine is
(*a*) equal to stroke volume
(*b*) equal to stroke volume and clearance volume
(*c*) less than stroke volume
(*d*) more than stroke volume
(*e*) more than cylinder volume.

2.80. The magneto in an automobile is basically
(*a*) transformer (*b*) d.c. generator
(*c*) capacitor (*d*) magnetic circuit
(*e*) a.c. generator.

2.81. The reason for supercharging in any engine is to
(*a*) increase efficiency
(*b*) increase power
(*c*) reduce weight and bulk for a given output
(*d*) effect fuel economy
(e) none of the above.

2.82. The operation of forcing additional air under pressure in the engine cylinder is known as
(*a*) scavenging (*b*) turbulence
(*c*) supercharging (*d*) pre-ignition
(*e*) dissociation and carburretion of fuel.

2.83. Supercharging is essential in
(*a*) diesel engines (*b*) gas turbines
(*c*) petrol engines (*d*) aircraft engines
(*e*) marine engines.

2.84. The minimum cranking speed in case of petrol engine is about
(*a*) half the operating speed
(*b*) one-fourth of operating speed
(*c*) 250-300 rpm (*d*) 60-80 rpm
(*e*) 10-20 rpm.

2.85. In a typical medium speed 4 stroke cycle diesel engine
(*a*) exhaust valve opens at 35° before bottom dead centre and closes at 20° after top dead centre
(*b*) exhaust valve opens at bottom dead centre and closes at top dead centre
(*c*) exhaust valve opens just after bottom dead centre and closes just before top dead centre
(*d*) may open and close anywhere
(*e*) none of the above is true.

2.86. Flash point of fuel oil is
(*a*) minimum temperature to which oil is heated in order to give off inflammable

vapours in sufficient quantity to ignite momentarily when brought in contact with a flame
(*b*) temperature at which it solidifies or congeals
(*c*) temperature at which it catches fire without external aid
(*d*) indicated by 90% distillation temperature, *i.e.* when 90% of sample oil has distilled off
(*e*) none of the above.

2.87. The mean effective pressure obtained from engine indicator indicates the
(*a*) maximum pressure developed
(*b*) minimum pressure
(*c*) instantaneous pressure at any instant
(*d*) exhaust pressure
(*e*) average pressure.

2.88. For the same power developed in I.C. engines, the cheaper system is
(*a*) naturally aspirated
(*b*) supercharged
(*c*) centrifugal pump
(*d*) turbo charger
(*e*) none of the above.

2.89. Installation of supercharger on a four-cycle diesel engine can result in the following percentage increase in power
(*a*) upto 25% (*b*) upto 35%
(*c*) upto 50% (*d*) upto 75%
(*e*) upto 100%.

2.90. Scavenging is usually done to increase
(*a*) thermal efficiency
(*b*) speed
(*c*) power output
(*d*) fuel consumption
(*e*) all of the above.

2.91. Which of the following is the lightest and most volatile liquid fuel
(*a*) diesel (*b*) kerosene
(*c*) fuel oil (*d*) gasoline
(*e*) lub oil.

2.92. 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
(*e*) 20 : 1.

2.93. Air fuel ratio for idling speed of a petrol engine is approximately
(*a*) 1 : 1 (*b*) 5 : 1
(*c*) 10 : 1 (*d*) 15 : 1
(*e*) 20 : 1.

2.94. Air fuel ratio at which a petrol engine can not work is
(*a*) 8 : 1 (*b*) 10 : 1
(*c*) 15 : 1 (*d*) 20 : 1 and less
(*e*) will work at all ratios.

2.95. For maximum power generation, the air fuel ratio for a petrol engine for vehicles, is of the order of
(*a*) 9 : 1 (*b*) 12 : 1
(*c*) 15 : 1 (*d*) 18 : 1
(*e*) 20 : 1.

2.96. The following volume of air is required for consuming 1 litre of fuel by a four stroke engine
(*a*) 1 m^3 (*b*) 2.5 m^3
(*c*) 5-6 m^3 (*d*) 9-10 m^3
(*e*) 15-18 m^3.

2.97. Pour point of fuel oil is the
(*a*) minimum temperature to which oil is heated in order to give off inflammable vapours in sufficient quantity to ignite momentarily when brought in contact with a flame
(*b*) temperature at which it solidifies or congeals
(*c*) it catches fire without external aid
(*d*) indicated by 90% distillation temperature *i.e.*, when 90% of sample oil has distilled off
(*e*) temperature at which it flows easily.

2.98. 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
(*e*) 10 kg/hr.

2.99. Diesel engine can work on very lean air fuel ratio of the order of 30 : 1. A petrol engine can also work on such a lean ratio provided
(*a*) it is properly designed
(*b*) best quality fuel is used
(*c*) can not work as it is impossible
(*d*) flywheel size is proper
(*e*) engine cooling is stopped.

2.100. A diesel engine has
(*a*) 1 valve (*b*) 2 valves
(*b*) 3 valves (*d*) 4 valves

(*e*) no valve.

2.101. A high flame speed is obtained in diesel engine when air fuel ratio is
(*a*) uniform throughout the mixture
(*b*) chemically correct mixture
(*c*) about 3-5% rich mixture
(*d*) about 10% rich mixture
(*e*) about 10% lean mixture.

2.102. The knock in diesel engine occurs due to
(*a*) instantaneous and rapid burning of the first part of the charge
(*b*) instantaneous atuo iginition of last part of charge
(*c*) delayed burning of the first part of the charge
(*d*) reduction of delay period
(*e*) all ot the above.

2.103. The air-fuel ratio in petrol engines is controlled by
(*a*) controlling valve opening/closing
(*b*) governing (*c*) injection
(*d*) carburettion
(*e*) scavenging and supercharging.

2.104. Volatility of diesel fuel oil is
(*a*) minimum temperature to which oil is heated in order to give off inflammable vapours in sufficient quantity to ignite momentarily when brought in contact with a flame
(*b*) temperature at which it solidifies or congeals
(*c*) it catches fire without external aid
(*d*) indicated by 90% distillation temperature, *i.e.*, when 90% of sample oil has distilled off
(*e*) temperature at which it flows easily.

2.105. Which is more viscous lub oil
(*a*) SEA 30 (*b*) SAE 40
(*c*) SAE 50 (*d*) SAE 70
(*e*) SAE 80.

2.106. In the opposed piston diesel engine, the combustion chamber is located
(*a*) above the piston
(*b*) below the piston
(*c*) between the pistons
(*d*) anywhere
(*e*) there is no such criterion.

2.107. A stoichiometric air-fuel ratio is
(*a*) chemically correct mixture
(*b*) lean mixture
(*c*) rich mixture for idling
(*d*) rich mixture for over loads
(*e*) the ratio used at full rated parameters.

2.108. In a naturally aspirated diesel engine, the air is supplied by
(*a*) a supercharger
(*b*) a centrifugal blower
(*c*) a vacuum chamber
(*d*) an injection tube
(*e*) forced chamber

2.109. In loop scavenging, the top of the piston is
(*a*) flat (*b*) contoured
(*c*) slanted (*d*) depressed
(*e*) convex shaped.

2.110. In the crankcase method of scavenging, the air pressure is produced by
(*a*) supercharger
(*b*) centrifugal pump
(*c*) natural aspirator
(*d*) movement of engine piston
(*e*) reciprocating pump.

2.111. In order to prevent formation of carbon on the injector, the temperature of nozzle tip should be
(*a*) less than 100°C
(*b*) between 100 – 250°C
(*c*) between 250 – 300°C
(*d*) between 400 – 500°C
(*e*) between 500 – 1000°C.

2.112. The thermal efficiency of a petrol engine of two stroke with crank case scavenging as compared to four stroke petrol engine with same comperssion ratio will be
(*a*) higher (*b*) lower
(*c*) same
(*d*) depends on size of engine
(*e*) unpredictable.

2.113. Ignition quailty of petrol is expressed by
(*a*) octane number
(*b*) cetane number
(*c*) calorific value
(*d*) self ignition temperature
(*e*) distillation temperature.

2.114. Petrol is distilled at a temperature in range of
(*a*) 30 – 65°C (*b*) 65 – 220°C
(*c*) 220 – 350°C (*d*) 350 – 450°C
(*e*) 450 – 550°C.

2.115. Kerosene is distilled at
(*a*) 30 – 65°C (*b*) 65 – 220°C
(*c*) 220 – 350°C (*d*) 350 – 450°C
(*e*) 450 – 550°C.

2.116. Self-ignition temperature of petrol is of the order of
(*a*) 150°C (*b*) 240°C
(*c*) 370°C (*d*) 450°C
(*e*) more than 500°C.

2.117. Iso-octane
(*a*) has octane number of 0
(*b*) has octane number of 50
(*c*) has octane number of 100
(*d*) is an index of detonation quality
(*e*) is an index of knocking quality.

2.118. Octane number is determined by comparing the performance of the petrol with the following hydrocarbons
(*a*) iso-octane
(*b*) mixture of normal heptane and iso-octane
(*c*) alpha methyl napthalene
(*d*) mixture of methane and ethane
(*e*) mixture of paraffins and aromatics.

2.119. Cetane
(*a*) has zero cetane number
(*b*) has 100 cetane number
(*c*) helps detonation
(*d*) is a straight chain paraffin
(*e*) determines the efficiency of an I.C. engine.

2.120. Ethyl fluid is used
(*a*) to increase the octane rating of the fuel
(*b*) to increase the cetane rating of the fuel
(*c*) as a defrosting agent
(*d*) as a superior type of fluid compared to others
(*e*) to improve lubricating quality of fuel.

1.121. The self-ignition temperature of diesel oil compared to petrol is
(*a*) higher
(*b*) lower
(*c*) same
(*d*) depends on quality of fuel
(*e*) unpredictable.

1.122. Normal heptane
(*a*) accelerates auto-ignition
(*b*) helps to resist auto-ignition
(*c*) does not affect auto-ignition
(*d*) has no relation with auto-ignition
(*e*) retards auto-ignition.

2.123. Cetane number is determined by comparing the performance of diesel oil with the following hydrocarbons
(*a*) cetane
(*b*) mixture of cetane and alphamethyl napthalene
(*c*) ethylene dibromide
(*d*) mixture of aldehydes and ketones
(*e*) mixture of cetane with tetra-ethyl lead

2.124. Which is correct statement about reaction time for autoignition of fuel and the fuel air ratio
(*a*) lean mixture has high reaction time
(*b*) rich mixture has high reaction time
(*c*) chemically correct mixture has minimum reaction time
(*d*) all of the above.
(*e*) non of the above.

2.125. Violent sound pulsations within the cylinder of an I.C. engine are caused due to
(*a*) heavy turbulence
(*b*) improved scavenging
(*c*) heavy supercharging
(*d*) detonation
(*e*) pre-ignition.

2.126. Auto-ignition temperature is
(*a*) minimum temperature to which oil is heated in order to give off inflammable vapours in sufficient quantity to ignite momentarily when brought in contact with a flame
(*b*) temperature at which it solidifies or congeals
(*c*) that at which it catches fire without external aid
(*d*) indicated by 90% distillation temperature, *i.e.*, when 90% of sample oil has distilled off
(*e*) indicated by 50% distillation temperature.

2.127. Ignition lag is
(*a*) the time taken by fuel after injection (before top dead centre) to reach upto auto-ignition temperature
(*b*) time before actual fuel injection and the pump plunger starts to pump fuel

(*c*) time corresponding to actual injection and top dead centre
(*d*) time corresopnding to actual ingition and top dead centre
(*e*) none of the above.

2.128. The spark plug gap is normally maintained at
(*a*) 0.1 to 0.2 mm (*b*) 0.2 to 0.4 mm
(*c*) 0.45 to 0.6 mm (*c*) 0.6 to 0.8 mm
(*e*) 0.8 to 1 mm.

2.129. The function of a fuel pump in a petrol pump is to
(*a*) inject fuel in cylinder
(*b*) supply fuel when carburettor fails
(*c*) pump fuel so that it reaches carburettor
(*d*) improve thermal efficiency
(*e*) does not exist.

2.130. The delay period in petrol engine is of the order of
(*a*) 0.001 sec (*b*) 0.002 sce
(*c*) 0.01 sec (*d*) 0.05 sec
(*e*) 0.1 sec.

2.131. Detonation is caused by the following unstable compounds
(*a*) peroxides, aldehydes and ketones
(*b*) peroxides, aldehydes, oxides and sulphides
(*c*) aldehydes, oxides and ketones
(*d*) ketones and sulphur compounds
(*e*) none of the above.

2.132. If overhead clearance is less, then the following type of engine should be selected
(*a*) V-type (*b*) In-line
(*c*) Vertical (*d*) Horizontal
(*e*) Radial.

2.133. Which is false statement about advantages of V-type engine
(*a*) compact design requiring lesser space
(*b*) improved distribution of air to cylinder
(*c*) casting less liable to distortion
(*d*) reduced torsional vibration because of shorter crankshaft
(*e*) less overhead clearance.

2.134. The pistons are usually given a coating such as tin plating in order to
(*a*) reduce weight
(*b*) conduct heat efficiently
(*c*) reduce possibility of scoring
(*d*) reduce friction
(*e*) increase lubrication effect.

2.135. Piston rings are usually made of
(*a*) cast iron
(*b*) aluminium
(*c*) phosphor bronze
(*d*) babbitt
(*e*) carbon steel.

2.136. Piston rings are plated with chromium, cadmium or phosphate in order to
(*a*) reduce cost
(*b*) improve surface finish
(*c*) prevent clogging
(*d*) reduce wear and eliminate scuffing
(*e*) improve heat transfer.

2.137. The top piston ring nearer to the piston crown is known as
(*a*) compression ring
(*b*) oil ring
(*c*) scrapper ring
(*d*) groove ring
(*e*) leading ring.

2.138. In order to prevent knock in the S.I. engines, the charge away from the spark plug should have
(*a*) low temperature
(*b*) low density
(*c*) long ignition delay
(*d*) rich mixture
(*e*) all of the above.

2.139. Diesel engines have low specific fuel consumption compared to petrol engine. This statement is
(*a*) not true
(*b*) true at full load
(*c*) true at part load
(*d*) true at both part and full load
(*e*) there could not be any such criterion.

2.140. To reduce the possibility of knock in the C.I. engines, the first elements of fuel and air should have
(*a*) high temperature
(*b*) high density
(*c*) short delay
(*d*) reactive mixture
(*e*) all of the above.

2.141. The detonation tendency in petrol engines for specified conditions of fuel rating,

compression ratio, speed etc. can be controlled by having
(*a*) smaller cylinder bore
(*b*) bigger cylinder bore
(*c*) medium cylinder bore
(*d*) cylinder bore could be anything as it does not control detonation
(*e*) proper stroke legth.

2.142. According to Recardo's theory, detonation occurs due to
(*a*) instantaneous auto-ignition of last part of charge to be burnt
(*b*) improper mixing of air and fuel
(*c*) improper combustion
(*d*) self ignition temperature has nothing to do with detonation
(*e*) none of the above.

2.143. A fuel will detonate less if it has
(*a*) higher self ignition temperature
(*b*) lower self ignition temperature
(*c*) proper self ignition temperature
(*d*) self ingition temperature has nothing to do with detonation
(*e*) none of the above.

2.144. The knocking in diesel engines for given fuel, will be
(*a*) enhanced by increasing compression ratio
(*b*) enhanced by decreasing compression ratio
(*c*) unaflected by compression ratio
(*d*) first enhanced by increasig compression ratio upto a limit beyond which it will be suppressed
(*e*) dependent on other factors.

2.145. The ignition of charge by some hot surface in the engine cylinder before operation of spark plug is known as
(*a*) auto ignition
(*b*) pre-ignition
(*c*) retarded ignition
(*d*) accelerated ignition
(*e*) detonation.

2.146. Injection lag is
(*a*) the time taken by fuel after injection (before top dead centre) to reach upto auto-ignition temperature
(*b*) time before actual fuel injection and the pump pluger starts to pump fuel
(*c*) time corresponding to actual injection and top dead centre
(*d*) time corresponding to actual ignition and top dead centre
(*e*) none of the above.

2.147. Ignition quality of diesel-fuel oil is expressed by an index called
(*a*) octane number (*b*) cetane number
(*c*) calorific value (*d*) carbon content
(*e*) ignition temperature.

2.148. For best results of efficient combustion, high speed diesel engines need an approximate cetane number of
(*a*) 100 (*b*) 10
(*c*) 50 (*d*) 5
(*e*) 1.

2,149. Calorific value of diesel oil is of the order of
(*a*) 3000 kcal/kg (*b*) 5000 kcal/kg
(*c*) 7500 kcal/kg (*d*) 10000 kcal/kg
(*e*) 15000 kcal/kg.

2.150. Carbon residue in diesel oil should not be more than
(*a*) 1% (*b*) 0.5%
(*c*) 0.1% (*d*) 0.01%
(*e*) 0.001%.

2.151. The most popular firing order in case of four cylinder in-line I.C. engine is
(*a*) 1-2-3-4 (*b*) 1-3-2-4
(*c*) 1-4-2-3 (*d*) 1-2-4-3
(*e*) 1-3-4-2.

2.152. The compression ratio of motor cars is
(*a*) 5 (*b*) 7
(*c*) 10 (*d*) 13
(*e*) 16.

2.153. The specific gravity of diesel oil is
(*a*) 1 (*b*) 0.7
(*c*) 0.85 (*d*) 0.5
(e) 1.25.

2.154. Freezing temperature of petrol is usually
(*a*) 0°C (*b*) – 10°C
(*c*) 10°C (d) less than – 30°C
(*e*) less than – 273°C.

2.155. The specific gravity of petrol is about
(*a*) 0.65 (*b*) 0.75
(*c*) 0.85 (*d*) 0.95
(*e*) 1.1.

2.156. Pick up the correct statement. Detonation can be controlled by
(*a*) varying compression ratio
(*b*) using lean mixture
(*c*) retarding the spark timing
(*d*) reducing the r.p.m.
(*e*) increasing inlet pressure.

2.157. The efficiency of I.C. engines normally is of the order of
(*a*) 15-20% (*b*) 20-25%
(*c*) 25-30% (*d*) 30-35%
(*e*) 35-50%.

2.158. The firing order in a six stroke I.C. engine is
(*a*) 1-3-6-5-2-4 (*b*) 1-4-2-5-6-3
(*c*) 1-6-2-5-4-3 (*d*) 1-5-2-6-3-4
(*e*) 1-5-3-4-2-6.

2.159. Sulphur content in diesel oil should not be more than
(*a*) 10% (*b*) 5%
(*c*) 1% (*d*) 0.1%
(*e*) 0.01%.

2.160. The m.e.p. of a diesel cycle having fixed compression ratio with increase in cut-off will
(*a*) increase
(*b*) decreae
(*c*) be unaffected
(*d*) depend on other factors
(*e*) unpredictable.

2.161. The ash content in diesel oil should bot be more than
(*a*) 1% (*b*) 5%
(*c*) 0.1% (*d*) 0.01%
(*e*) 0.001%.

2.162. The pour point of diesel oil must be
(*a*) lower than the coldest atmospheric temperature at whcih oil is to be pumped
(*b*) higher than above
(*c*) has no such relation
(*d*) nore than 100°C
(*e*) none of the above.

2.163. High carbon content in diesel oil used for diesel engine leads to
(*a*) production of highly corrosive gases corroding the cylinder walls and exhaust system
(*b*) excessive engine wear
(*c*) damaging of both the storage tank and the engine
(*d*) deposition on engine parts
(*e*) none of the above.

2.164. Exhaust pipes of engines are covered with insulating marterial in order to
(*a*) keep the exhaust pipes warm
(*b*) reduce formation of condenstae
(*c*) reduce heat transfer to the engine room
(*d*) increase engine efficiency
(*e*) conserve heat.

2.165. Ignition timing of a multi cylider petrol engine can be adjusted by
(*a*) rotating the crank
(*b*) adjusting the spark plug gap
(*c*) adjusting ignition coil position
(*d*) rotating the distributor
(*e*) delaying the spark by increasing capacitor in ignition circuit.

2.166. Fuel consumption with increase in back pressure will
(*a*) increase
(*b*) decrease
(*c*) remain unaffected
(*d*) depend on other factors
(*e*) none of the above.

2.167. The cooling water requirement for diesel engine is of the order of
(*a*) 0.2 to 1.0 litre per minute per h.p.
(*b*) 1 to 3 litres per minute per h.p.
(*c*) 5 to 10 litres per minute per h.p
(*d*) 10 to 20 litres per minute per h.p.
(*e*) 20-30 litres per minute per h.p.

2.168. A 4-stroke diesel engine needs about following amount of air
(*a*) 75 cc per min. per h.p.
(*b*) 750 cc per min. per h.p.
(*c*) 7500 cc per min. per h.p.
(*d*) 75000 cc per min. per h.p.
(*e*) 750000 cc per min. per h.p.

2.169. Leakage past the piston rings and valve seats in I.C. engines with increase in speed
(*a*) increases (*b*) decreases
(*c*) remains same (*d*) unpredictable
(*e*) none of the above.

2.170. The heat wasted in diesel engine is of the order of
(*a*) 80% (*b*) 65%

(*c*) 50% (*d*) 35%
(*e*) 25%.

2.171. With increase in speed of vehicle, the back pressure will
(*a*) decrease (*b*) increase
(*c*) remain unaffected
(*d*) depend on other factors
(*e*) none of the above.

2.172. The function of a distributor in an automobile is to
(*a*) distribute charge equally to all the cylinders
(*b*) regulate power
(*c*) feed lub oil to all moving parts
(*d*) time the spark
(*e*) inject fuel at appropriate time.

2.173. The ratio of useful power; engine friction; exhaust gas losses; cooling water, air and oil losses for a diesel engine is of the order of
(*a*) 5:25:30:50 (*b*) 25:35:5:35
(*c*) 25:5:10:60 (*d*) 40:30:15:15
(*e*) 25:5:35:35.

2.174. For same power and same speed, the flywheel of a four stroke engine as compared to two-stroke I.C. engine will be
(*a*) smaller
(*b*) bigger
(*c*) same size
(*d*) dependent on other engine parameters
(*e*) unpredictable.

2.175. Air injection in I.C. engines refers to injection of
(*a*) air only
(*b*) liquid fuel only
(*c*) liquid fuel and air
(*d*) supercharging
(*e*) does not exist.

2.176. Solid injection in I.C. engines refers to injection of
(*a*) liquid fuel only
(*b*) liquid fuel and air
(*c*) solid fuel
(*d*) solid fuel and air
(*e*) does not exist.

2.177. The system of lubrication used for motor cycles and scooters is by
(*a*) forced lubrication system
(*b*) splash lubrication
(*c*) applying grease under pressure
(*d*) wet sump method
(*e*) mixing about 5% lub oil with petrol.

2.178. The m.e.p. of a petrol engine first increases as the fuel air ratio is increased and then decreases on further increase in fuel air ratio. The m.e.p. is maximum in the zone of
(*a*) lean mixture
(*b*) chemically correct mixture
(*c*) rich mixture
(*d*) unpredictable
(*e*) none of the above.

2.179. The specific fuel consumption for a petrol engine first decreases with increase in fuel air ratio and then increases with further increase in fuel air ratio. The minimum value occurs in the range of
(*a*) lean mixture
(*b*) chemically correct mixture
(*c*) rich mixture
(*d*) unpredictable
(*e*) none of the above.

2.180. The thermal efficiency of a two cycle engine as compared to four cycle engine is
(*a*) more
(*b*) less
(*c*) same
(*d*) more upto some load and then less
(*e*) it may be less or more depending on several other factors.

2.181. Diesel engines as compared to petrol engines require
(*a*) bigger flywheel
(*b*) smaller flywheel
(*c*) same size flywheel
(*d*) no flywheel
(*e*) flywheel whose size may be less or more depending on several other factors.

2.182. Auto-ignition reaction time for petrol engine first decreases with increase in fuel air ratio, reaches a minimum value and then increases with subsequent increase in fuel air ratio. The minimum value occurs in the region of
(*a*) lean mixture
(*b*) chemically correct fuel air ratio
(*c*) rich mixture (*d*) unpredictable
(*e*) none of the above.

2.183. The tendency of a diesel engine to knock increases, if
(*a*) engine speed is increased
(*b*) engine H.P. is increased
(*c*) octane number of fuel is increased
(*d*) conperssion ratio is increased
(*e*) engine has to move uphill.

2.184. The tendency of a petrol engine to knock increases by
(*a*) supercharging
(*b*) scavenging
(*c*) increasing engine H.P.
(*d*) reducing the spark advance
(*e*) increasing cetane number of fuel.

2.185. Free acids in diesel oil for diesel engine lead to
(*a*) production of highly corrosive gases corroding the cylinder walls and exhaust system
(*b*) excessive engine wear
(*c*) damaging of both the storage tank and the engine
(*d*) deposition on engine parts
(*e*) excessive fuel consumption.

2.186. Thermal efficiency of high speed diesel engine at design load may be of the order of
(*a*) 20% (*b*) 35%
(*c*) 50% (*d*) 70%
(*e*) 85%.

2.187. The thermostat in I.C. engines permitting hot water to go to radiator is set around
(*a*) 70 – 80°C (*b*) 80 – 85°C
(*c*) 85 – 95°C (*d*) above 100°C
(*e*) above 120°C.

2.188. The brake mean effective pressure of an I.C. engine with increase in speed will
(*a*) increase (*b*) decrease
(*c*) remain unaffected.
(*d*) fluctuate according to engine speed
(*e*) unpredictable.

2.189. High ash and sediment in diesel oil used in diesel engine lead to
(*a*) production of highly corrosive gases corroding the cylinder walls and exhaust system
(*b*) excessive engine wear
(*c*) damaging of both the storage tank and the engine
(*d*) deposition on engine parts
(*e*) blocking of exhaust pipes.

2.190. Mixing of fuel and air in case of diesel engine occurs in
(*a*) injection pump
(*b*) injector
(*c*) inlet manifold
(*d*) carburettor
(*e*) engine cylinder.

2.191. The advantage of reversing the flow of air in an air cleaner is to
(*a*) increase velocity of air
(*b*) increase air flow
(*c*) reduce the velocity of air
(*d*) throw out a large percentage of foreign matter
(*e*) cool the air.

2.192. The most effective air cleaner in case of diesel engines is
(*a*) dry type (*b*) wet type
(*c*) whirl type (*d*) oil bath type
(*e*) all are equally good.

2.193. Fins are provided over engine cylinder in scooters for
(*a*) higher strength of cylinder
(*b*) better cooling
(*c*) good appearance
(*d*) higher efficiency
(*e*) easier handling and ease in manufacturing.

2.194. The elements of most concern in regard to pollution caused by engines are
(*a*) CO and CO_2
(*b*) CO and hydrocarbons
(*c*) CO_2 and hydrocarbons
(*d*) carbon and dust
(*e*) hot products of combustion

2.195. The preferred location of an oil cooler is
(*a*) before the filters
(*b*) after the filters
(*c*) between the filters
(*d*) before and after the filters
(*e*) any where.

2.196. The petrol from tank to the automotive engine is fed by
(*a*) gravity
(*b*) pump run by engine
(*c*) suction pressure created by suction stroke
(*d*) capillary action

(*e*) fuel pump.

2.197. In petrol engine, increase of cooling water temperature will
(*a*) increase the knocking tendency
(*b*) decrease the knocking tendecny
(*c*) not affect the knocking tendency
(*d*) increase or decrease knocking tendency depedning on strength and time of spark
(*e*) unpredictable.

2.198. Which of the curves in Fig. 2.2 is correct for a petrol engine

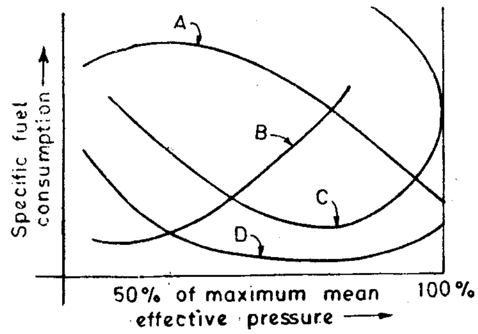

Fig. 2.2.

(*a*) curve *A* (*b*) curve *B*
(*c*) curve *C* (*d*) curve *D*
(*e*) none of the above.

2.199. Which of the curves in Fig. 2.2 is correct for a diesel engine
(*a*) curve *A* (*b*) curve *B*
(*c*) curve *C* (*d*) curve *D*
(*e*) none of the above.

2.200. With increase in engine speed, the ignition of spark in petrol engine has to be
(*a*) unaltered (*b*) increased
(*c*) decreased (*d*) advanced
(*e*) reatrded.

2.201. In petrol engines, the maximum power is developed corresponding to relative fuel air ratio of
(*a*) 0.85 (*b*) 1.00
(*c*) 1.1 to 1.3 (*d*) 1.2 to 1.5
(*e*) 1.5 to 1.8.

2.202. In petrol engine using a fixed octane rating fuel, increase of engine speed will
(*a*) increase the knocking tendency
(*b*) decrease the knocking tendency
(*c*) not affect the knocking tendency
(*d*) increase or decrease knocking tendency depending on other factors
(*e*) unpredictable

2.203. Which is the correct curve in Fig. 2.3 for a petrol engine depicting the behaviour of specific fuel-consumption for various types of fuel air ratios, particularly with reference to the minimum specific fuel consumption

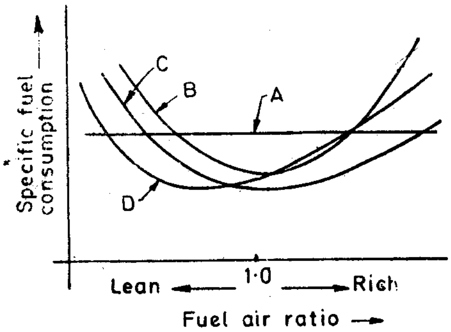

Fig. 2.3.

(*a*) curve *A* (*b*) curve *B*
(*c*) curve *C* (*d*) curve *D*
(*e*) none of the above.

2.204. In petrol engine using fuel having fixed octane rating, increase in compression ratio will
(*a*) increase the knocking tendency
(*b*) decrease the knocking tendency
(*c*) not affect the knocking tendency
(*d*) increase or decrease knocking tendecy depending on strength and time of spark
(*e*) unpredictable.

2.205. In a petrol engine, which of the following gas gets exhausted out without burning and without transformation
(*a*) O_2 (*b*) CO_2
(*c*) CO (*d*) water vapour
(*e*) nitrogen.

2.206. The level of fuel in the float chamber of a carburettor as compared to the level of the jet in the venturi is
(*a*) same (*b*) higher
(*c*) lower (*d*) may be anywhere
(*e*) varies from situation to situation.

2.207. In carburettors, the top of the fuel jet with reference to the level in the float chamber is kept at
(*a*) same level
(*b*) slightly higher level
(*c*) slightly lower level
(*d*) may be anywhere
(*e*) varies from situation to situation.

2.208. Carburretion is done to
(*a*) feed petrol into cylinder
(*b*) govern the engine
(*c*) break up and mix the petrol with air
(*d*) heat up the charge to cylinder
(*e*) scavenge the cylinder.

2.209. Power impulses from an I.C. engine are somoothed out by
(*a*) governor (*b*) crank shaft
(*c*) gear box (*d*) flywheel
(*e*) timing spark properly.

2.210. The theoretically correct mixture of air and petrol is approximately
(*a*) 8 : 1 (*b*) 12 : 1
(*c*) 15 : 1 (*d*) 20 : 1
(*e*) 24 : 1.

2.211. For low speed operation or for idling in petrol engines, the engine requirements are for
(*a*) lean mixture
(*b*) theoretically correct mixture
(*c*) rich mixture
(*d*) any type of mixture
(*e*) lean/rich mixture depending upon capacity of engine.

2.212. In petrol engines, advancing the spark timing will
(*a*) increase the knocking tendency
(*b*) decrease the knocking tendency
(*c*) not affect the knocking tendncy
(*d*) increase or decrease knocking tendency depending on strenght and time of spark
(*e*) unpredictable.

2.213. The following type of carburettor is preferred
(*a*) concentric type
(*b*) eccentric type
(*c*) horizontal type
(*d*) vertical type
(*e*) none of the above.

2.214. In the passanger cars, the following type of carburettor is preferred
(*a*) horizontal type
(*b*) downward draught type
(*c*) upward draught type
(*c*) inclined draught type
(*e*) any one of the above types.

2.215. The essential equipment for producing high vlotage for sparking in petrol engines with battery is
(*a*) ignition coil
(*b*) ignition coil and distributor
(*c*) ignition coil and condenser
(*d*) ignition coil and contact breaker
(*e*) ignition coil, contact breaker and condenser.

2.216. The ignition coil in diesel engines produces voltage of the order of
(*a*) 6 to 12 volts (*b*) 240 volts
(*c*) 1000 volts (*d*) 20,000 volts
(*e*) 80,000 volts.

2.217. If the door of a diesel engine crankcase is opened just after shutdown before cooling of engine, then
(*a*) efficiency of engine will be poor
(*b*) there is a risk of explosion taking place
(*c*) it is the safest practice
(*d*) some parts may be subjected to thermal stresses
(*e*) some lub oil may be wasted.

2.218. The thermal efficiency of a diesel engine is of the order of
(*a*) 92% (*b*) 68%
(*c*) 52% (*d*) 34%
(*e*) 25%.

2.219. The thermal efficiency of a gas engine is of the order of
(*a*) 92% (*b*) 68%
(*c*) 52% (*d*) 34%
(*e*) 25%.

2.220. Theoretically, the following engine should have maximum efficiency
(*a*) gas engine
(*b*) 2-stroke S.I. engine
(*c*) 4-stroke S.I. engine
(*d*) steam engine
(*e*) 4-stroke C.I. engine.

2.221. The part load efficiency of a carburettor is,

(*a*) maximum (*b*) optimum
(*c*) poor (*d*) constant
(*e*) best.

2.222. In petrol engine using a fixed octane rating fuel and fixed compression ratio, supercharging will
(*a*) increase the knocking tendency
(*b*) decrease the knocking tendency
(*c*) not affect the knocking tendency
(*d*) increase or decrease knocking tendency depending on strenght and time of spark
(*e*) unpredictable.

2.223. High sulphur content in diesel oil used for diesel engines leads to
(*a*) production of highly corrosive gases corroding the cylinder walls and exhaust system
(*b*) excessive engine wear
(*c*) damaging of both the storage tank and the engine
(*d*) deposition on engine parts
(*e*) reduction in thermal efficiency.

2.224. In open combustion chamber in diesel engines
(*a*) the shape and layout of the piston crown, the inlet port, and the valve produce the turbulent effect on fuel mixture
(*b*) fuel is injected into an auxiliary chamber that is separated from the cylinder by an orifice or throat
(*c*) only a part of air charge is contained in an auxiliary chamber in which the fuel starts to burn with insufficient air which due to explosion tendency mixes thoroughly into main cylinder charge
(*d*) fuel is injected at atmospheric pressure
(*e*) there are no valves.

2.225. The basic requirement of a good combustion chamber is
(*a*) high compression ratio
(*b*) low compression ratio
(*c*) low volumetric efficiency
(*d*) minimum turbulence
(*e*) high power output and high thermal efficiency.

2.226. Deposition of carbon in petrol engine cylinder would result in increase of
(*a*) clearance volume
(*b*) swept volume
(*c*) compression ratio
(*d*) volumetric efficiency
(*e*) mean effective pressure.

2.227. Which of the following engines can work on very lean mixture
(*a*) S.I. engine
(*b*) C.I. engine
(*c*) two stroke engine
(*d*) four stroke engine
(*e*) all of the above.

2.228. If petrol is used in a diesel engine, then
(*a*) higher knocking will occur
(*b*) efficiency will be low
(*c*) low power will be produced
(*d*) black smoke will be produced
(*e*) lot of fuel will remain unburnt.

2.229. Hot air standard diesel cycle efficiency with increase in value of C_n
(*a*) increases
(*b*) decreases
(*c*) remains unaffected
(*d*) depends on other factors
(*e*) unpredictable.

2.230. In turbulence chamber in diesel engine
(*a*) the shape and layout of the piston crown, the inlet port, and the valve produce the turbulent effect of fuel mixture
(*b*) fuel is injected into an auxiliary chamber that is separated from the cylinder by an orifice or throat
(*c*) only a part of air charge is contained in an auxiliary chamber in which the fuel starts to burn with insufficient air which due to explosion tendency mixes thoroughly into main cylinder charge
(*d*) there are no valves
(*e*) fuel is partly burnt by spark.

2.231. For low load operation, more suitable (economical) engine is
(*a*) S.I. engine
(*b*) C.I. engine
(*c*) both are equally good
(*d*) multicylinder engine
(*e*) two stroke engine.

2.232. A two stroke crank compressed engine has following ports in the cylinder
(*a*) suction port and exhaust port
(*b*) transfer port only
(*c*) suction port and transfer port
(*d*) transfer port and exhaust port
(*e*) suction port, exhaust port and transfer port.

2.233. For the same size and weight, a two stroke engine as compared to four stroke engine will generate power
(*a*) about twice (*b*) about 0.5 times
(*c*) nearly equal (*d*) about 1.7 times
(*e*) about 2.5 times.

2.234. A two stroke engine is usually identified by
(*a*) size of flywheel
(*b*) weight of engine
(*c*) type of lubrication system
(*d*) absence of valves
(*e*) location of fuel tank.

2.235. If diesel is fed by mistake in the oil tank of a petrol engien, then engine will
(*a*) give lot of smoke
(*b*) detonate
(*c*) knock
(*d*) not run
(*e*) run for some time and then stop.

2.236. The thermal efficiency of a semi-diesel cycle having fixed compression ratio and fixed quantity of heat, with increase in pressure ratio will
(*a*) increase (*b*) decrease
(*c*) remain unaffected
(*d*) increase/decrease depending upon engine capacity
(*e*) first increase and then decrease.

2.237. Scavenging air is supplied to a two-stroke engine at a density greater than that of atmosphere. This means the engine is
(*a*) supercharged
(*b*) not supercharged
(*c*) charged
(*d*) supercharged provided its speed is low
(*e*) supercharged provided its speed is high.

2.238. Pistion speed is equal to
(*a*) $\text{stroke} \times \text{rpm}$ (*b*) $\frac{\text{stroke} \times \text{rpm}}{2}$
(*c*) $2 \times \text{stroke} \times \text{rpm}$
(*d*) $\frac{\text{stroke} \times \text{rpm}}{4}$ (*e*) $4 \times \text{stroke} \times \text{rpm}$

2.239. In precombustion chamber in diesel engine
(*a*) the shape and layout of the pistion crown, the inlet port, and the valve produce the turbulent effect of fuel mixture
(*b*) fuel is injected into an auxiliary chamber that is separated from the cylinder by an orifice or throat
(*c*) only a part of air charge is contained in an auxiliary chamber in which the fuel starts to burn with insufficient air which due to explosion tendency mixes thoroughly into main cylinder charge
(*d*) there are no valves
(*e*) fuel is partly ignited by spark.

2.240. In a diesel engine, injection pressure developed by injector is of the order of
(*a*) 10 kg/cm^2 (*b*) 100 kg/cm^2
(*c*) 500 kg/cm^2 (*d*) 1400 kg/cm^2
(*e*) 2000 kg/cm^2.

2.241. All the four operations in two stroke engine are performed in following number of revolutions of crank shaft
(*a*) half (*b*) one
(*c*) two (*d*) four
(*e*) eight.

2.242. In the case of compression ignition engine, the %age of CO in exhaust gases is
(*a*) zero (*b*) 5-10%
(*c*) depends on load
(*d*) considerable percent
(*e*) 10-12%.

2.243. As the number of cylinders in multi-cylinder engine increases, the power to weigth ratio
(*a*) decreases (*b*) increases
(*c*) remains same
(*d*) decreases upto a limit and then increases
(*e*) increases upto and limit and then decreases.

2.244. In the case of petrol engine at maximum output, the percentage of CO in exhaust gases is
(*a*) zero (*b*) 5-10%

(*c*) depends on load and quality of fuel
(*d*) considerable percent
(*e*) 10-12%.

2.245. The termal efficiency of a petrol engine at design load is around
(*a*) 90% (*b*) 50%
(*c*) 40% (*d*) 30%
(*e*) 15%.

2.246. In isochronous governing, speed droop is
(*a*) 100% (*b*) 50%
(*c*) 5% (*c*) 30%
(e) 1%.

2.247. Method of governing used in petrol engine is
(*a*) quantity governing
(*b*) quality governing
(*c*) combined governing
(*d*) partial governing
(*e*) hit and miss governing.

2.248. Pick up false statement
(*a*) For petrol and large gas engines, quantity governing is preferred
(*b*) In quantity governing, air fuel ratio is almost constant and quantity of charge is changed depending on load
(*c*) In hit and miss governing, fuel supply is completely cut off during one or more number of cycles
(*d*) In quality governing, quantity of fuel is varied to suit the load and total charge of air is varied
(*e*) For close regulation of speed, combination of both quality and quantity governing is used.

2.249. Method of governing used in diesel engine is
(*a*) quantity governing
(*b*) quality governing
(*c*) combined governing
(*d*) partial governing
(*e*) hit and miss governing.

2.250. An engine has a normal speed of 960 r.p.m. and no load speed of 1000 r.p.m. The speed droop of governor will be about
(*a*) 2% (*b*) 4%
(*c*) 8% (*d*) ± 4%
(e) 1%.

2.251. An engine at half load begins to act with an increasing load at 970 r.p.m. and with a decreasing load at 980 r.p.m. The sensitivity of governor is
(*a*) 5% (*b*) 2%
(*c*) 1% (*d*) 0.5%
(*e*) 2.5%.

2.252. The bi-fuel engine uses
(*a*) two fuels used in two combustion chambers
(*b*) liquid fuel during start up and gas as the basic fuel
(*c*) gas fuel during start up and liquid fuel as the basic fuel
(*d*) can work on two fuels but the one most economical is used
(*e*) bi-fuel engines do not exist.

2.253. Morse test is used to determine mechanical efficiency of
(*a*) single cylinder C.I. engine
(*b*) single cylinder S.I. engines
(*c*) two stroke engines
(*d*) four-storke engines
(*e*) multi-cylinder engines.

2.254. During idling stage, gasoline does not flow through the carburettor tube because of
(*a*) pressure drop
(*b*) high pressure
(*c*) venturi vacuum
(*d*) it is not desired to be passed through main tube
(*e*) all of the above.

2.255. Thermal efficiency of I.C. engine on weak mixture is
(*a*) higher
(*b*) lower
(*c*) unaffected
(*d*) higher/lower depending on engine rating
(*e*) unpredictable.

2.256. In petrol engine the actual pressure developed compared to the predicted maximum pressure is
(*a*) 90% (*b*) 70%
(*c*) 50% (*d*) 25%
(*e*) 10%.

2.257. 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
(*e*) 90-100.

2.258. A fuel of octane rating 85 matches the anti knock qualities of a mixture consisting of 85% and 15% respectively of
(*a*) iso-octane and normal heptane
(*b*) normal heptane and iso-octane
(*c*) petrol and diesel
(*d*) benzene and methyl alcohol
(*e*) melhyl alcohol and benzene.

2.259. Octane number of petrol available from Indian refineries of the order of
(*a*) 50 (*b*) 72
(*c*) 13 (*d*) 94
(*e*) 100.

2.260. Octane number of iso-octane is about
(*a*) 0 (*b*) 50
(*c*) 80 (*d*) 90
(*e*) 100.

2.261. Air cycle efficiency for a petrol engine having compression ratio of 5 : 1 will be
(*a*) 80% (*b*) 60%
(*c*) 47.5% (*d*) 30%
(*e*) 20%.

2.262. Which of the following fuel detonates readily
(*a*) benzene (*b*) iso-octane
(*c*) n-heptane (*d*) alcohol
(*e*) all of the above.

2.263. Which of the following fuel has little tendency towards detonation
(*a*) benzene (*b*) iso-octane
(*c*) n-heptane (*d*) alcohol
(*e*) all of the above.

2.264. 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 tetraethyle lead and ethylene dibromide
(*e*) adding benzole.

2.265. For spark ignition engines, fuels in order of decreasing knock tendency are
(*a*) paraffins, napthenes, aromatics
(*b*) napthenes, paraffins, aromatics
(*c*) paraffins, aromatics, napthenes
(*d*) aromatics, paraffins, napthenes
(*e*) nepthenes, aromatics, paraffins.

2.266. Tendency of detonation in S.I. engines increases with
(*a*) decrease of engine speed
(*b*) increase of engine speed
(*c*) decrease of compression ratio
(*d*) increase of compression ratio
(*e*) none of the above.

2.267. Antickock for compression ignition engines is
(*a*) amyl nitrate (*b*) tetra ethyl lead
(*c*) ethylene dibromide
(*d*) napthene (*e*) lead ethide.

2.268. Detonation in petrol engines can be suppressed or reduced by the addtiton of small quantity of
(*a*) lead ethide (*b*) iso-octane
(*c*) n-heptane (*d*) methyl napthalene
(*e*) amyl nitrate.

2.269. Performance numbers are
(*a*) indices of efficiency of petrol engines
(*b*) indices of efficency of diesel engines
(*c*) indices of performance rating of engines
(*d*) indicative of the fuels having antiknock qualities superior to iso-octane
(*e*) indicative of the fuels having antiknock qualities superior to cetane.

2.270. It is possible to obtain a number of blends of the fuel by mixing/blending
(*a*) cetane with iso-octane
(*b*) cetane with tetra-ethyl lead
(*c*) cetane with aldehydes and ketones
(*d*) cetane with aldehydes and ketones
(*e*) cetane with α-methyl napthalene.

2.271. Compression ratio for spark ignition engines usually varies between
(*a*) 4-6 (*b*) 6-13
(*c*) 10-18 (*d*) 14-25
(*e*) 2-4.

2.272. Four-stroke petrol engines as compared to two stroke petrol engines having same output rating and same compression ratio have
(*a*) higher thermal efficiency
(*b*) lower thermal efficiency
(*c*) higher specific fuel consumption
(*d*) higher specific output
(*e*) higher fuel consumption.

2.273. Compression ratio for compression ignition engines usually varies between
(*a*) 4-6 (*b*) 6-12

(*c*) 10-18 (*d*) 14-25
(*e*) 25-30.

2.274. The air requirement of a petrol engine during acceleration period in comparison to theoretically correct air required for complete combustion is
(*a*) less (*b*) more
(*c*) same
(*d*) may be less or more depending upon engine capcity
(*e*) unpredictable.

2.275. Cetane number of petrol is around
(*a*) 10 (*b*) 15-20
(*c*) 35 (*d*) 45-55
(*e*) 55-70.

2.276. The cetane number of diesel oil, generally available is of the order of
(*a*) 0-5 (*b*) 10-15
(*c*) 20-25 (*d*) 30-35
(*e*) 55-70.

2.277. Morse test in multi-cylinder engines is used to determine
(*a*) air flow to engine
(*b*) volumetric efficiency
(*c*) B.H.P. (*d*) I.H.P.
(*e*) mechanical efficiency.

2.278. High speed diesel engines need a cetane number of
(*a*) 100 (*b*) 50
(*c*) 0 (*d*) infinity
(*e*) 25.

2.279. The volatility of a diesel-fuel oil is indicated by the
(*a*) distillation temperature
(*b*) 50% distillation temperature
(*c*) 30% distillation temperature
(*d*) 20% distillation temperature
(*e*) 10% distillation temperature.

2.280. Speed droop is the
(*a*) decrease in engine speed
(*b*) decrease in engine speed from no load to full load
(*c*) decrease in engine speed form 25% load to 75% load
(*d*) decrease in engine speed at 50% load
(*e*) decrease in speed corresponding to 10% change in load.

2.281. Hunting occurs due to
(*a*) over-control by the governor
(*b*) poor-control by the governor
(*c*) faulty governor
(*d*) improperly designed governor
(*e*) bad engine design.

2.282. Rocker arms are used in following type of I.C. engines
(*a*) side valve engines
(*b*) radial engines (*c*) stationary engines
(*d*) overhead valve engines
(*e*) steam engines.

2.283. Cetane number is the measure of
(*a*) ignition quality
(*b*) additions in fuel
(*c*) auto-ignition temperature
(*d*) calorific value of fuel
(*e*) viscosity of fuel.

2.284. Mean effective pressure of an engine by the indicator diagram can be determined by the relation

(*a*) $\dfrac{\text{area of indicator diagram (A)} \times \text{spring constant (S)}}{\text{length of indicator diagram (L)}}$

(*b*) $\dfrac{AL}{S}$ (*c*) $\dfrac{A}{LS}$

(*d*) $\dfrac{LS}{A}$ (*e*) $\dfrac{L}{AS}$

2.285. Pick up the correct statement
(*a*) BHP (Brake Horse Power) + FHP (Frictional horse Power) = IHP (indicated Horse Power)
(*b*) IHP = BHP – FHP
(*c*) IHP + BHP + FHP = 0
(*d*) FHP = BHP – IHP
(*e*) $\text{FHP} = \dfrac{\text{IHP}}{\text{BHP}}$

2.286. The detonating tendency in petrol engines increases with
(*a*) decrease of compression ratio
(*b*) increase of compression ratio
(*c*) increase of engine speed
(*d*) decrease of engine speed
(*e*) increase/decrease of compression ratio and/or speed has no influence on detonation.

2.287. The antifreeze solution commonly used in automobiles is
(*a*) glycol (*b*) normal-heptane
(*c*) iso-octane (*d*) lead ethyl

(*e*) ammonium bromide.

2.288. The power to weight ratio in a two stroke engine as compared to four stroke engine is
(*a*) more (*b*) less
(*c*) equal
(*d*) depends on the power rating
(*e*) unpredictable.

2.289. Freezing temperature of petrol is of the order of
(*a*) – 40 to 0°C (*b*) – 10 to – 4°C
(*c*) – 20 to – 10°C (*d*) – 30 to – 20°C
(*e*) – 50 to – 30°C.

2.290. Injection lag in diesel engines is caused by
(*a*) expansion of fuel-oil discharge lines under high pressure
(*b*) compressibility of fuel
(*c*) leakage past the fuel-oil plunger
(*d*) all of the above.
(*e*) none of the above.

2.291. Pistons of diesel engines are usually cooled by
(*a*) water (*b*) air
(*c*) lubricating oil (*d*) fuel oil
(*e*) synthetic fluid.

2.292. In order to reduce wear and eliminate scuffing, the piston rings are
(*a*) made of cast iron
(*b*) lubricated
(*c*) provided with stepped groove
(*d*) plated with chromium or cadmium
(*e*) made flexible.

2.293. The back pressure of petrol engine is usually of the order of
(a) 1.0 ata (*b*) 1.2 ata
(*c*) 0.8 ata (*d*) 0.5 ata
(*e*) 2 ata.

2.294. The cause of smoky exhaust in a diesel engine could be
(*a*) fuel is not distributed equally to all the cylinders
(*b*) exhaust valve receives too much lube oil
(*c*) fuel injection is late or fuel injector is not adjusted right
(*d*) water in the fuel
(*e*) all of the above.

2.295. The device used to reduce exhaust noise is called
(*a*) muffler (*b*) exhaust pipe
(*c*) exhaust manifold
(*d*) tail pipe (*e*) filter.

2.296. An engine will generate maximum torque when it
(*a*) runs at maximum speed
(*b*) develops maximum power
(*c*) consumes maximum fuel
(*d*) operates at point of maximum efficiency
(*e*) runs at lowest speed.

2.297. The specific fuel constumption is expressed as the fuel consumed
(*a*) per unit time
(*b*) per unit IHP
(*c*) per hour per unit brake horse power
(*d*) per hour per unit IHP
(*e*) per km distance travelled.

2.298. While two wheeler drives are started by kicking, four wheel drives are not because
(*a*) it requires less force to start two wheeler by kicking
(*b*) it is not practicable to provide kicking in a car
(*c*) provision of battery ignition system in two wheel drives would occupy lot of space
(*d*) all of the above
(*e*) none of the above.

2.299. Higher calorific value of a fuel is based on the assumption that
(*a*) no water is present in fuel
(*b*) the effect of water present is ignored
(*c*) the water is present in vapour form
(*d*) the water is present in form of small droplets
(*e*) water is thoroughly mixed.

2.300. When an engine is idling, it requires
(*a*) no fuel in the air
(*b*) lean fuel air mixture
(*c*) rich fuel air mixture
(*d*) stoichiometric mixture
(*e*) fuel corresponding to no load condition.

2.301. An igniton coil in the spark engine performs the function of
(*a*) controlling spark
(*b*) controlling current produced by the generator

(c) supplying high voltage to the spark plug
(d) regulating battery voltage
(e) avoiding sparking.

2.302. If the gear ratio of first gear and of differential be 1 : 4.5 and 1 :4 respectively, then the ratio of engine speed and axle speed for the automobile in first gear is
(a) 1 : 4.5 (b) 1 : 4
(c) 1 : 18 (d) 18 : 1
(e) 4 : 1.

2.303. In the above prob. 2.302 , the ratio of engine speed and axle speed, when automobile is in topmost gear, will be
(a) 1 ; 45 (b) 4 : 1
(c) 4.5 : 1 (d) 1 : 4
(e) 1 : 18.

2.304. In the case of compound engine, equal power is developed by each cylinder with a view to
(a) have maximum efficiency
(b) have maximum fuel economy
(c) have interchageable parts
(d) obtain uniform turning moment
(e) have uniform wear and maintenance.

2.305. The power to weight ratio of multicylinder engines with increase in number of cylinders for the same power will
(a) increase
(b) decrease
(c) remain more or less same
(d) depends upon power to be developed
(e) have unifrom wear and maintenance.

2.306. The compression ratio is kept low in petrol engine compared to a diesel beacuse
(a) petrol engine is a light engine
(b) it provides fuel economy
(c) faster operation is required in petrol engine
(d) higher compression ratio in pertol engine would lead to pre-ignition of fuel
(e) engine design becomes simpler.

2.307. A distributor in spark ignition engine performs the function of
(a) distributing the right quantity of fuel oil to the desired cylinder.
(b) distributing the air requirement appropriately
(c) distributing the power to the wheels
(d) providing the correct firing order in the engine
(e) adding additives to fuel oil.

2.308. Which of the following does not relate to C.I. engine
(a) fuel pump (b) fuel injector
(c) governor (d) carburettor
(e) flywheel.

2.209. Which of the following does not relate to S.I. engine
(a) ignition coil (b) distributor
(c) spark plug (d) fuel injector
(e) flywheel.

2.310. A temperature indicator is usually provided for automobiles. It indicates temperature of
(a) lub oil
(b) engine cylinder walls
(c) jacket cooling water
(d) engine piston
(e) air surrounding radiator.

2.311. The following type of battery is commonly used in automobile applications
(a) dry battery (b) nickel-cadmium
(c) nickel-iron (d) lead-acid
(e) stationary battery.

2.312. The gear ratio in the differential unit of a passenger car is of the order of
(a) 2 : 1 (b) 3 : 1
(c) 6 : 1 (d) 8 : 1
(e) 10 : 1.

2.313. The differential in automobiles performs the function of
(a) permitting two rear wheels to run independently
(b) to enable the automobile turn by 90°
(c) allowing rear wheel movement
(d) reducing speed of propeller shaft to suit the requirement of wheel axles
(e) permitting two rear wheels to have flexibility of relative speed, whenever it is required.

2.314. The automobiles generally utilise batteries having voltage of
(a) 3 V (b) 6 V
(c) 12 V (d) 24 V
(e) 28 V.

2.315. The acid used in automobile battery is
(a) H_2SO_4 (b) HCI

(*c*) HNO_3
(*d*) Hydrofluoric acid
(*e*) dry type.

2.316. Four-wheel drive implies
(*a*) vehicle has 4 wheels
(*b*) all the four wheels can't be steered
(*c*) all the four wheels can be steered
(*d*) rear of vehicle has four wheels which are powered
(*e*) none of the above.

2.317. Automobile engines are usually designed as multi-cylinder engines because of
(*a*) economy reasons
(*b*) higher efficiency
(*c*) better balance, uniform torque output
(*d*) lower fuel consumption
(*e*) continuity of power output even if one cylinder fails.

2.318. The commonly used ignition accelerators are
(*a*) acetone peroxide
(*b*) ethyl nitrate
(*c*) isoamyl nitrate
(*d*) any one of the above
(*e*) none of the above.

2.319. Ignition accelerators in a compression igniton engine reduce or eliminate
(*a*) combustion knock
(*b*) preignition
(*c*) detonation
(*d*) spontaneous combustion
(*e*) all of the above.

2.320. Ignition accelerators are substances which
(*a*) increase the rate of preflame reaction and reduce the ignition lag
(*b*) increase knock
(*c*) reduce detonation
(*d*) increase thermal efficiency
(*e*) generate more power.

2.321. Pick up the correct statement
(*a*) both iso-octane and normal-heptane help in prolonging the reaction time for auto-ignition at a particular pressure and temperature
(*b*) both iso-octane and normal heptane help to resist auto-ignition
(*c*) normal-heptane accelerates auto-ignition and iso-octane helps to resist auto-igntion
(*d*) iso-octane accelerates auto ignition and normal-heptane helps to resist auto-ignition
(*e*) both iso-octane and normal-heptane are good antiknocks.

2.322. Petrol engines are not suitable for part load operation, because
(*a*) mechanical efficiency is poor due to increasing internal losses at increased throttling
(*b*) of fear of pre-ignition
(*c*) of huge knocking
(*d*) of increased detonation tendency
(*e*) of overheating of engine.

2.323. The power to weight ratio of diesel engine compared to petrol engine is
(*a*) high (*b*) low
(*c*) same
(*d*) high in some cases and low in other cases
(*e*) not comparable.

2.324. Flash point for diesel fuel oil should be
(*a*) minimum 49°C
(*b*) maximum 49°C
(*c*) minimum 99°C
(*d*) maximum 99°C
(*e*) maximum149°C.

2.325. Vapour lock is
(*a*) supply of liquid fuel particles to engine
(*b*) locking carburettor jets due to high vapour pressure
(*c*) excess fuel supply to engine due to faster vaporisation
(*d*) seizure or partial stoppage ot fuel supply due to vaporisation of fuel in supply system
(*e*) complete or partial stoppage of fuel supply due to vaporisation of fuel in supply system.

2.326. Which of the following does not assist in getting higher output from diesel engine
(*a*) high compression ratio
(*b*) high excess air
(*c*) high fuel air ratio
(*d*) fine atomisation of fuel
(*e*) none of the above.