PART 04 - MECHANICAL, AUTOMOBILE AND AERONAUTICAL ENGINEERING

(Answer ALL questions)

76. The efficiency of a Screw Jack is given by

  1. $\dfrac{\tan \alpha}{\tan(\alpha + \phi)}$

  2. $\dfrac{\tan a}{\tan(\alpha - \phi)}$

  3. $\dfrac{\tan(\alpha + \phi)}{\tan a}$

  4. $\dfrac{\tan(a\ \phi)}{\tan a}$

77. The train value of a gear train is

  1. equal to velocity ratio of a gear train

  2. reciprocal of velocity ratio of a gear train

  3. always greater than unity

  4. always less than unity

78. The ratio of the maximum displacement of the forced vibration to the deflection due to the static force is known a s

  1. damping factor

  2. damping coefficient

  3. logarithmic decrement

  4. magnification factor

79. A plate with a circular hole is subjected to a transverse load. The magnitude of stress infront of the hole in the axial direction is

  1. same a s the stress in the transverse direction

  2. 3 times the stress in the transverse direction

  3. 2 times the stress in the transverse

  4. the magnitude of the stress is zero

80. The main constituent of duralumin is

  1. aluminium

  2. manganese

  3. copper

  4. magnesium

81. The steel used for rails under heavy traffic and on sharp curves is

  1. manganese steel

  2. chrome steel

  3. cast steel

  4. mild steel

82. Corrosion resistance of stainless steel is due to

  1. Chromium

  2. Vanadium

  3. Carbon

  4. Sulphur

83. Which material will have highest limiting strength?

  1. Aluminium

  2. Cast iron

  3. Mild steel

  4. Wrought. iron

84. A 3 m^2 hot black surface a t $80°$ C is losing heat to the surrounding air a t $25"$ C by convection with a convection coefficient of 12 $W/m^2\,°C$, and by radiation to the surrounding surfaces a t $15°$ C. The total heat loss from the surface is

  1. 1987 W

  2. 2239 W

  4. 3451 W

85. For an irreversible process, entropy change is

  1. greater than $\delta Q/T$

  2. equal to S Q $/T$

  3.

  4. equal to zero

NG 27

Joule–Thomson coefficient is given by

1.

2. $(\delta T / \delta V)_h$

3. $(\delta T / \delta V)_s$

4. $(S S I S P)$,

87. Following relationship defines the Gibbs free energy G

1. $G = H + TS$

2. $G = H - TS$

3. $G = U + TS$

4. $F = U - T S$

88. Internal energy and enthalpy of a n ideal gas are functions of

1. temperature and pressure

2. pressure only

3. temperature only

4. temperature and specific volume

89. In S.I. Units one ton of refrigeration is equal to

1. 210 kJ/min

2. 2 1 kJ/min

3. 420 kJ/min

4. 8 4 0 kJ/min

90. Domestic refrigerator working on vapour cycle uses the following type of expansion valve

1. electrically operated throttle valve

2. capillary tube

3. expansion valve

4. thermostatic valve

91. Which of the following refrigerants h a s the lowest freezing point?

1. Freon - 1 2

2. NH_3

3. CO_2

4. Freon - 22

92. The most suitable refrigerant for a commercial ice plant is

1. Brine

2. Freon - 1 2

3. NH_3

4. CO_2

93. Air is dehumidified by

1. heating

2. cooling

3. injecting water

4. injecting steam

94. In which type of welding a pool of molten metal is used

1. electroslag

2. submerged arc

3. MIG

4. TIG

95. A brazed joint may be satisfactorily used on components made of

1. tin plate

2. brass

3. copper

96. In sand moulding, the middle part of flask is called

1. cope

2. check

3. drag

4. flask-middle

15   NG 27

97. For grinding cast iron, brass and aluminium which one of the following material is used for wheel?
    1. Aluminium oxide
    2. Silicon carbide
    3. Borazon
    4. Diamond

98. The process in which higher hydrocarbons are decomposed into smaller hydrocarbons is called
    1. cracking
    2. reforming
    3. polymerization
    4. alkylation

99. One effect of detonation is
    1. delay in ignition
    2. interruption in lubrication
    3. loss of power
    4. deterioration in the quality of air-fuel mixture

100. An indication of ignition quality of diesel fuel is given by
    1. detonation
    2. octane number
    3. pre-ignition
    4. cetane number

101. The most widely used fuel supply system for car engine is
    1. Gravity system
    2. Pressure system
    3. Vacuum system
    4. Pump system

102. Fuel pump pressure should be approximately
    1. 3 kPa
    2. 30 kPa
    3. 100 kPa
    4. 300 kPa

103. The inertia of the rotating parts of the clutch should be
    1. maximum
    2. minimum
    3. zero
    4. 50 % of minimum

104. Cushioning springs in clutch plate are mean; to reduce
    1. torsional vibrations
    2. vehicle speed
    3. jerky starts
    4. engine speed

105. The thrust bearings should come into contact with the release levers when the
    1. vehicle is stationary
    2. vehicle is running very fast
    3. vehicle is driven very slow
    4. clutch pedal is depressed

106. Free pedal play in car clutches is about
    1. 3 mm
    2. 30 mm
    3. 6 0 m m
    4. 100 mm

107. Thin airfoil theory predicts the lift curve slope of a thin airfoil is
    1. π per degree
    2. π per radian
       2π
    4. 2n per radian

108. NACA 0014 implies that the airfoil is symmetric
    1.
    2. positively cambered
    3. negatively cambered
    4. cusped

NG 27   16

The component of a transonic airplane for which transonic area rule applied is

1. nose
2. wing
3. tail
4. fuselage

110. Induced drag of an airplane can be reduced by

1. boundary layer fence
2. spoilers
3. winglets
4. decreasing aspect ratio

111. V-n diagram is a plot of

1. Velocity Vs normal force
2. Volumetric flow Vs normal force
3. Velocity Vs load factor
4. Volumetric flow Vs load factor

112. The order of temperature in the primary zone of a can type combustor is

1. 2600 K
2. 1200 K
3. 400 K
4. 3400 K

113. The overall air to fuel ratio in a turbojet engine is approximately

1. 67
2. 15
3. 8
4. 4

114. The order of pressure ratio that can be achieved in a single sided centrifugal compressor is

1. 2 4
2. 6
3. 42
4. 2

115. For turbine blade cooling, the'coolant air is tapped from the following range of stages of a multistage-axial flow compressor

1. 1 0 to 1 2
2. 4 to 6
3. 18 to 20
4. 1st and 2nd stages only

116. In an optimally expanded jet engine nozzle, the nozzle exit pressure is equal to

1. half of ambient pressure
2. ambient pressure
3. one-fourth of combustion chamber pressure
4. pressure at inlet section of the intake of the engine

117. In case of pure shear a t a point, the sum of normal stresses on two rectangular orthogonal planes is equal to

1. maximum shear stress
2. twice the maximum shear stress
3. half the maximum shear stress
4. zero

118. A hollow shaft of same cross sectional area as solid shaft transmits

1. same torque
2. less torque
3. more torque
4. depends on the external diameter

119. The effective length of a column with one end fixed and the other end free is

1. its own length
2. twice its length
3. half its length
4. $2^{-1/2}$ x its length

120. A spherical vessel with an inside diameter of 2 m is made of material having an allowable stress in tension of 500 kgf / cm^2. The thickness of the shell to withstand a pressure

1.
   10 cm
2. 5 c m
3. 2.5 cm
4. 1.25 cm