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Aerospace Engineering

Group Number : 1
Group Id : 39090047
Group Maximum Duration : 0
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Revisit allowed for edit? : No
Break time: 0
Group Marks: 120

Mathematics

Section Id : 39090087
Section Number : 1
Section type : Online
Mandatory or Optional: Mandatory
Number of Questions: 10
Number of Questions to be attempted: 10
Section Marks: 10
Display Number Panel: Yes
Group All Questions: No

Sub-Section Number: 1
Sub-Section Id: 39090087
Question Shuffling Allowed : Yes

Question Number : 1 Question Id : 3909005521 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Rank of the matrix $\begin{bmatrix} -1 & 2 & 3 & 2 \\ 4 & 0 & -1 & -1 \\ -6 & -2 & -2 & -1 \\ 2 & 2 & 3 & 2 \end{bmatrix}$ is

Options :

1. 1
2. 2
3. 3
4. 4

Question Number : 2 Question Id : 3909005522 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The number of solutions of the system

$$x + 2y + z = 2$$

$$2x + y + z = 0$$

$$x - y = 2$$

Options :

1. 0
2. 1
3. 2
4. 3

Question Number : 3 Question Id : 3909005523 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A is a square matrix of order 3, with eigen value 1, -1, 2 and $A = PBP^{-1}$ for some matrices B, P , then the sum of eigen values of B^2 is

Options :

1. 3
2. 4

3. 5

4. 6

Question Number : 4 Question Id : 3909005524 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
 Single Line Question Option : No Option Orientation : Vertical
 Correct Marks : 1 Wrong Marks : 0

Global maximum of $f(x) = x - \sin 2x$ in $\left[0, \frac{\pi}{2}\right]$ is attained at $x =$

Options :

1. $\pi/3$ 2. $\pi/4$ 3. $\pi/5$ 4. $\pi/6$

Question Number : 5 Question Id : 3909005525 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
 Single Line Question Option : No Option Orientation : Vertical
 Correct Marks : 1 Wrong Marks : 0

Domain of the real function $f(x, y) = \ln(x - y) + xy$ is

Options :

1. $\{(x, y): x > y\}$ 2. $\{(x, y): x < y\}$ 3. $\{(x, y): |x| > |y|\}$ 4. $\{(x, y): xy > 0\}$

Question Number : 6 Question Id : 3909005526 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
 Single Line Question Option : No Option Orientation : Vertical
 Correct Marks : 1 Wrong Marks : 0

The function $f(x, y) = \begin{cases} \frac{3x^2y}{x^2+y^2} & \text{if } (x, y) \neq (0, 0) \\ 0 & \text{if } (x, y) = (0, 0) \end{cases}$ is continuous on

Options :

1. $\mathbb{R}^2$
2. $\mathbb{R}^2 - (0,0)$
3. $\{(0,0)\}$
4. $\mathbb{R}^2 - (1,1)$

Question Number : 7 Question Id : 3909005527 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
 Single Line Question Option : No Option Orientation : Vertical
 Correct Marks : 1 Wrong Marks : 0

If $z = 3xy^4 + x^2y$, where $x = \sin 2t$, $y = \cos t$, then $\left. \frac{dz}{dt} \right|_{t=0} =$

Options :

1. 3
2. 4
3. 5
4. 6

Question Number : 8 Question Id : 3909005528 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
 Single Line Question Option : No Option Orientation : Vertical
 Correct Marks : 1 Wrong Marks : 0

Inverse Laplace transform of $\left(\frac{2}{s^2 - 2s + 5} \right) =$

Options :

1. $e^{2t} \cos t$
2. $e^t \sin 2t$
3. $e^t \cos 2t$
4. $e^{2t} \sin t$

Question Number : 9 Question Id : 3909005529 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
 Single Line Question Option : No Option Orientation : Vertical
 Correct Marks : 1 Wrong Marks : 0

If $y = y(x)$ is the solution of $y'' + y = 0$, $y(0) = 1$, $y'(0) = 1$, then $y^2(x) - 1 =$

Options :

1. $\sin 2x$
2. $\cos 2x$
3. $\sec 2x$
4. $\operatorname{cosec} 2x$

Question Number : 10 Question Id : 3909005530 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
 Single Line Question Option : No Option Orientation : Vertical
 Correct Marks : 1 Wrong Marks : 0

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

Options :

1. $x - 1$
2. $x^2 + 1$
3. $x + 1$
4. $x^2 - 1$

Aerospace Engineering

Section Id :	39090088
Section Number :	2
Section type :	Online
Mandatory or Optional:	Mandatory
Number of Questions:	110
Number of Questions to be attempted:	110
Section Marks:	110
Display Number Panel:	Yes
Group All Questions:	No

Sub-Section Id: 39090088
Question Shuffling Allowed : Yes

Question Number : 11 Question Id : 3909005531 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Under the standard atmospheric conditions, the temperature _____ in the troposphere.

Options :

1. decreases with increase in altitude
2. increases with increase in altitude
3. remains constant with altitude
4. varies exponentially with altitude

Question Number : 12 Question Id : 3909005532 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

In the Ionosphere, the temperature gradient with altitude is

Options :

1. positive.
2. negative.
3. zero.
4. complex.

Question Number : 13 Question Id : 3909005533 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

In the stratosphere, pressure

Options :

1. varies linearly with increase in altitude.
2. varies parabolically with increase in altitude.

3. remains constant with altitude.
4. varies exponentially with altitude.

Question Number : 14 Question Id : 3909005534 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

A barometric altimeter is a

Options :

1. pressure gauge which translates pressure reading into altitude.
2. temperature gauge which translates temperature reading into altitude.
3. density gauge which translates density reading into altitude.
4. gauge which translates altitude reading into pressure.

Question Number : 15 Question Id : 3909005535 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The cruise Mach number of SR-71 Blackbird is

Options :

1. 0.5
2. 1.0
3. 2.0
4. 3.0

Question Number : 16 Question Id : 3909005536 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The pressure measured using a sounding rocket at a specific altitude is $5.4 \times 10^4 \text{ N/m}^2$. The temperature measured at the same location is -18°C . The density at the same location is

Options :

1. 2.737 kg/m^3
2. 1.225 kg/m^3
3. 1.737 kg/m^3
4. 0.737 kg/m^3

Question Number : 17 Question Id : 3909005537 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Under standard atmospheric conditions, pressure at 5 km altitude is

Options :

1. 1.013 N/m^2
2. 1.013 bar
3. $5.4 \times 10^4 \text{ N/m}^2$
4. 5.4 bar

Question Number : 18 Question Id : 3909005538 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Under standard atmospheric conditions, temperature at 12 km altitude is

Options :

1. 273 K
2. 273°C
3. 216°C
4. 216 K

Question Number : 19 Question Id : 3909005539 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Under standard atmospheric conditions, the density at 20 km altitude is

Options :

1. 0.0889 kg/m^3
2. 1.225 kg/m^3
3. 1.013 kg/m^3
4. 2 kg/m^3

Question Number : 20 Question Id : 3909005540 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In a low speed wind tunnel, the area of cross section of the inlet is $24 \text{ cm} \times 24 \text{ cm}$. The area of the test section is $8 \text{ cm} \times 8 \text{ cm}$. The ratio of the average speed at the test section to that at the inlet is

Options :

1. 9
2. 3
3. $1/9$
4. $1/3$

Question Number : 21 Question Id : 3909005541 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Isentropic relation between pressure and density is

Options :

1. $\frac{p}{\rho^{\gamma-1}} = \text{constant}$
2. $\frac{p}{\rho^{\gamma}} = \text{constant}$
3. $\frac{p}{\rho^{1-\gamma}} = \text{constant}$

4. $\frac{p}{\rho^{\gamma+1}} = \text{constant}$

Question Number : 22 Question Id : 3909005542 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Mach number is defined as

Options :

1. True air speed / Speed of sound
2. Speed of sound / True air speed
3. True air speed X Speed of sound
4. (Speed of sound X True air speed)²

Question Number : 23 Question Id : 3909005543 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

For steady, isentropic compressible flow, the relation between pressure, density and velocity is

Options :

1. $\frac{\gamma}{\gamma-1} \frac{p}{\rho} + \frac{V^2}{2} = \text{constant}$
2. $\frac{\gamma}{\gamma+1} \frac{p}{\rho} + \frac{V^2}{2} = \text{constant}$
3. $\frac{p}{\rho} + \frac{V^2}{2} = \text{constant}$
4. $\frac{p}{\rho} + \frac{\gamma}{\gamma-1} \frac{V^2}{2} = \text{constant}$

Question Number : 24 Question Id : 3909005544 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The speed of sound in air at 0°C is

Options :

1. 0 m/s
2. 331 m/s
3. 340 m/s
4. 1000 m/s

Question Number : 25 Question Id : 3909005545 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Pitot tube measures the

Options :

1. stagnation pressure only
2. stagnation temperature only
3. static pressure only
4. stagnation and static pressure

Question Number : 26 Question Id : 3909005546 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Equivalent airspeed is calculated based on

Options :

1. Density of air at sea-level standard conditions
2. Density of water at sea-level standard conditions
3. Density of air at the flight altitude
4. Density of air at the service ceiling

Question Number : 27 Question Id : 3909005547 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following relations between true air speed (TAS) and equivalent air speed (EAS) is true?

Options :

1. $TAS > EAS$
2. $TAS < EAS$
3. $TAS = EAS$
4. $TAS = EAS/2$

Question Number : 28 Question Id : 3909005548 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Corrected airspeed indicator reading is

Options :

1. Corrected for position error but not for instrument error
2. Corrected for position error and instrument error
3. Corrected for neither position error nor instrument error
4. Corrected for instrument error but not for position error

Question Number : 29 Question Id : 3909005549 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Airplane lift coefficient during steady, level flight is calculated using

Options :

1. $\frac{T}{\frac{1}{2}\rho V^2 S}$
2. $\frac{D}{\frac{1}{2}\rho V^2 S}$
3. $\frac{T-D}{\frac{1}{2}\rho V^2 S}$

4. $\frac{W}{\frac{1}{2}\rho V^2 S}$

Question Number : 30 Question Id : 3909005550 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The aspect ratio of a rectangular wing of span 4 m and chord length 1 m is

Options :

1. 16
2. 4
3. 1/16
4. $\frac{1}{4}$

Question Number : 31 Question Id : 3909005551 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The Kutta-Joukowski theorem relates the lift to circulation as

Options :

1. $L = \Gamma$
2. $L = \rho V \Gamma$
3. $L = \rho V / \Gamma$
4. $L = V \Gamma$

Question Number : 32 Question Id : 3909005552 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

For air at sea level conditions, the coefficient of viscosity

Options :

1. increases with increase in temperature
2. decreases with increase in temperature

3. remains constant with increase in temperature
4. depends on velocity only

Question Number : 33 Question Id : 3909005553 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The Reynolds number based on the diameter for a sphere of radius 0.5 cm in a fluid having a freestream velocity of 1 m/s and kinematic viscosity $10^{-5} \text{ m}^2/\text{s}$ is

Options :

1. 10^5
2. 10^3
3. 0.5×10^5
4. 0.5×10^3

Question Number : 34 Question Id : 3909005554 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The laminar boundary layer thickness over a flat plate with no pressure gradient

Options :

1. grows linearly in the downstream direction
2. grows exponentially in the downstream direction
3. grows parabolically in the downstream direction
4. remains constant

Question Number : 35 Question Id : 3909005555 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The skin friction drag coefficient due to a laminar boundary layer over a flat plate with no pressure gradient is

Options :

1. independent of the Reynolds number
2. directly proportional to Reynolds number
3. inversely proportional to square root of Reynolds number
4. directly proportional to square root of Reynolds number

Question Number : 36 Question Id : 3909005556 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

At the flow separation, the shear stress due to the flow is

Options :

1. positive
2. negative
3. zero
4. infinite

Question Number : 37 Question Id : 3909005557 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Camber is defined as

Options :

1. Maximum distance of mean line from the chord line
2. Minimum distance of mean line from the chord line
3. Curvature of the mean line
4. Curvature of the chord line

Question Number : 38 Question Id : 3909005558 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Drag polar relates

Options :

1. c_m and c_d
2. c_l and c_d
3. c_l and c_m
4. c_l and α

Question Number : 39 Question Id : 3909005559 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The pitching moment is related to the pitching moment coefficient as

Options :

1. $m = c_m qc$
2. $m = c_m qc^2$
3. $m = c_m qc^3$
4. $m = c_m q$

Question Number : 40 Question Id : 3909005560 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The aerodynamic center is defined as the point

Options :

1. About which the variation of pitching moment with angle of attack is zero
2. At which the aerodynamic forces are acting
3. About which pitching moment is zero
4. Which is the center of the aerofoil

Question Number : 41 Question Id : 3909005561 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

For an airfoil at low subsonic speeds, the aerodynamic center is at the

Options :

1. Leading edge
2. Trailing edge
3. Center
4. Quarter-chord point

Question Number : 42 Question Id : 3909005562 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

At low speeds, the coefficient of pressure is related to velocity as

Options :

1. $c_p = 1 - \left(\frac{V}{V_\infty}\right)$
2. $c_p = 1 - \left(\frac{V}{V_\infty}\right)^2$
3. $c_p = 1 - \left(\frac{V}{V_\infty}\right)^3$
4. $c_p = 1 - \left(\frac{V}{V_\infty}\right)^{-2}$

Question Number : 43 Question Id : 3909005563 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The Prandtl-Glauert transformation factor for a Mach number 0.86 is

Options :

1. 0.25
2. 0.5

3. 1.0

4. 2.0

Question Number : 44 Question Id : 3909005564 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Drag divergence is

Options :

1. The increase in zero-lift drag coefficient at high subsonic Mach number
2. Divergence of wing due to aero-elastic effect
3. Due to the flow transitioning to turbulent flow
4. Flow becoming supersonic on the windward side of airfoil

Question Number : 45 Question Id : 3909005565 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Supercritical airfoils are

Options :

1. Characterized by thick trailing edges
2. Characterized by sharp leading and trailing edges
3. Having higher drag-divergence Mach number compared to conventional airfoil
4. Designed for operation in supersonic mean flow conditions

Question Number : 46 Question Id : 3909005566 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The maximum thickness of NACA 23015 airfoil is

Options :

1. 0.23 c
2. 0.30 c
3. 0.15 c
4. 3.0 c

Question Number : 47 Question Id : 3909005567 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Which of the following statement is correct under low-subsonic speed?

Options :

1. A thick airfoil has a steep stall
2. A thick airfoil doesn't have stall
3. A thick airfoil has a gradual stall
4. A thin airfoil doesn't have stall

Question Number : 48 Question Id : 3909005568 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Stall occurs in airfoil because of

Options :

1. Flow separation
2. Laminar to turbulent transition
3. Flow becoming supersonic
4. Flow reattachment

Question Number : 49 Question Id : 3909005569 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Using a plain flap on an airfoil will

Options :

1. Increase the slope of the lift curve
2. Reduce the drag of the airfoil
3. Increase the maximum lift coefficient
4. Increase the stall angle

Question Number : 50 Question Id : 3909005570 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The induced drag coefficient is related to the lift coefficient as

Options :

1. $C_{Di} = \frac{C_L}{\pi e AR}$
2. $C_{Di} = \frac{C_L^2}{\pi e AR}$
3. $C_{Di} = \frac{C_L^{3/2}}{\pi e AR}$
4. $C_{Di} = \text{Constant}$

Question Number : 51 Question Id : 3909005571 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The propulsive efficiency of a jet flying at 800 kmph with a jet exhaust velocity of 1600 kmph

Options :

1. 50 %
2. 67 %
3. 75 %

4. 100 %

Question Number : 52 Question Id : 3909005572 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The bypass ratio of a turbofan engine where 20 % of the mass flows through the turbine is

Options :

1. 2

2. 4

3. 6

4. 8

Question Number : 53 Question Id : 3909005573 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

During steady un-powered flight, the angle a glider makes with the horizon is given by

Options :

1. $\sin \gamma = \frac{C_D}{C_L}$

2. $\cos \gamma = \frac{C_D}{C_L}$

3. $\tan \gamma = \frac{C_D}{C_L}$

4. $\sin \gamma = \frac{C_L}{C_D}$

Question Number : 54 Question Id : 3909005574 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The maximum possible ratio of lift to drag, $\left(\frac{C_L}{C_D}\right)_{max}$ is

Options :

1. $\frac{1}{2} \sqrt{\frac{\pi A R e}{C_{D0}}}$

2. $\sqrt{\frac{\pi A R e}{C_{D0}}}$

3. $\frac{1}{2} \sqrt{\frac{\pi}{C_{D0}}}$

4. $2 \sqrt{\frac{\pi A R e}{C_{D0}}}$

Question Number : 55 Question Id : 3909005575 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The $\left(\frac{C_L}{C_D}\right)_{max}$ for a glider is 15. The minimum possible flight path angle is

Options :

1. 1.77°

2. 2.77°

3. 3.77°

4. 4.77°

Question Number : 56 Question Id : 3909005576 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following conditions can be used to achieve low-stall speed?

Options :

1. high wing loading

2. high C_{Lmax}

3. high C_L/C_D

4. reducing C_D

Question Number : 57 Question Id : 3909005577 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

During steady climb, the thrust required is related to weight and drag as

Options :

1. $T = D + W \sin \gamma$
2. $T = W \sin \gamma$
3. $T = D$
4. $T = D + W$

Question Number : 58 Question Id : 3909005578 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

During the steady, level, powered flight of an aircraft with turbojet engine, the velocity for minimum thrust condition is

Options :

1. $\sqrt{\frac{\frac{2W}{\rho S}}{\sqrt{\pi A Re C_{D0}}}}$
2. $\sqrt{\frac{\frac{2W}{\rho S}}{\pi A Re C_{D0}}}$
3. $\frac{\frac{2W}{\rho S}}{\sqrt{\pi A Re C_{D0}}}$
4. $\sqrt{\frac{\frac{W}{\rho S}}{\sqrt{\pi A Re C_{D0}}}}$

Question Number : 59 Question Id : 3909005579 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

During the steady, level, powered flight of an aircraft with turbojet engine, the ratio of induced drag to total drag is

Options :

1. 0.25
2. 0.33
3. 0.5
4. 0.67

Question Number : 60 Question Id : 3909005580 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

For propeller driven airplane, the ratio of speed for minimum drag to minimum power is

Options :

1. 1
2. 1.12
3. 1.22
4. 1.32

Question Number : 61 Question Id : 3909005581 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

For a propeller driven airplane, the rate of climb is given by

Options :

1. Power available/Weight
2. Power required/Weight
3. (Power available – Power required)/Weight

4. $(\text{Power available} + \text{Power required})/\text{Weight}$

Question Number : 62 Question Id : 3909005582 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Absolute ceiling is the altitude at which

Options :

1. The rate of climb is maximum
2. The rate of climb is zero
3. The power available is zero
4. The thrust available is zero

Question Number : 63 Question Id : 3909005583 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The service ceiling of a jet-powered commercial airplane is defined as the altitude at which the rate of climb is

Options :

1. 0 feet /min
2. 500 feet /min
3. 1000 feet/min
4. 2000 feet/min

Question Number : 64 Question Id : 3909005584 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

For a jet-powered aircraft, maximum range occurs when aircraft is flying at a velocity such that _____ is maximum

Options :

1. C_L/C_D

2. $1/C_D$
3. $\sqrt{C_L}/C_D$
4. C_L

Question Number : 65 Question Id : 3909005585 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The load factor is defined by

Options :

1. L/W
2. W/L
3. T/D
4. W/S

Question Number : 66 Question Id : 3909005586 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following is not an example of buffeting?

Options :

1. Flow separation over the wing exciting the wing structure
2. Wake from the wing exciting the horizontal tail
3. Separated flow from spoilers hitting the horizontal tail
4. Aerodynamic forces overcoming wing strength and resulting in divergence

Question Number : 67 Question Id : 3909005587 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The static longitudinal stability criterion is satisfied when

Options :

1. Aerodynamic center is ahead of center of gravity
2. Aerodynamic center is behind center of gravity
3. Aerodynamic center and center of gravity coincide
4. Center of pressure is ahead of center of gravity

Question Number : 68 Question Id : 3909005588 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

An aircraft in flight has _____ degrees of freedom

Options :

1. two
2. four
3. six
4. eight

Question Number : 69 Question Id : 3909005589 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

About trimmed equilibrium of an aircraft, which of the following statement is false?

Options :

1. The aircraft is in equilibrium
2. The net force on the aircraft is zero
3. The net moment acting on the aircraft is zero
4. The aircraft is accelerating

Question Number : 70 Question Id : 3909005590 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

For an aircraft having wing area S , standard mean chord c , area of tail plane S_T and tail moment arm l_T , the tail volume ratio is defined as

Options :

1. $\frac{S \cdot C}{S_T \cdot l_T}$

2. $\frac{S_T \cdot l_T}{S \cdot C}$

3. $\frac{S \cdot l_T}{S_T \cdot C}$

4. $\frac{S_T \cdot C}{S \cdot l_T}$

Question Number : 71 Question Id : 3909005591 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

For a conventional aircraft, positive right push on the stick leads to

Options :

1. nose up pitch response

2. nose to the right response

3. left wing down response

4. right wing down response

Question Number : 72 Question Id : 3909005592 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The tendency of an aircraft to converge to the initial equilibrium condition following a small disturbance from equilibrium is referred to as

Options :

1. Static stability

2. Dynamic stability

3. Trim
4. Controls free motion

Question Number : 73 Question Id : 3909005593 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

_____ contributes significantly to lateral static stability of an aircraft

Options :

1. Wing sweep
2. Aspect ratio
3. Wing dihedral
4. Fins

Question Number : 74 Question Id : 3909005594 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

A lightly damped, low frequency oscillation in speed which couples with pitch attitude and height of the aircraft is known as

Options :

1. Dutch roll
2. Phugoid
3. Roll subsidence mode
4. Spiral mode

Question Number : 75 Question Id : 3909005595 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The Lanchester's model predicts the phugoid frequency as

Options :

1. $\frac{g\sqrt{2}}{V_0}$

2. $\frac{g}{V_0}$

3. $\frac{V_0}{g\sqrt{2}}$

4. $\frac{V_0}{g}$

Question Number : 76 Question Id : 3909005596 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

The damping ratio of the phugoid mode is approximately proportional to

Options :

1. $\frac{C_L}{C_D}$

2. $\frac{C_D}{C_L}$

3. $\frac{C_M}{C_D}$

4. $\frac{C_L}{C_M}$

Question Number : 77 Question Id : 3909005597 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

Expand the abbreviation: STOL

Options :

1. Short Take-Off and Landing

2. Steady Take-Off and Landing

3. Smooth Take-Off and Landing

4. Supersonic Take-Off and Landing

Question Number : 78 Question Id : 3909005598 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 1 Wrong Marks : 0

An aircraft with VSTOL capability is

Options :

1. F-15
2. Harrier
3. Mig-29
4. Su 30

Question Number : 79 Question Id : 3909005599 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

For aircrafts capable of thrust vectoring, for maximizing the instantaneous turn rate, the thrust should be aligned at ____ to flight direction

Options :

1. 0^0
2. 30^0
3. 60^0
4. 90^0

Question Number : 80 Question Id : 3909005600 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following is not a flight instrument found on an aircraft?

Options :

1. Densitymeter
2. Machmeter
3. Accelerometer
4. Altitude indicator

Question Number : 81 Question Id : 3909005601 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The space program in which people and equipment were sent to moon was

Options :

1. Gemini
2. Mercury
3. Apollo
4. Saturn

Question Number : 82 Question Id : 3909005602 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

An artificial satellite is moving around earth with r_a being the distance between the center of the earth and the satellite at apogee and r_p being the distance between the center of the earth and the satellite at perigee. The satellite is moving in an elliptical orbit with 'a' being the semi-major axis and 'b' being the semi-minor axis. Then the relation between r_a , r_p and a is

Options :

1. $r_a + r_p = 2a$
2. $r_a + r_p = a$
3. $r_a - r_p = 2a$
4. $r_p - r_a = 2a$

Question Number : 83 Question Id : 3909005603 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Kepler's law states that the time period of a planet around the sun is related to the semi-major axis of its elliptical orbit as

Options :

1. $T \propto a$
2. $T^3 \propto a^2$

3. $T^2 \propto a^3$

4. $T \propto \sqrt{a}$

Question Number : 84 Question Id : 3909005604 Question Type : MCQ Option Shuffling : Yes Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The orbital velocity of a satellite in a circular orbit about the earth at an altitude of h above the equator is

Options :

1. $\sqrt{\frac{GM_e}{R_e+h}}$

2. $\sqrt{\frac{2GM_e}{R_e+h}}$

3. $\sqrt{\frac{GM_e}{2(R_e+h)}}$

4. $\sqrt{\frac{GM_e}{R_e+2h}}$

