

Question Paper Preview

Question Paper Name: Aerospace Engineering 11th May 2017 Shift 1
Subject Name: Aerospace Engineering
Duration: 120

Aerospace Engineering

Display Number Panel: Yes

Group All Questions: No

Question Number : 1 Question Id : 8711121 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If A is a square matrix of order n , then $|2A|$ is

Options :

1. $2^n |A|$

2. $2 |A|$

3. $2^{n-1} |A|$

4. 0

Question Number : 2 Question Id : 8711122 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The value of p for which the equations $2x + 3y = 0$, $6x + py = 0$ can have non trivial solution is

Options :

1. 2

2. 7

3. 9

4. 11

Question Number : 3 Question Id : 8711123 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If $u = \tan^{-1}(y/x)$, then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} =$

Options :

1. $\tan^{-1}(y/x)$
2. $\frac{1}{2} \tan^{-1}(y/x)$
3. 0
4. $\frac{1}{4} \tan^{-1}(y/x)$

Question Number : 4 Question Id : 8711124 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If R is the region bounded by the closed curve C, then the area of R is given by

Options :

1. $\frac{1}{2} \oint (x dy - y dx)$
2. $\frac{1}{2} \oint (y dx + x dy)$
3. $\frac{1}{2} \oint (x dx + y dy)$
4. $\oint (y dx - x dy)$

Question Number : 5 Question Id : 8711125 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The divergence of the vector field $\vec{F} = xy^2\mathbf{i} + 2x^2yz\mathbf{j} - 3yz^2\mathbf{k}$ at (1, 1, 1) is

Options :

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

Question Number : 6 Question Id : 8711126 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The Laplace Transform of $\sin^2(2t)$ is

Options :

1. $2s/(s^2 - 4)$
2. $2/(s(s + 4))$
3. $2s/(s^2 + 4)$
4. $2/(s(s^2 + 4))$

Question Number : 7 Question Id : 8711127 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The complementary function of the differential equation $x^2y'' - xy' + y = \log x$ is

Options :

1. $y = (c_1 + c_2 \log x)x$
2. $y = c_1 + c_2x$
3. $y = (c_1 + c_2x) \log x$
4. $y = c_1 + c_2 \log x$

Question Number : 8 Question Id : 8711128 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The equation $x^6 - x - 1 = 0$ has

Options :

1. Exactly three positive real roots
2. Exactly two positive real roots
3. Exactly one positive real root
4. No positive real root

Question Number : 9 Question Id : 8711129 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Given the following data

x	3	6	9	12
f(x)	-1	1	2	3

By Trapezoidal rule, $\int_3^{12} f(x)dx =$

Options :

1. 8
2. 5
3. 10
4. 12

Question Number : 10 Question Id : 87111210 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The second approximate solution of $dy/dx = y + x$, $y(0) = 1$ by Picard's process is

Options :

1. $1 + x + x^2/2 + x^3/3$
2. $1 + x + x^2/2 + x^3/6$
3. $1 + x + x^2 + x^3/6$
4. $1 + x + x^2 + x^3$

Question Number : 11 Question Id : 87111211 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The typical mean temperature _____ with increasing altitude in the troposphere.

Options :

1. decreases
2. increases
3. remains constant
4. decreases and then increases

Question Number : 12 Question Id : 87111212 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Wide extended horizontal sheet of clouds typically found below 2 km altitude are known as

Options :

1. Stratus clouds
2. Cumulus clouds
3. Cirrus clouds
4. Stratocumulus clouds

Question Number : 13 Question Id : 87111213 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The boundary between troposphere and stratosphere is known as

Options :

1. Tropopause
2. Stratopause
3. Mesopause
4. Exosphere

Question Number : 14 Question Id : 87111214 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The first subsonic commercial aircraft to incorporate a fly by wire system was

Options :

1. Airbus 320
2. Boeing 747
3. Embraer 650
4. Cessna caravan

Question Number : 15 Question Id : 87111215 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Short range aircrafts have range less than

Options :

1. 500 km
2. 1000 km

1500 km

3.

3000 km

4.

Question Number : 16 Question Id : 87111216 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A moment of 100 kg-m/s is imparted to a projectile over a duration of 0.05 s.
What is the force provided to the projectile?

Options :

1. 4000 N

2. 2000 N

3. 5000 N

4. 3000 N

Question Number : 17 Question Id : 87111217 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For an aircraft having a wing span b and standard mean chord c , the aspect ratio of the aircraft is

Options :

1. b^2/c

2. b/c

3. bc

4. c/b

Question Number : 18 Question Id : 87111218 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Which of the following is false for steady level flight?

Options :

1. $T = D$

2. $L = W$

3. $\gamma = 0$

4. $\alpha = 0$

Question Number : 19 Question Id : 87111219 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The C_L for minimum thrust or drag for an aircraft in steady level flight is

Options :

1. $\sqrt{\frac{K}{C_{D0}}}$

2. $\sqrt{\frac{2K}{C_{D0}}}$

3. $\sqrt{\frac{C_{D0}}{K}}$

4. $\sqrt{\frac{K}{2C_{D0}}}$

Question Number : 20 Question Id : 87111220 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The total drag for an aircraft in steady level flight when the drag is minimum is

Options :

1. qSC_{D0}

2. $2qSC_{D0}$

3. $3qSC_{D0}$

4. $4qSC_{D0}$

Question Number : 21 Question Id : 87111221 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

During gliding flight of an aircraft ,

Options :

1. $\frac{L}{D} = \sin \gamma$

2. $\frac{L}{D} = \cos \gamma$

3. $\frac{L}{D} = \tan \gamma$

4. $\frac{L}{D} = \cot \gamma$

Question Number : 22 Question Id : 87111222 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The sink rate of a glider is the

Options :

1. Vertical component of velocity
2. Horizontal component of velocity
3. Rate of change of vertical velocity
4. Rate of change of horizontal velocity

Question Number : 23 Question Id : 87111223 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

At constant angle of attack, the drag of an aircraft is

Options :

1. directly proportional to square root of load factor
2. inversely proportional to square root of load factor
3. inversely proportional to load factor
4. directly proportional to load factor

Question Number : 24 Question Id : 87111224 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The zero-lift drag coefficient of typical aircrafts is in the range

Options :

1. (1,2)
2. (2,5)

(0.01, 0.05)

3.

(-0.05, -0.01)

4.

Question Number : 25 Question Id : 87111225 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Which of the following cannot be determined using a pibal?

Options :

Direction of wind

1.

Speed of wind

2.

Height of cloud

3.

Relative humidity

4.

Question Number : 26 Question Id : 87111226 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For an airfoil, the net aerodynamic force acts at the

Options :

center of pressure

1.

aerodynamic center

2.

quarter-chord point

3.

mid-chord point

4.

Question Number : 27 Question Id : 87111227 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

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

Options :

Static stability

1.

Dynamic stability

2.

Trim

3.

Controls free motion

4.

Question Number : 28 Question Id : 87111228 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

_____ contributes significantly to lateral static stability of an aircraft.

Options :

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

Question Number : 29 Question Id : 87111229 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The damped oscillation in yaw which couples into roll and sideslip is known as

Options :

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

Question Number : 30 Question Id : 87111230 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The sum of the forces on an aircraft along the wind X_s -axis is _____.
(T = Thrust, W = Weight, L = Lift, D = Drag, α = angle of attack, γ = climb angle)

Options :

1. $T \cos \alpha - D - W \cos \gamma$
2. $T \sin \alpha - D - W \cos \gamma$
3. $T \cos \alpha - D - W \sin \gamma$
4. $T \sin \alpha - D - W \sin \gamma$

Question Number : 31 Question Id : 87111231 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The inertial navigation system works on the basis of

Options :

1. Magnetism
2. Gyroscopic principle
3. Atmospheric pressure variation with altitude
4. Location of sun

Question Number : 32 Question Id : 87111232 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The minimum airspeed required for a vertical loop does not depend on

Options :

1. Airspeed lost in the first half of the maneuver
2. Radius of the loop
3. Minimum airspeed required for control
4. Stability margin of the aircraft

Question Number : 33 Question Id : 87111233 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In a stall turn, the acrobatic aircraft uses _____ to turn about the axis normal to the aircraft.

Options :

1. Aileron
2. Rudder
3. Flap
4. Elevator

Question Number : 34 Question Id : 87111234 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

During the maneuver of the roll-off-the-top of a loop, the aircraft turns through

Options :

1. 90°
2. 180°
3. 270°
4. 360°

Question Number : 35 Question Id : 87111235 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The Euler angle ψ is called as

Options :

1. yaw angle
2. roll angle
3. azimuth angle
4. flight path angle

Question Number : 36 Question Id : 87111236 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

There are _____ non-dimensional derivatives with respect to pitch rate of an airplane.

Options :

1. 6
2. 9
3. 12
4. 3

Question Number : 37 Question Id : 87111237 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If the real part of the eigen value is zero, then the solution corresponds to

Options :

1. damped mode

2. un-damped mode
3. rigid body mode
4. divergent mode

Question Number : 38 Question Id : 87111238 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Spiral mode of an airplane is

Options :

1. slowly convergent
2. highly convergent
3. slowly damped oscillatory mode
4. highly damped oscillatory mode

Question Number : 39 Question Id : 87111239 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For steady level flight, the velocity (V) is related to wing loading (W/S) as

Options :

1. $\sqrt{\frac{2 W}{\rho C_L S}}$
2. $\sqrt{\frac{\rho C_L W}{2 S}}$
3. $\frac{2 W}{\rho C_L S}$
4. $\frac{\rho C_L W}{2 S}$

Question Number : 40 Question Id : 87111240 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The power required for steady level flight of an aircraft is

Options :

1. $\frac{1}{2} \rho V^3 S C_{D0} + \frac{KW^2}{\frac{1}{2} \rho V S}$

$$\frac{1}{2} \rho V^3 S C_{D0} + \frac{KW^3}{\frac{1}{2} \rho V S}$$

2.

$$\frac{1}{2} \rho V^2 S C_{D0} + \frac{KW^3}{\frac{1}{2} \rho V S}$$

3.

$$\frac{1}{2} \rho V^2 S C_{D0} + \frac{KW^2}{\frac{1}{2} \rho V S}$$

4.

Question Number : 41 Question Id : 87111241 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The dynamic pressure for minimum power requirement for an aircraft in steady level flight is

Options :

$$\frac{S}{W} \sqrt{\frac{3K}{C_{D0}}}$$

1.

$$\frac{W}{S} \sqrt{\frac{K}{3C_{D0}}}$$

2.

$$\frac{S}{W} \sqrt{\frac{3}{KC_{D0}}}$$

3.

$$\frac{W}{S} \sqrt{\frac{1}{3KC_{D0}}}$$

4.

Question Number : 42 Question Id : 87111242 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The induced drag at the condition of minimum power requirement for an aircraft in steady level flight is ____ that of zero-lift drag.

Options :

1. equal to

2. twice

3. thrice

4.

half

Question Number : 43 Question Id : 87111243 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The velocity for minimum power required for an aircraft in steady level flight is _____ times that for the condition of minimum thrust.

Options :

1. 0.25
2. 0.50
3. 0.75
4. 1.00

Question Number : 44 Question Id : 87111244 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The C_L for an aircraft flying at minimum power is _____ % more than that for the aircraft flying at minimum thrust under steady level flight condition.

Options :

1. 41
2. 50
3. 73
4. 100

Question Number : 45 Question Id : 87111245 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

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

Options :

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

Question Number : 46 Question Id : 87111246 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

An artificial satellite in an elliptical trajectory around the earth moves such that the center of the earth is at the _____.

Options :

1. Perigee
2. Apogee
3. Center of the ellipse
4. Focus of the ellipse

Question Number : 47 Question Id : 87111247 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The radius of the earth is approximately

Options :

1. 3370 km
2. 4720 km
3. 5720 km
4. 6370 km

Question Number : 48 Question Id : 87111248 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If mass of the earth is M_E , radius of the earth is R_E and 'G' is universal gravitation constant, then the acceleration due to gravity is represented as _____.

Options :

1. $\frac{GM_E}{R_E^2}$
2. $\frac{GM_E}{R_E^3}$
3. $\frac{GM_E}{R_E}$
4. $\frac{GR_E^2}{M_E}$

Question Number : 49 Question Id : 87111249 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The mass of an astronaut on Earth is 60 kg. His mass on another planet where the acceleration due to gravity is $1/5^{\text{th}}$ that of earth will be

Options :

60 kg

1.

12 kg

2.

300 kg

3.

65 kg

4.

Question Number : 50 Question Id : 87111250 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A satellite will travel in a circular orbit of radius r around earth if the normal component of acceleration is _____ (g is the acceleration due to gravity on the earth's surface and R is the radius of earth).

Options :

$g \frac{R^2}{r^2}$

1.

$g \frac{r^2}{R^2}$

2.

g

3.

$g \frac{R^3}{r^3}$

4.

Question Number : 51 Question Id : 87111251 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For a satellite moving in an elliptic orbit around earth, the maximum speed will be at the point

Options :

farthest from the earth

1.

on the semi-minor axis

2.

on the ellipse making 135° with the apogee

3.

closest to the earth

4.

Question Number : 52 Question Id : 87111252 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For an unpowered space vehicle, at the closest point the velocity of the vehicle is less than that for a parabolic trajectory, then the trajectory has the shape of

Options :

1. Ellipse
2. Straight line
3. Parabola
4. Hyperbola

Question Number : 53 Question Id : 87111253 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The trajectory of an unpowered space vehicle around earth is

Options :

1. a spiral
2. an ellipsoid
3. a conic section
4. a cardioid

Question Number : 54 Question Id : 87111254 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Which of the following statements about communications satellite is wrong?

Options :

1. Communication satellites are placed in a geosynchronous orbit
2. They move in a circular orbit
3. The time period of the satellite is approximately 24 hours

The altitude of the satellite is 500 km

4.

Question Number : 55 Question Id : 87111255 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Dynamic pressure is defined as

Options :

1. $\rho_{\infty} C_{\infty}$

1.

2. $\rho_{\infty} V_{\infty}$

2.

3. $\frac{1}{2} \rho_{\infty} C_{\infty}^2$

3.

4. $\frac{1}{2} \rho_{\infty} V_{\infty}^2$

4.

Question Number : 56 Question Id : 87111256 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The SI unit of the coefficient of viscosity is

Options :

1. $\frac{N}{m^2}$

1.

2. $\frac{N}{m}$

2.

3. $\frac{N}{m^2 s}$

3.

4. $\frac{Ns}{m^2}$

4.

Question Number : 57 Question Id : 87111257 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The tangent to _____ gives the direction of flow at that point.

Options :

1. Path line

1.

2. Vortex line

2.

Streak line

3.

Stream line

4.

Question Number : 58 Question Id : 87111258 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For inviscid, incompressible flows, the superposition of a uniform flow with a source is equivalent to

Options :

flow over a Rankine oval

1.

flow over a cylinder

2.

flow past flat plate

3.

flow over a semi-infinite body

4.

Question Number : 59 Question Id : 87111259 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For the inviscid, incompressible flow past a sphere, the maximum velocity reached on the surface of the sphere is

Options :

$$\frac{3}{2} V_{\infty}$$

1.

$$\frac{1}{2} V_{\infty}$$

2.

$$\frac{2}{3} V_{\infty}$$

3.

$$2V_{\infty}$$

4.

Question Number : 60 Question Id : 87111260 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

At low Reynolds number the flow in the boundary layer tends to be

Options :

Turbulent

1.

Inviscid

2.

Static

3.

laminar

4.

Question Number : 61 Question Id : 87111261 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For the flow in a boundary layer, the thickness at which the axial velocity approaches 0.99 times the free stream velocity is known as

Options :

Boundary layer thickness

1.

Displacement thickness

2.

Momentum thickness

3.

Shape factor

4.

Question Number : 62 Question Id : 87111262 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For a laminar boundary layer past a flat plate, the boundary layer thickness grows _____ in the downstream direction.

Options :

linearly

1.

parabolically

2.

elliptically

3.

exponentially

4.

Question Number : 63 Question Id : 87111263 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The direction of aerodynamic lift is

Options :

1. Parallel to freestream velocity
2. Perpendicular to freestream velocity
3. Parallel to fuselage datum
4. Parallel to side slip velocity

Question Number : 64 Question Id : 87111264 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The stalling velocity of an aircraft is determined by

Options :

1. $\frac{dC_L}{d\alpha}$
2. C_D
3. $C_{L_{max}}$
4. $\frac{C_L}{C_D}$

Question Number : 65 Question Id : 87111265 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The design lift coefficient for NACA 23012 airfoil is

Options :

1. 0.1
2. 0.2
3. 0.3
4. 0.4

Question Number : 66 Question Id : 87111266 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The thin airfoil theory predicts the slope of the lift curve to be

Options :

1. π
2. $\pi/2$
3. 3π
4. 2π

Question Number : 67 Question Id : 87111267 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Aerodynamic center is defined as the point about which

Options :

1. the moment is zero
2. the moment is independent of angle of attack
3. the pressure is zero
4. the flow separates

Question Number : 68 Question Id : 87111268 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

According to the Kutta-Joukowski theorem the lift is written as

Options :

1. $\rho_{\infty} V_{\infty} \Gamma$
2. $\rho_{\infty} V_{\infty} \Gamma / 2$
3. $\rho_{\infty} V_{\infty}^2 \Gamma$
4. $\frac{1}{2} \rho_{\infty} V_{\infty}^2 \Gamma$

Question Number : 69 Question Id : 87111269 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The magnitude of the pitching moment about the quarter chord point for a NACA 0012 airfoil _____.

Options :

1. decreases beyond stall
2. increases beyond stall
3. becomes zero at stall
4. remains constant beyond stall

Question Number : 70 Question Id : 87111270 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The Blasius solution for an incompressible, laminar boundary layer predicts the boundary layer thickness to be

Options :

1. $\delta = \frac{5}{\sqrt{Re_x}}$
2. $\delta = \frac{5x}{\sqrt{2Re_x}}$
3. $\delta = \frac{5}{\sqrt{x Re_x}}$
4. $\delta = \frac{5x}{\sqrt{Re_x}}$

Question Number : 71 Question Id : 87111271 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The two dimensional stagnation point flow is known as

Options :

1. Couette flow
2. Poiseuille flow
3. Hiemenz flow
4. Stokes flow

Question Number : 72 Question Id : 87111272 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Tollmien-Schlichting waves are

Options :

1. the waves propagating from a body moving at supersonic speeds
2. the waves emanating from a sharp corner in supersonic flow
3. the waves emanating from an open jet
4. two dimensional growing waves in the early linear phase of laminar to turbulent transition

Question Number : 73 Question Id : 87111273 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The friction velocity in a turbulent boundary layer is defined as

Options :

1. $\frac{\tau_w}{\rho}$
2. $\frac{\rho}{\tau_w}$
3. $\sqrt{\frac{\tau_w}{\rho}}$
4. $\sqrt{\frac{\rho}{\tau_w}}$

Question Number : 74 Question Id : 87111274 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

At the point of boundary layer separation _____.

Options :

1. Shear stress is maximum
2. Shear stress is zero
3. Velocity is negative

Density variation is maximum

4.

Question Number : 75 Question Id : 87111275 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In a boundary layer the flow is _____.

Options :

1. Irrotational and viscous

1.

2. rotational and inviscid

2.

3. rotational and viscous

3.

4. irrotational and inviscid

4.

Question Number : 76 Question Id : 87111276 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In a boundary layer developed along the flow, if the pressure decreases along the downstream then the boundary layer thickness

Options :

1. remains same

1.

2. decreases more rapidly

2.

3. decreases gradually

3.

4. increases gradually

4.

Question Number : 77 Question Id : 87111277 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The specific internal energy of a gas is related to its specific enthalpy as

Options :

1. $h = e + pv$

1.

2. $h = e - pv$

2.

$$h = e + 2pv$$

3.

$$h = 2e + pv$$

4.

Question Number : 78 Question Id : 87111278 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

When a supersonic flow is turned away from itself, _____ is formed.

Options :

1. a shock wave

1.

2. an expansion wave

2.

3. a slip line

3.

4. a vortex sheet

4.

Question Number : 79 Question Id : 87111279 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The speed of sound at standard sea level is

Options :

1. 300 m/s

1.

2. 340 m/s

2.

3. 400 m/s

3.

4. 430 m/s

4.

Question Number : 80 Question Id : 87111280 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In a convergent-divergent nozzle, when the flow goes sonic at the throat, it is called

Options :

1. Choked flow

1.

2. Stagnation flow

3. Stokes flow

4. Fanno flow

Question Number : 81 Question Id : 87111281 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The purpose of a diffuser is to

Options :

1. Decrease the pressure of flow

2. Increase the temperature of flow

3. Decrease the velocity of the flow

4. Increase the stagnation temperature of the flow

Question Number : 82 Question Id : 87111282 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A process in which entropy remains constant is known as

Options :

1. Isothermal process

2. Adiabatic process

3. Isobaric process

4. Isentropic process

Question Number : 83 Question Id : 87111283 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Which of the following statements is true?

Options :

Pressure is an extensive property

1.

Internal energy is an extensive property

2.

Both pressure and internal energy are extensive properties

3.

Neither pressure nor internal energy are extensive properties

4.

Question Number : 84 Question Id : 87111284 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The true air speed (v) is related to the equivalent air speed (v_E) as,

(where ρ is the freestream density and ρ_0 is the density at the standard sea level international standard atmosphere value)

Options :

$$v = v_E \sqrt{\frac{\rho}{\rho_0}}$$

1.

$$v = v_E \sqrt{\frac{\rho_0}{\rho}}$$

2.

$$v = v_E \frac{\rho}{\rho_0}$$

3.

$$v = v_E \frac{\rho_0}{\rho}$$

4.

Question Number : 85 Question Id : 87111285 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Rayleigh's supersonic pitot tube equation relates the

Options :

stagnation temperature behind a shock to the static temperature ahead of the shock

1.

static pressure behind a shock to the static pressure ahead of the shock

2.

stagnation pressure behind a shock to the stagnation pressure ahead of the shock

3.

stagnation pressure behind a shock to the static pressure ahead of the shock

4.

Question Number : 86 Question Id : 87111286 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

PIV stand for

Options :

1. Particle Interference Velocimetry
2. Particle Image Velocimetry
3. Particle induced vibrations
4. Phase Interference Velocimetry

Question Number : 87 Question Id : 87111287 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Which of the following is not an objective of flight testing?

Options :

1. Determine actual characteristics of aircraft
2. Determine the skills of the pilot
3. Provide developmental information
4. Provide research information

Question Number : 88 Question Id : 87111288 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Which of the following is not a factor for the flight test planning?

Options :

1. Safety
2. Cost
3. Schedule
4. FAR approval

Question Number : 89 Question Id : 87111289 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In a supersonic windtunnel, flow follows the following sequence

Options :

1. nozzle-test section-diffuser
2. diffuser-test section-nozzle
3. test section-diffuser-nozzle
4. test section-nozzle-diffuser

Question Number : 90 Question Id : 87111290 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Which of the following type of error is not significant in pitot-static systems?

Options :

1. position error
2. Instrument error
3. Parallax error
4. Pressure lag error

Question Number : 91 Question Id : 87111291 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

On the principal planes of stress, the shear stress is

Options :

1. Maximum value
2. Minimum value
3. Zero
4. Positive

Question Number : 92 Question Id : 87111292 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Following Prandtl's stress function for the torsion of a uniform circular beam, the shear lines have the shape of

Options :

1. Ellipse

2. Hyperbola

3. Concentric circles

4. Parabola

Question Number : 93 Question Id : 87111293 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The ratio of effective length of a fixed-fixed column to its actual length is

Options :

1. 2.0

2. 1.0

3. 0.5

4. 0.6998

Question Number : 94 Question Id : 87111294 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The main structural elements of the wing of an aircraft are

Options :

1. Ribs

2. Spars

3. Stringers

4. Bulkhead

The instantaneous slope of the stress-strain curve at any value of strain is called

Options :

1. Young's modulus
2. Modulus of rigidity
3. Tangent Modulus
4. Secant Modulus

The time dependent deformation of a material under an applied load is defined as

Options :

1. Fatigue
2. Stress
3. Strain
4. Creep

For a shaft in torsion, the proportionality constant between torsion and twist per unit length is

Options :

1. Torsion constant
2. Torsional rigidity
3. Flexural rigidity
4. Bulk modulus of rigidity

Question Number : 98 Question Id : 87111298 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The torsion constant of an narrow rectangular strip subjected to torque is _____.
(t is the thickness and s is the width)

Options :

1. $\frac{st^3}{2}$

2. $\frac{st^2}{2}$

3. $\frac{st^2}{3}$

4. $\frac{st^3}{3}$

Question Number : 99 Question Id : 87111299 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The principle of superposition method for analysis of structures is limited to

Options :

1. linear systems

2. nonlinear systems

3. viscoelastic materials

4. structures undergoing plastic deformation

Question Number : 100 Question Id : 871112100 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The primary instability of a structural element involves

Options :

1. Local failure

2. Failure at the edges

3. The bending of the complete element

Change in cross sectional area

4.

Question Number : 101 Question Id : 871112101 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The maximum load the aircraft is expected to experience during its operation is called

Options :

1. limit load
2. proof load
3. ultimate load
4. proof factor

Question Number : 102 Question Id : 871112102 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Which type of vibrations are also known as transient vibrations?

Options :

1. Torsional vibrations
2. Undamped vibrations
3. Damped vibrations
4. Transverse vibrations

Question Number : 103 Question Id : 871112103 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The deflection of the mid-span point of a simply supported beam, having flexural rigidity EI and length L , subjected to a point force W in the vertical direction is

Options :

1. $\frac{0.02 EI L^2}{W}$
2. $\frac{0.02 W L^2}{EI}$
3. $\frac{0.02 EI L^3}{W}$

$$\frac{0.02 WL^3}{EI}$$

4.

Question Number : 104 Question Id : 871112104 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The flexural rigidity of a thin plate in bending is _____.
(E is the Young's Modulus, t is the thickness and ν is the Poisson's ratio)

Options :

$$\frac{Et^2}{12(1-\nu^2)}$$

1.

$$\frac{Et}{12(1-\nu^2)}$$

2.

$$\frac{Et^3}{12(1-\nu^2)}$$

3.

$$\frac{Et^2}{12}$$

4.

Question Number : 105 Question Id : 871112105 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The buckling coefficient of a plate simply supported on all edges in compression is _____ that for bending.

Options :

Less than

1.

Greater than

2.

Equal to

3.

Asymptotically equal to

4.

Question Number : 106 Question Id : 871112106 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For a panel stiffened by longitudinal members in compression, which is the least likely mode of failure?

Options :

The panel failing as an Euler column

1.

The panel between the stringers buckling as plates

2.

The elements of stringers buckling as long plates

3.

The flange attached to panel failing as columns

4.

Question Number : 107 Question Id : 871112107 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The hoop stress of a spherical pressure vessel is _____ that of a cylindrical pressure vessel when the thickness, radius and differential pressure are same.

Options :

1. same as

2. twice

3. half

4. $1/4^{\text{th}}$

Question Number : 108 Question Id : 871112108 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The specific impulse is related to the effective exhaust velocity as

Options :

1. $C = \frac{I_{sp}}{g_0}$

2. $C = \frac{I_{sp}^2}{g_0}$

3. $C = I_{sp}g_0$

4. $C = 2I_{sp}g_0$

Question Number : 109 Question Id : 871112109 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A optimum performance of a C-D nozzle with high area ratio is at

Options :

1. sea level conditions
2. its design altitude
3. independent of altitude
4. free space

Question Number : 110 Question Id : 871112110 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Thermal efficiency of a Brayton cycle _____ with pressure ratio across the compressor.

Options :

1. Increases linearly
2. Increases nonlinearly
3. Decreases
4. Remains constant

Question Number : 111 Question Id : 871112111 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The maximum value of propulsive efficiency occurs when

Options :

1. the aircraft flies at its maximum velocity
2. the engine produces maximum thrust
3. the exit velocity is twice of the flight velocity
4. the exit velocity is equal to the flight velocity

Question Number : 112 Question Id : 871112112 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The Thrust Specific Fuel Consumption (TSFC) is defined as

Options :

1. $\frac{T}{\dot{m}_f}$

2. $\frac{\dot{m}_f}{T}$

3. $\frac{T}{m_f}$

4. $\frac{m_f}{T}$

Question Number : 113 Question Id : 871112113 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The specific impulse of a typical solid propellant rocket engine is

Options :

1. 50 s

2. 250 s

3. 450 s

4. 1000 s

Question Number : 114 Question Id : 871112114 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Gibb's equation relates _____ to thermodynamic variables.

Options :

1. Kinetic energy

2. Potential energy

3. Heat

4. Entropy

Question Number : 115 Question Id : 871112115 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

An example of a binder used in solid propellants is

Options :

1. Ammonium perchlorate

2. Ammonium nitrate

3. HTPB

4. RDX

Question Number : 116 Question Id : 871112116 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The combustion taking place in a combustor of a jet engine is typically

Options :

1. Fuel-rich

2. Fuel-lean

3. Stoichiometric

4. Near stoichiometric proportions

Question Number : 117 Question Id : 871112117 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The value of γ of the combustion products in a gas turbine engine _____ with temperature.

Options :

1. increases

2. decreases

3. decreases and then increases

4. remains constant

Question Number : 118 Question Id : 871112118 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Which of the following doesn't contribute to inlet losses in air-breathing engines?

Options :

1. Wall friction
2. Flow separation
3. Shock losses
4. Flow reattachment

Question Number : 119 Question Id : 871112119 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The isentropic efficiency of a compressor is defined as

Options :

1. ideal work of compression for given π_c
2. actual work of compression for given π_c
3. ideal work of compression for given π_c divided by actual work of compression for given π_c
4. actual work of compression for given π_c divided by ideal work of compression for given π_c

Question Number : 120 Question Id : 871112120 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The Leading Edge Advanced Propulsion (LEAP) engine is developed by

Options :

1. General Electric and Snecma
2. Lockheed and General Electric
3. Northrop Grumman and Rolls Royce
4. Lockheed and Kawasaki