A
SET

Booklet No. :

AS - 15

Aerospace Engineering

Duration of Test : 2 Hours **Max. Marks : 120**

Hall Ticket No. | | | | | | | | |

Name of the Candidate : _____

Date of Examination : _____ **OMR Answer Sheet No. :** _____

_____ _____

Signature of the Candidate **Signature of the Invigilator**

INSTRUCTIONS

1. This Question Booklet consists of **120** multiple choice objective type questions to be answered in **120** minutes.
2. Every question in this booklet has 4 choices marked (A), (B), (C) and (D) for its answer.
3. Each question carries **one** mark. There are no negative marks for wrong answers.
4. This Booklet consists of **16** pages. Any discrepancy or any defect is found, the same may be informed to the Invigilator for replacement of Booklet.
5. Answer all the questions on the OMR Answer Sheet using **Blue/Black ball point pen only.**
6. Before answering the questions on the OMR Answer Sheet, please read the instructions printed on the OMR sheet carefully.
7. OMR Answer Sheet should be handed over to the Invigilator before leaving the Examination Hall.
8. Calculators, Pagers, Mobile Phones, etc., are not allowed into the Examination Hall.
9. No part of the Booklet should be detached under any circumstances.
10. The seal of the Booklet should be opened only after signal/bell is given.

AEROSPACE ENGINEERING

1. If r(A) is the rank then a set of linear equations in n variables will have infinite number of solutions if

(A) $r(A) = r(A:b) = n$ (B) $r(A) < r(A:b) = n$

(C) $r(A) = r(A:b) < n$ (D) none

2. The largest eigen value of the matrix $A = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 2 & 0 \\ -4 & 0 & 3 \end{bmatrix}$ is

(A) 3 (B) 6 (C) 2 (D) 0

3. If the function $f(x) = \frac{1}{x}$ satisfies Lagranges mean value theorem at the point c in the interval [1,4] then

(A) $c = 2$ (B) $c = 1$ (C) $c = 0$ (D) none

4. A stationary point for the surface $z = xy(1 - x - y)$ is

(A) $(-1, -1)$ (B) (1/3, 1/3) (C) (1, 1) (D) (0, 1)

5. The value of $\oint_C y^2\,dx - x^2\,dy$ where c is the boundary of the triangle whose vertices are (1, 0), (0, 1) and (–1, 0) is

(A) 2/3 (B) 1/3 (C) 2 (D) –2/3

6. The particular integral of the differential equation $(D-2)^2 y = e^{2x} + 3$ is

(A) $\frac{x^2}{2}e^{2x} + \frac{3}{4}$ (B) $\frac{x}{2}e^{2x} + 3$ (C) 0 (D) $e^{2x} + 3$

7. If $F(s)$ and $G(s)$ are Laplace transforms of $f(t)$ and $g(t)$, then the inverse Laplace transform of the product $F(s)\ G(s)$ is

(A) $\int_0^1 f(u)g(t-u)du$ (B) $\int_0^t f(u)g(t-u)du$

(C) $f(t)g(t)$ (D) None

8. The convergence condition of the iterations $x_{n+1} = \phi(x_n)$ is

(A) $|\phi'(x_n)| > 1$ (B) $|\phi'(x_n)| = 0$

(C) does not depend on ϕ (D) $|\phi'(x_n)| < 1$

9. If $f(x)$ is given in the following table then, the value of $\int_0^4 f(x)dx$ by trapezoidal rule is

x	0	1	2	3	4
$f(x)$	2	2	4	8	14

(A) 22 (B) 44 (C) 64 (D) 18

10. For a differential equation $\frac{dy}{dx} = x^2 + y$ subject to $y(0) = 1$ the next approximation with Picard iteration method is

(A) $y_1 = 1 + x + \frac{x^3}{3}$ (B) $y_1 = 1 - x^2$

(C) $y_1 = 1 + x^2$ (D) $y_1 = 1 + 2x + \frac{x^2}{2}$

11. Pressure Altitude

(A) Pressure differential with respect to Pressure at Sea Level
(B) Physical distance between aircraft and reference (e.g. Sea Level)
(C) Difference in density with International Standard Atmosphere (ISA) temperature
(D) Distance between Center of Earth and parallel surfaces around the spherical earth Gravitational potential same on a surface

12. Indicated Airspeed

(A) airspeed measurement from difference in pressures
(B) airspeed correcting for instrument errors
(C) airspeed corrected for Compressibility effects
(D) actual relative speed between aircraft and airmass, corrected for difference in density at different altitudes

13. Maximum glide endurance is

(A) minimum angle of decent (B) minimum rate of descent
(C) max glide rate (D) minimum sink rate

14. Elevator control effectiveness of an airplane determines the

(A) turn radius
(B) rate of climb
(C) most forward location of the centre of gravity
(D) after location of the centre of gravity

15. True Airspeed is

(A) airspeed measurement from difference in pressures
(B) airspeed correcting for instrument errors
(C) airspeed corrected for compressibility effects
(D) actual relative speed between aircraft and airmass, corrected for difference in density at different altitudes

16. If the ball oscillates about the equilibrium position and the oscillations never dampen out, it Possess

(A) dynamic stability (B) static stability

(C) neutral stability (D) neutral dynamic stability

17. If the ball oscillates and did not slow down, but continued to climb to a higher position with each oscillation it would never return to its equilibrium position, the ball posses

(A) dynamic stability (B) netural stability

(C) negative dynamic stability (D) static stability

18. How do jets and props achieve max angle of climb ?

(A) Full throttle at L/D max, props faster than L/D max

(B) 85 % throttle at L/d max, props slower than L/d max

(C) full throttle, jets faster than L/D max, props at L/D max

(D) full throttle, jets at L/d max, props slower than L/d max

19. Which one of the following flight instruments is used on an aircraft to determine its altitude in flight ?

(A) Vertical speed indicator (B) Altimeter

(C) Artificial Horizon (D) Turn-bank indicator

20. Critical aileron reversal speed can be increased by

(A) Increasing the offset distance between the aerodynamic center and center of twist

(B) Increasing the offset distance between the C.G. of the airplane and center of twist

(C) Increasing the stiffness of the wing

(D) Increasing the offset distance between the aerodynamic center and C.G. of the airplane

21. Schlieren technique could be used in a wind tunnel

(A) to measure the pressure distribution over a model being tested

(B) to measure the velocity distribution over a model being tested

(C) for optical flow visualization over a model being tested

(D) all of the above

22. Phugoid mode is associated with

(A) Stick fixed static longitudinal stability

(B) Stick free static longitudinal stability

(C) Stick fixed static directional stability

(D) Stick fixed dynamic longitudinal stability

23. Which one of the following is the most stable configuration of an airplane in roll ?
(A) Sweep back, anhedral and low wing
(B) Sweep forward, dihedral and low wing
(C) Sweep forward, anhedral and high wing
(D) Sweep back, dihedral and high wing

24. A supersonic airplane is expected to fly at both subsonic and supersonic speeds during its whole flight course. Which one of the following statements is TRUE ?
(A) Airplane will experience less stability in pitch at supersonic speeds than at subsonic speeds.
(B) Airplane will feel no change in pitch stability.
(C) Airplane will experience more stability in pitch at supersonic speeds than at subsonic speeds.
(D) Pitch stability cannot be inferred from the information given.

25. When the airflow over the propeller blades of a failed engine keeps the propeller turning, this is known as
(A) Wind milling
(B) Propeller braking
(C) Reverse thrust
(D) Contra rotating

26. Coordinate turn in a horizontal plane is associated with
(A) increased side slip
(B) gain in altitude
(C) zero side slip angle
(D) loss of altitude

27. Trimming of an airplane means
(A) $\frac{C_L}{C_D}$ is maximum
(B) Rate of climb is maximum
(C) Pitching moment about center of gravity is zero
(D) Maximum rate of climb is zero

28. One engine inoperative condition is associated with
(A) Rudder (B) Elevator (C) Fuselage (D) Aileron

29. NACA 4412 implies the maximum camber of airfoil occurs at
(A) 4% of chord
(B) 40% of chord
(C) 12% of chord
(D) 20% of chord

30. Which one of the following is favourable for an airplane take-off ?
(A) Head wind
(B) Cross wind
(C) Tail wind
(D) Tail wind and cross wind

31. Which of the following pump is generally used to pump highly viscous fluid ?
(A) Air lift pump
(B) Reciprocating Pump
(C) Centrifugal Pump
(D) Screw Pump

32. Which one of the following is TRUE with respect to Phugoid mode of an aircraft ?

(A) Long period and weak damping
(B) Long period and strong damping
(C) Short period and weak damping
(D) Short period and strong damping

33. Buffeting is associated with

(A) A steady amplitude oscillation (B) Unsteady amplitude oscillation
(C) Quasi steady amplitude oscillation (D) Critically damped oscillation

34. Choose the appropriate limiting load factors for designing a fighter.

(A) $-1.8 \leq n \leq 4.4$ (B) $-1.25 \leq n \leq 3.1$
(C) $-4.5 \leq n \leq 7.75$ (D) $-2 \leq n \leq 14.5$

35. Aerodynamic center of an airfoil is the point about which

(A) Pitching moment is zero (B) Pitching moment is constant
(C) Pitching moment is positive (D) Pitching moment is negative

36. Minimum rate of sink is associated with

(A) minimum power (B) minimum thrust
(C) minimum drag (D) minimum lift

37. V-n diagram is a plot of

(A) Velocity Vs normal force (B) volumetric flow Vs normal force
(C) Velocity Vs load factor (D) Volumetric flow Vs load factor

38. Endurance of a jet propelled airplane

(A) increases when altitude increases (B) decreases when altitude increases
(C) is maximum at service ceiling (D) does not depend on altitude

39. The aerodynamic center of a wing section is at 25% of Mean Aerodynamic Chord (MAC) for zero sweep back angle. If the wing is given a sweep back of 35°, the probable position of aerodynamic center in terms of MAC is

(A) 20% (B) 25% (C) 35% (D) 70%

40. Static margin is defined as $\frac{X_1 - X_2}{Mean\ Aerodynamic\ chord}$. What are X_1 and X_2 ?

(A) X_1 = location of neutral point & X_2 = location of center of gravity
(B) X_1 = location of neutral point & X_2 = location of wing aerodynamic center
(C) X_1 = location of wing aerodynamic center & X_2 = location of center of gravity
(D) None

41. For cyclic boundary conditions choose one of the following :
(A) flow through CD nozzle
(B) flow through turbine blades
(C) flow through jet engine combustor
(D) flow over a circular cylinder

42. For specifying adiabatic condition, the following boundary condition is appropriate :
(A) Dirichet boundary condition
(B) Von Neumann boundary condition
(C) Wall temperature specification
(D) Both (A) & (C)

43. In case of shock capturing methods, the following technique can be used :
(A) time dependent technique (B) space marching technique
(C) shooting technique (D) interpolation methods

44. Lift on a delta wing is
(A) calculated from Prandtl-Lanchester lifting line theory
(B) calculated from high angle of attack lifting line theory
(C) computed from empirical formula
(D) calculated from Polhamus's suction analogy

45. Downwash along the span of a wing having elliptical lift distribution
(A) Increases with increase in span
(B) Increases with increase in wing area
(C) Does not change
(D) Decreases with increase in velocity

46. The component of a transonic airplane for which transonic area rule applied is
(A) Nose (B) Wing (C) Tail (D) Fuselage

47. Induced drag of an airplane can be reduced by
(A) Boundary layer fence (B) Spoilers
(C) Winglets (D) Decreasing aspect ratio

48. Prandtl – Glauret rule gives the relation between
(A) Viscous and inviscid flow
(B) Compressible and incompressible flow
(C) Transonic and subsonic flow
(D) Transonic and supersonic flow

49. Velocity potential is valid for
(A) Viscous flow (B) Real flow
(C) Rotational flow (D) Irrotational flow

50. Aerodynamic efficiency of a lifting surface is represented by

(A) D/L (B) $C_L^{1/2} / C_D$ (C) $C_L^{3/2} / C_D$ (D) L/D

51. Transonic drag rise is related to

(A) sonic boom (B) shock stall

(C) very high angle of attack (D) none

52. Zero Mach Number flows are known as

(A) inviscid flows (B) irrotational flows

(C) incompressible flows (D) isentropic flows

53. Potential flows are

(A) irrotational flows (B) viscous flows

(C) shear flows (D) laminar flows

54. If the resultant wind over an aerofoil flying at 300 km/h is tilted by 1.2°, determine the downwash.

(A) –1.746 m/s (B) 100 m/s (C) –100 m/s (D) 1.746 m/s

55. A wing of aspect ratio 4 and efficiency of 0.8 has a profile drag coefficient of 1.2. If the total drag coefficient experienced by the wing is 0.5, the lift coefficient will be

(A) 1.95

(B) 3.82

(C) 1.396

(D) Given data is not sufficient to determine.

56. The circulation at the mid-point of a flat plate at 2° to a free stream of speed 30 m/s is

(A) 3.75 m^2/s (B) 1.046 m^2/s

(C) 2.094 m^2/s (D) 0.2666 m^2/s

57. An incompressible fluid flows over a flat plate with zero pressure gradient. The boundary layer thickness is 1 mm at a location where the Reynolds number is 1000. If the velocity of the fluid alone is increased by a factor of 4, then the boundary layer thickness at the same location, in mm will be

(A) 4 (B) 2 (C) 0.5 (D) 0.25

58. Ambient Pressure is the

(A) Pressure of the surrounding medium such as a fluid or a gas which comes into contact with the object

(B) Pressure of the atmosphere at the altitude at which the aircraft is flying

(C) Pressure as the result of the velocity through a fluid or gas

(D) The feeling in a restaurant or nightclub

59. The reinforcement used in Ceramic Matrix Composite is in the form of
(A) long fiber (B) short fiber/whiskers
(C) silicon carbide and boron nitride. (D) silicate

60. If the load passes through the shear center of the section of a beam, then there will be
(A) no bending of the beam (B) only bending
(C) bending and twisting (D) only twisting

61. Aerodynamics of a spinning cricket ball is related to
(A) Bernoulli's principle (B) Magnus effect
(C) Kutta condition (D) Newton's second law

62. Stalling in an incompressible flow is due to
(A) Sudden expansion (B) Flow separation
(C) Adiabatic compression (D) Isentropic expansion

63. Lifting flow over circular cylinder is obtained by the combination of
(A) Uniform flow + source + vortex (B) Uniform flow + sink + vortex
(C) Source + Sink + Uniform flow (D) Uniform flow + doublet + vortex

64. The induced drag is minimum for the plan form which is
(A) Rectangular (B) Elliptic (C) Parabolic (D) Square

65. The following equation is widely used for computation of steady transonic flows over and airfoil using relaxation techniques :
(A) Sprieter's equation (B) Murman-Cole equation
(C) Poisson's equation (D) Prandtl's equation

66. Let the exact solution obtained using a computer with infinite accuracy be denoted by '*D*'. Similarly, denote the numerical solution computed by using a real machine with finite accuracy by '*N*' and analytical solution of the PDE by '*A*', then we may write discretization error as
(A) $A - D$ (B) $N - D$ (C) $D - N$ (D) $A - N$

67. Numerical panel methods are applicable for
(A) steady, incompressible and inviscid flows only
(B) unsteady, incompressible and inviscid flows
(C) steady, compressible and inviscid flows
(D) unsteady, compressible and inviscid flows

68. Artificial viscosity is added to numerical scheme to
(A) create viscous effect to an inviscid equation
(B) create compressibility
(C) dissipate the solution
(D) reduce discretization error

69. In numerical grid generation the condition for orthogonality of grids is defined as

(A) $x_\xi x_\eta + y_\xi y_\eta = 0$ (B) $x_\xi x_\eta - y_\xi y_\eta = 0$

(C) $x_\xi y_\eta + x_\xi y_\eta = 0$ (D) $x_\xi y_\eta - x_\xi y_\eta = 0$

70. Numerical grid generation is carried out for the following reason :

(A) descritization of flow domain

(B) controlling the flow domain

(C) specifying the boundary conditions for flow domain

(D) defining flow variables inside the flow domain

71. (i) In the stiffness method of analyzing indeterminate structures, displacements are taken as the unknown quantities.

(ii) In the flexibility method of analyzing indeterminate structures, forces are taken as the unknown quantities.

(iii) The stiffness method is limited to structures that behave in a linearly elastic manner.

(iv) The flexibility method is limited to structures that behave in a linearly elastic manner.

Which of the above statements are true ?

(A) All the four statements (B) (iii) alone

(C) (iii) and (iv) (D) (i), (ii) and (iii)

72. A simply-supported beam of 2 m length is subject to a linearly varying distributed load of zero intensity at the left end to 50 N/m at the right end. The support reactions are R_1 at the left end and R_2 at the right end

(A) $R_1 = 33.33$ N (B) $R_2 = 16.66$ N

(C) $R_1 = 16.66$ N (D) $R_1 = 25$ N

73. A given column is constrained to bend in the x-y plane. Its cross-section should be chosen such that

(A) the moment of inertia for bending in the x-y plane is large

(B) the moment of inertia for bending in the x-z plane is large

(C) the cross-section area is minimum for a given value of moment of inertia for bending in the x-z plane

(D) (B) and (C) both are correct

74. Which of the following statements below represent Maxwell's reciprocal theorem ?

(A) the deflection at point A due to a load acting at point B is equal to the deflection at point B due to the same load acting at point A.

(B) the angle of rotation at point A due to a force acting at point B is numerically equal to the deflection at point B due to a couple acting at point A provided the force and the couple have the same numerical value.

(C) both (A) and (B) are correct statements.

(D) both (A) and (B) are incorrect statements.

75. For a thin-walled angle section, the shear center position
(A) coincides with the centroid of the section
(B) lies at the corner of the angle
(C) depends on the applied load
(D) lies on the line which connects centroid and angle corner

76. Consider a doubly symmetric thin-walled hollow rectangular section subject to a downward force through the rectangle center. At which point will the shear stress be maximum ?
(A) At the upper left and right corners
(B) At the lower left and right corners
(C) At the mid-points of the left and right walls
(D) At the rectangle center

77. Which of the following statements are true ?
(A) A beam having a doubly symmetric cross-section can never experience unsymmetric bending.
(B) A beam having a singly symmetric cross-section can never experience unsymmetric bending.
(C) Both (A) and (B) are correct statements.
(D) Both (A) and (B) are incorrect statements.

78. A hollow shaft of same cross sectional area as solid shaft transmits
(A) same torque (B) less torque
(C) more torque (D) depends on the external diameter

79. For a symmetrical section the magnitude of the cross product of inertia is
(A) zero (B) minimum (C) maximum (D) none of the above

80. A beam with boom areas resists varying bending moment. If the walls are ineffective in bending then the shear flow variation between two boom areas is
(A) linear (B) zero (C) constant (D) parabolic

81. For a 3D orthotropic material, the number of independent elastic constants are
(A) 4 (B) 9 (C) 2 (D) 21

82. For every ply above the laminate midplane, there is an identical ply (material and orientation) an equal distance below the midplane is called
(A) Symmetric Laminate (B) Unsymmetric laminate
(C) Balanced Laminate (D) Unbalanced Laminate

83. A cantilever beam of length L is subjected to a bending moment M at its free end. The shear force at its midpoint is
(A) M/(2L) (B) M/L (C) 0 (D) M/(4L)

84. A cantilever 6 m long carries a point load of 100 kN at its free end and another load P at the middle of its length. If the maximum bending moment is 900 kN-m the value of P is
(A) 200 kN (B) 150 kN (C) 100 kN (D) 50 kN.

85. A circular rod of length L and torsional rigidity GJ is fixed at one end and free at the other end. If a twisting moment T is applied at a distance L/2 from fixed end, the angle of twist at free end will be
(A) TL/(2GJ) (B) TL/(GJ) (C) 2TL/(GJ) (D) 4TL/(GJ)

86. If the vorticity vector is zero at every point in a flow, the flow is said to be
(A) rotational (B) irrotational (C) circular (D) turbulent

87. The Reynold's Number for fluid flow in a pipe is independent of
(A) viscosity of the fluid (B) velocity of the fluid
(C) diameter of the pipe (D) length of the pipe

88. Subspace iteration method is used to
(A) extract all the eigen values of the problem
(B) extract the least eigen value
(C) extract the largest eigen value
(D) extract the specified number of eigen values

89. The underbody can be used to create _____ of the car's down force.
(A) 30% (B) 40% (C) 50% (D) 60%

90. In a two dimensional problem the state of pure shear at a point is characterized by
(A) $\varepsilon_x = \varepsilon_y$ and $\gamma_{xy} = 0$ (B) $\varepsilon_x = -\varepsilon_y$ and $\gamma_{xy} \neq 0$
(C) $\varepsilon_x = -2\varepsilon_y$ and $\gamma_{xy} \neq 0$ (D) $\varepsilon_x = -0.5\varepsilon_y$ and $\gamma_{xy} \neq 0$

91. A coil is cut into two halves. The stiffness of cut coils will be
(A) double (B) half (C) same (D) quadrupled

92. The effective length of a column with one end fixed and the other end is free
(A) its own length (B) twice its length
(C) half its length (D) two and half its length

93. Castigliano's theorem is valid for
(A) Elastic structure (B) Truss
(C) Beam (D) Linear structure

94. If the load passes through the shear center of the section of a beam, then there will be
(A) no bending of the beam (B) only bending
(C) bending with twisting (D) only twisting

95. A propeller aircraft is flying at high subsonic speed. As propeller r.p.m. is increased shocks, on the propeller, would first appear at

(A) root of propeller blades (B) tips of propeller blades
(C) propeller hub (D) simultaneously all over propeller

96. Buckling of the fuselage skin can be delayed by

(A) increasing internal pressure
(B) placing stiffeners farther apart
(C) reducing skin thickness
(D) placing stiffeners farther and decreasing internal pressure

97. Which of the following action induce torsional stresses on the fuselage structure ?

(A) Rudder deflection (B) Landing gear actuation
(C) Elevator deflection (D) Aileron deflection

98. In curved beams the distribution of bending stress is

(A) linear (B) parabolic (C) uniform (D) hyperbolic

99. A cantilever of length 2L is subjected to a tip load P. The transverse deflection at the midpoint of the cantilever is

(A) $5PL^3/6EI$ (B) $5PL^2/6EI$ (C) $6PL^3/EI$ (D) $6PL^2/5EI$

100. If a convergent – divergent nozzle is under 'choked flow' condition then mass flow through the nozzle

(A) is zero
(B) remains constant with reduction in exit pressure
(C) decreases with reduction in exit pressure
(D) increases with reduction in exit pressure

101. On a variable pitch propeller, the largest obtainable pitch angle is known as

(A) Fine pitch (B) Take-off pitch
(C) Optimum pitch (D) Coarse pitch

102. One of the reasons for combustion instability of scramjet engine is due to

(A) expansion of the working medium
(B) compression due to heat addition
(C) compression in isolator
(D) compression due to fuel injection

103. Choose the correct statement :

Bell shaped nozzles have the value of $\chi = \frac{1+\cos\chi}{2}$ in the following range :

(A) 0.9 to 0.99 (B) 0.8 to 0.88 (C) 0.5 to 0.55 (D) 1 to 1.33

104. The phenomenon 'rotating stall' is peculiar to the following :

(A) Axial flow compressor blade passage
(B) Centrifugal flow compressor blade passage
(C) Axial flow turbine blade passage
(D) Wing sections of turbojet aircraft

105. An over-expanded supersonic nozzle is one, in which

(A) the nozzle exit pressure is greater than the ambient pressure

(B) the nozzle exit pressure is equal to the ambient pressure

(C) the nozzle exit pressure is lower than the ambient pressure

(D) the nozzle throat pressure is greater than the ambient pressure

106. Direct fuel injection is often used in aero piston engines, in preference to float chamber carburetors. Which of these statements applies to the direct fuel injection system ?

(A) The fuel does not have to be vaporized

(B) It cannot operate inverted

(C) A throttle butterfly is unnecessary

(D) There is no choke in the intake

107. The operational range of Mach number for a ramjet engine is between

(A) 2 and 5 (B) 0.3 and 0.8 (C) 0.1 and 0.3 (D) 1.2 and 2.0

108. The following type of engine is widely used for civil transportation by airplanes :

(A) turbojet (B) turboprop (C) turbofan (D) piston type

109. The aircraft powered by the following engine requires the longest runway :

(A) ramjet (B) turbojet (C) turboprop (D) turbofan

110. "Blade twist" in a propeller helps to

(A) make feathering possible

(B) make the blade stronger and lighter

(C) reduce noise levels

(D) even out the thrust along the length of the blade

111. In the critical operation of supersonic inlets the normal shock position is

(A) at the lip of the inlet

(B) inside the inlet

(C) outside the inlet

(D) at the exit section of the inlet

112. For a simply supported beam with central load, at the location of the load

(A) Deflection is maximum with zero slope

(B) Deflection is maximum with maximum slope

(C) Deflection and slope are zero

(D) Deflection is zero with maximum slope

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

(A) 67 (B) 15 (C) 8 (D) 4

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

(A) 24 (B) 6 (C) 42 (D) 2

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

(A) 10 to 12 (B) 4 to 6 (C) 18 to 20 (D) 1^{st} & 2^{nd} stages

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

(A) half of ambient pressure

(B) ambient pressure

(C) one-fourth of combustion chamber pressure

(D) pressure at inlet section of the intake of the engine

117. The typical value of temperature in gas turbine engine combustion chamber primary zone is about

(A) 2600 K (B) 4000 K (C) 1200 K (D) 600 K

118. Flame stability is ensured when

(A) reaction time more than residence time of the internal flow medium

(B) the residence time is more than the reaction time of the medium

(C) flame velocity is more than internal velocity

(D) internal flow velocity is more than flame velocity

119. The bypass ratio in a modern turbofan engine lies in the range of

(A) 0.1 to 0.5 (B) 5 to 9 (C) 1.1 to 2 (D) 0.8 to 1.2

120. The type of compression that a working medium undergoes in a ramjet engine inlet is in the following order :

(A) shock compression, subsonic ram compression and mechanical compression

(B) shock compression, mechanical compression and subsonic ram compression

(C) subsonic ram compression and shock compression

(D) shock compression, subsonic ram compression

SPACE FOR ROUGH WORK