56. In a short column with eccentric loading, the neutral axis
    1. Passes through the centroid of the section
    2. Passes through the point of application of load
    3. Passes through the shear center of the section
    4. Does not pass through the centroid of the section

57. If a thick cylindrical shell is subjected to internal pressure then hoop stress, radial stress and longitudinal stress at a point in the thickness will be
    1. Tensile, compressive and compressive respectively
    2. All compressive
    3. All tensile
    4. Tensile, compressive and tensile respectively

58. A compressive member always tends to buckler in the direction of
    1. axis of load
    2. minimum cross section
    3. least radius of gyration
    4. perpendicular to the axis of the load

59. In the case of unsymmetrical bending, the resultant deflection of a beam is
    1. Perpendicular to the axis of symmetry
    2. Parallel to the axis of symmetry
    3. Perpendicular to the neutral axis
    4. Parallel to the neutral axis

60. If the load passes through the shear center of the section of a beam, then there will be
    1. no bending of the beam
    2. only bending
    3. bending and twisting
    4. only twisting

61. A coil is cut into two halves, the stiffness of cut coils will be
    1. double
    2. half
    3. same
    4. quadrupled

62. 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

63. 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 of its length
    4. $2^{-1/2} \times$ its length

64. For a 3D anisotropic material the number of independent elastic constants
    1. 4
    2. 9
    3. 2
    4. 21

65. The logarithmic decrement measured for a viscously damped single degree of freedom system is 0.125. The value of the damping factor in % is closest to
    1. 2.0
    2. 1.0
    3. 1.5
    4. 0.5

66. When the column of length '2L' is fixed at one end and free at the other end, the effective length factor for ideal column is given by _____.
    1. 2
    2. 0.699
    3. 1
    4. 4

13

67. As compared to uniaxial tension or compression, the strain energy stored in bending is only
   1. 0.125
   2. 0.25
   3. 0.333
   4. 0.5

68. If the shear force along a section of a beam is zero, the bending moment at the Section is
   1. zero
   2. maximum
   3. minimum
   4. none of the above

69. The reinforcement used in Ceramic Matrix Composite is in the form of
   1. long fiber
   2. short fiber/whiskers
   3. silicon carbide and boron nitride
   4. silicate

70. The compatibility conditions in theory of elasticity ensures that
   1. there is compatibility between stress components
   2. relationships between stresses and strains are consistent with the constitutive relations
   3. displacements are single valued and continuous
   4. stresses satisfy the bi-harmonic equation

71. For every ply above the laminate midplane, there is an identical ply (material and orientation) an equal distance below the midplane is called
   1. symmetric Laminate
   2. unsymmetric laminate
   3. balanced Laminate
   4. unbalanced Laminate

72. In curved beams the distribution of bending stress is
   1. Linear
   2. Parabolic
   3. Uniform
   4. Hyperbolic

73. Buckling of the fuselage skin can be delayed by
   1. increasing internal pressure
   2. placing stiffeners farther apart
   3. reducing skin thickness
   4. placing stiffeners farther and decreasing internal pressure

74. For a plane truss with n number of members and j number of joints the truss is statically determinate only when
   1. $j = 2n - 3$
   2. $n = 2j = 3$
   3. $n = 4j - 3$
   4. $4j = n + 3$

75. Galerkin method used to derive finite element equations is based on
   1. variational approach
   2. use of functional
   3. weighted residual approach
   4. minimizing sum of the square of the error

76. Zero Mach number flows are also called
   1. Incompressible flows
   2. Irrotational flows
   3. Inviscid flows
   4. Isentropic flows

77. Bernoulli's equation is valid under steady state
   1. Only along a streamline in inviscid flow, and between any two points in potential flow
   2. Between any two points in both inviscid flow and potential flow
   3. Between any two points in inviscid flow, and only along a streamline in potential flow
   4. Only along a streamline in both inviscid flow and potential flow

78. Winglets are used on wings to minimize
   1. skin friction drag
   2. profile drag
   3. wave drag
   4. induced drag

79. For a symmetric airfoil, the lift coefficient for zero degree angle of attack is
    1. −1.0
    2. 0.0
    3. 0.5
    4. 1

80. The primary purpose of trailing edge flap is to
    1. avoid flow separation
    2. increase $C_{l, max}$
    3. reduce wave drag
    4. reduce induced drag

81. With increase in airfoil thickness, the critical Mach number for an airfoil is likely to
    1. decrease
    2. increase
    3. remain unchanged
    4. be undefined

82. The pitch angle and the angle of attack for a fixed wing aircraft are equal during
    1. Wings level constant altitude flight
    2. Unaccelerated climb
    3. Unaccelerated descent
    4. Landing

83. Streamlined body is one for which
    1. Pressure drag is more than the skin friction drag
    2. Induced drag is more than the profile drag
    3. Skin friction drag is more than pressure drag
    4. Profile drag is more than induced drag

84. Lifting flow over circular cylinder is obtained by the combination of
    1. Uniform flow + source + sink
    2. Uniform flow + sink + vortex
    3. Uniform flow + doublet + vortex
    4. Uniform flow + source

85. The dimensions of Strength of vortex is
    1. MLT^{-2}
    2. ML^2T^{-3}
    3. L^2T^{-1}
    4. LT^{-1}

86. Total pressure at a point defined as the pressure when the flow is brought to rest
    1. adiabatically
    2. isentropically
    3. isothermally
    4. isobarically

87. Prandtl's classical lifting line theory applicable to
    1. Low aspect ratio straight wings
    2. High aspect ratio wings
    3. Swept wings
    4. Delta wings

88. Blasius solution is derived for
    1. Compressible flow over a flat plate at zero angle of attack
    2. Incompressible flow over a flat plate zero angle of attack
    3. Compressible flow over a flat plate at 90° angle of attack
    4. Incompressible flow over a flat plate at 90° angle of attack

89. Select the correct statement from the following
    1. As Reynolds number increases, coefficient of skin friction decreases
    2. As Mach number increases coefficient of skin friction increases
    3. As Reynolds number increases, coefficient of skin friction increases
    4. As Mach number decreases coefficient of skin friction decreases

90. The instrument used for the measurement of turbulence in wind tunnel is
    1. Yaw meter
    2. Yaw sphere
    3. Hot-wire Anemometer
    4. Rakes

91. The approximate loss of stagnation pressure across a scramjet engine is
    1. 35 to 40%
    2. 1 to 2%
    3. Zero
    4. 0.1 to 0.2%

92. In the isolator of a scramjet engine the following phenomenon can be observed
    1. continuous shock train
    2. fluttering
    3. near absence of boundary layer
    4. continuous drop in static pressure

93. Wall heat flux is maximum at the following location for a rocket nozzle
    1. at the inlet of the nozzle
    2. at the outlet of the nozzle
    3. at the throat of the nozzle
    4. at 2/3rd of the diverging length of the nozzle

94. The inherent disadvantage of a ramjet engine is
    1. high drag
    2. not self-starting
    3. low frontal area
    4. no moving parts

95. Specific impulse of a rocket depends upon
    1. rocket nozzle thrust coefficient
    2. characteristic velocity
    3. both thrust coefficient and characteristic velocity
    4. weight of propellant and characteristic velocity

96. Burning rate index of a solid propellant is in the range of
    1. 0.2 to 0.5
    2. 2 to 5
    3. 20 to 50
    4. always 1.4

97. For numerical grid generation the following type of equations are used
    1. Elliptic equations
    2. Taylor's series
    3. Fourier series
    4. Hyperbolic equations

98. From which of the following stages of a multistage (say 20-stage) axial flow compressor, cooling air can be tapped for turbine in a jet engine?
    1. first stage
    2. last stage
    3. 4th to 5th stage
    4. 16th to 17th stage

99. The position of shock at critical operation of a ramjet engine is at
    1. at the lip of inlet
    2. at the exit of inlet
    3. detached from and standing ahead of inlet
    4. inside the inlet

100. The following flow parameter drops during operation of a gas turbine
    1. Flow velocity
    2. Entropy
    3. Total enthalpy
    4. Mach number

101. Flow through a gas turbine combustion chamber can be approximated as
    1. Incompressible flow
    2. Rayleigh flow
    3. Fanno flow
    4. Couette flow

102. Forward Time and Central space scheme stability depends upon
    1. time step
    2. distance step
    3. both distance step and time step
    4. distance step and number of iterations

103. Discretization error in flow computations can be reduced by
    1. increasing the distance between two grid points
    2. increasing the number of grid points
    3. by employing central difference scheme at the boundaries of flow domain
    4. by increasing the number of iterations

104. The phenomenon 'rotating stall' occurs in the following type of compressor
    1. Reciprocating compressor
    2. Screw compressor
    3. Centrifugal compressor
    4. Axial flow compressor

105. External expansion ramp nozzle is used in one of the following engines
    1. Turbofan engine
    2. Scramjet engine
    3. Ramjet engine
    4. Turbojet engine

106. Time dependent methods in CFD are widely used for
    1. analytical solutions for steady state problems
    2. numerical solutions for steady Cyclic problems
    3. numerical solutions for unsteady state problems
    4. analytical solutions for unsteady state problems

107. Increasing aspect ratio has the effect of
    1. Increasing lift curve slope
    2. Decreasing lift curve slope
    3. Decreasing coefficient of lift
    4. None of the above

108. The component of a transonic airplane for which transonic area rule applied is
    1. Nose
    2. Wing
    3. Tail
    4. Fuselage

109. At the point of boundary layer separation _____.
    1. Shear stress is maximum
    2. Shear stress is zero
    3. Velocity is negative
    4. Density variation is maximum

110. Prandtl – Glauret rule gives the relation between
    1. Viscous and inviscid flow
    2. Compressible and incompressible flow
    3. Transonic and subsonic flow
    4. Transonic and supersonic flow

111. Service ceiling of an airplane represents
    1. practical upper limit for level flight
    2. practical lower limit for level flight
    3. zero rate of climb
    4. maximum rate of climb

112. One engine in operative condition is associated with
    1. Rudder
    2. Elevator
    3. Horizontal tail
    4. None of the above

113. Aileron reversal is associated with
    1. Magnus effect
    2. Kutta condition
    3. Aeroeleastic effect
    4. Biot – Savart law

114. Adverse yaw is associated with
    1. Climbing
    2. Banking
    3. Take off
    4. Landing

115. 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