# National Testing Agency

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| **Question Paper Name:** | Aerospace Engineering Online Refresher Programmes for Higher Education Faculty |
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| **Creation Date:** | 2019-03-30 13:12:41 |
| **Duration:** | 180 |
| **Total Marks:** | 121 |
| **Display Marks:** | Yes |

### Aerospace Engineering Online Refresher Programmes for Higher Education Faculty

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|---|---|
| **Group Number :** | 1 |
| **Group Id :** | 9095825 |
| **Group Maximum Duration :** | 0 |
| **Group Minimum Duration :** | 120 |
| **Revisit allowed for view? :** | No |
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| **Break time:** | 0 |
| **Group Marks:** | 121 |

### Aerospace Engineering Online Refresher Programmes for Higher Education Faculty

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|---|---|
| **Section Id :** | 9095825 |
| **Section Number :** | 1 |
| **Section type :** | Online |
| **Mandatory or Optional:** | Mandatory |
| **Number of Questions:** | 121 |
| **Number of Questions to be attempted:** | 121 |
| **Section Marks:** | 121 |
| **Display Number Panel:** | Yes |
| **Group All Questions:** | No |

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|---|---|
| **Sub-Section Number:** | 1 |
| **Sub-Section Id:** | 9095825 |
| **Question Shuffling Allowed :** | Yes |

**Question Number : 1 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The following accord provides for recognition of programs accredited for the engineer track:

a) Delhi Accord

b) Sydney Accord

c) Dacca Accord

d) None of the above

**Options :**

1. A
2. B
3. C
4. D

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

**Correct Marks : 1  Wrong Marks : 0**

The following statement is NOT true for Complex Engineering Problems:

a)  Involve a limited range of resources

b)  Involve creative use of engineering  principles

c)  Involve diverse groups of stakeholders

d)  Require judgment in decision making

**Options :**
1. A
2. B
3. C
4. D

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

**Correct Marks : 1  Wrong Marks : 0**

The following statement is true for pitot tube shown in the swayam video:

a)  Three ports in the tube: one for static, one for dynamic and one for total pressure

b)  Two ports in the tube: one for static, one for dynamic pressure

c)  Two ports in the tube: one for static, one for total pressure

d)  Two ports in the tube: one for total, one for dynamic pressure

**Options :**
1. A
2. B
3. C
4. D

**Question Number : 4  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

The following indicator uses at least two pressure inputs out of static /dynamic /total pressure

a) Gyroscope

b) Magnetic compass

c) Airspeed Indicator

d) Vertical speed Indicator

Options :

1. A

2. B

3. C

4. D

**Question Number : 5  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

An altimeter will use only the following pressure input:

a) Static pressure

b) Dynamic pressure

c) Total pressure

d) All of the above

Options :

1. A

2. B

3. C

4. D

**Question Number : 6  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

Which of the following is **not** typically specified by a Customer during aircraft design?

a) Market and operational requirements

b) Airworthiness requirements

c) Forecasts of the economic situation in future

d) Technological developments

Options :

1. A

2. B

3. C

4. D

**Question Number : 7  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

Which of the following task is carried out during Conceptual Phase of aircraft design?

    a)  Design various components of the aircraft

    b)  Freeze the configuration

    c)  Ensure design practicality

    d)  Estimate component masses, performance, and cost

**Options :**

1. A

2. B

3. C

4. D

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

What percentage of Life Cycle Cost is typically Committed and actually Spent during the

Concept Exploration Phase?

    a)  40% Committed and 15% Spent

    b)  15% Committed and 40% Spent

    c)  65% Committed and 15% Spent

    d)  15% Committed and 65% Spent

**Options :**

1. A

2. B

3. C

4. D

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

What is the benefit of usage of Supercritical Airfoils for wings of Airliners?

    a)  Lower Wing mass and more efficient flaps

    b)  Higher wing sweep

    c)  Higher maximum Lift Coefficient

    d)  Lower surface friction drag

**Options :**

1. A

2. B

3. C

4. D

**Question Number : 10  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

How is Roll Trim achieved in Concorde SST aircraft?

   a)  Deflection of Elevons

   b)  Transfer of fuel between Wing and Fuselage tanks

   c)  Transfer of fuel between port and starboard Wing tanks

   d)  Deflection of Droop Nose

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 11  Question Type : MCQ  Option Shuffling : No  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 key requirement for an *Interceptor* aircraft?

   a)  Low fuel consumption

   b)  High rate of climb

   c)  High T/W

   d)  High Maneuverability

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 12  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

Which of the following features is **not** provided in A-10 Thunderbolt aircraft?

   a)  Infrared Masking

   b)  Cockpit Armor

   c)  Stealth

   d)  Ammo Drum Protection

**Options :**

1. A
2. B

3. C

4. D

**Question Number : 13  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

Why don't we see many variable sweep aircraft?

  a)  Inefficient loiter performance

  b)  Inefficient over transonic speed

  c)  Adds weight and complexity

  d)  Difficult to maneuver

**Options :**

1. A

2. B

3. C

4. D

**Question Number : 14  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

How is directional control obtained in UCAV?

  a)  Coordinated rudder and aileron deflections

  b)  Coordinated trailing edge deflections

  c)  All moving vertical tail

  d)  Fuel transfer between two wings

**Options :**

1. A

2. B

3. C

4. D

**Question Number : 15  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

What is the name of the central portion of the House of Quality (HoQ) chart?

  a)  Design Features Matrix

  b)  Design Feature Correlation matrix

  c)  Design Feature Priority Row

  d)  Customer Priority Column

**Options :**

1. A

2. B

3. C

4. D

**Question Number : 16  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

What is the main task done while carrying out *Initial Sizing* of an aircraft?

   a)  Estimation of the aircraft dimensions

   b)  Estimation of Range and Endurance

   c)  Estimation of the Wing and Tail dimensions

   d)  Estimation of Design Gross Take-off Weight

**Options :**

1. A

2. B

3. C

4. D

**Question Number : 17  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

What can be said about A and C in the formula for empty weight fraction $\dot{\omega} = AW_o{}^C$?

   a)  A is positive and C is negative

   b)  A is negative and C is negative

   c)  A is negative and C is positive

   d)  A is positive and C is positive

**Options :**

1. A

2. B

3. C

4. D

**Question Number : 18  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

What's the optimum value of Lift to Drag ratio L/D for maximizing Endurance of a jet

engined aircraft?

    a) $[L/D]_{max}$

    b) $0.866[L/D]_{max}$

    c) $0.5[L/D]_{max}$

    d) $0.707[L/D]_{max}$

Options :

1. A

2. B

3. C

4. D


**Question Number : 19 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Which is the highest component of drag for a typical subsonic transport aircraft?

    a) Form drag

    b) Skin Friction drag

    c) Induced drag

    d) Interference drag

Options :

1. A

2. B

3. C

4. D


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

**Correct Marks : 1 Wrong Marks : 0**

What parameter is used to incorporate the effect of skin roughness while estimation of

surface friction drag?

    a) Flow Reynolds number

    b) Equivalent Reynolds number

    c) Critical Reynolds number

    d) Cutoff Reynolds Number

Options :

1. A

2. B

3. C

4. D

**Question Number : 21 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

Which wing parameter effects $C_{L_\alpha}$ for an unswept rectangular wing?

    a) Chord length

    b) Wing span

    c) Aspect Ratio

    d) Wing area

**Options :**
1. A
2. B
3. C
4. D

**Question Number : 22 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

Determine the maximum value of Absolute AoA ($\alpha_{a\ max}$), if $\alpha_{L=0}= -2$ and $\alpha_{max}= 16$.

    a) -2

    b) 14

    c) 16

    d) 18

**Options :**
1. A
2. B
3. C
4. D

**Question Number : 23 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

Which of the following Constraints depend only on W/S?

    a) Instantaneous Turn Rate

    b) Take-off Distance

    c) Climb Gradient

    d) Sustained Turn Rate

**Options :**
1. A

2. B

3. C

4. D

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

**Correct Marks : 1  Wrong Marks : 0**

Which of the following Constraints depend only on T/W?

   a)  Ceiling

   b)  Missed Approach Gradient

   c)  Range

   d)  Climb Performance

**Options :**

1. A

2. B

3. C

4. D

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

**Correct Marks : 1  Wrong Marks : 0**

What is the minimum value of T/W, if $CD_o$ = 0.012, Climb Gradient (G) = 0.15, Aspect

Ratio=7, and Oswald efficiency factor (e) = 0.87?

   a)  0.250

   b)  0.500

   c)  0.175

   d)  0.625

**Options :**

1. A

2. B

3. C

4. D

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

**Correct Marks : 1  Wrong Marks : 0**

What are the possible values for the Thrust lapse ratio (α) for a Military aircraft during

level flight?

    a)  0.75  and 1.2

    b)  -0.30 and 1.0

    c)  0.00 and 1.0

    d)  0.75 and -1.0

**Options :**
1. A
2. B
3. C
4. D

**Question Number : 27  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**
**Correct Marks : 1  Wrong Marks : 0**

Which of the following components of Life Cycle Cost is generally the largest?

    a)  Design  and Development

    b)  Support Equipment

    c)  Operations and Support

    d)  Production

**Options :**
1. A
2. B
3. C
4. D

**Question Number : 28  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**
**Correct Marks : 1  Wrong Marks : 0**

Which of the following items is included while estimating the Defense Contractor's

Planning Report (DCPR) weight?

    a)  Wing

    b)  Engines

    c)  Avionics

    d)  Landing Gear

**Options :**
1. A
2. B
3. C
4. D

**Question Number : 29  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**
**Correct Marks : 1  Wrong Marks : 0**

What is Harmonic Range?

    a)  Range with zero payload and including reserve fuel

    b)  Range assuming all the mission fuel is utilized for cruise flight alone

    c)  Range with maximum possible payload

    d)  Range with reserve fuel

**Options :**
1. A
2. B
3. C
4. D

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

Which is the best wing layout for an Aerobatic aircraft?

    a)  High wing

    b)  Mid wing

    c)  Low wing

    d)  None of the above

**Options :**
1. A
2. B
3. C
4. D

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

Which of the following is **true** when the Aspect Ratio of a wing is increased?

    a)  Increases stalling AoA

    b)  Reduces subsonic $(L/D)_{max}$

    c)  Increases wing weight

    d)  Reduces flexibility

**Options :**
1. A
2. B
3. C

4. D

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

What is the key disadvantage of a T-Tail layout?

a) Reduced maneuverability

b) Leads to a much larger tails

c) Bad for maintenance

d) Increases drag

Options :

1. A
2. B
3. C
4. D

**Question Number : 33  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option :**
**No  Option Orientation : Vertical**
**Correct Marks : 1  Wrong Marks : 0**

Why is *Dive Pull out* called as a checked maneuver?

a) Pilot may exceed the prescribed load factor at the lowest point of dive

b) The control surfaces have to be checked after it is carried out

c) The Pilot and co-pilot have to refer to a checklist while carrying out this maneuver

d) The Landing Gear has to be checked after this maneuver is completed

Options :

1. A
2. B
3. C
4. D

**Question Number : 34  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option :**
**No  Option Orientation : Vertical**
**Correct Marks : 1  Wrong Marks : 0**

Which of the following airspeed is adopted to ensure that the same V-n diagram is

applicable at all altitudes of operation?

a) Equivalent Airspeed

b) Calibrated Airspeed

c) Indicated Airspeed

d) True Airspeed

Options :

1. A

2. B

3. C

4. D

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

**Correct Marks : 1  Wrong Marks : 0**

What is the drawback of providing Commonality in transport aircraft?

a) Non Optimal Designs

b) Expensive Designs

c) Higher Maintenance Cost

d) Higher Crew Training cost

**Options :**

1. A

2. B

3. C

4. D

**Question Number : 36  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

Why do we generally estimate T/W first and then the corresponding W/S, rather than

the other way around?

a) T/W is not dependent on W/S

b) Thrust data is available from engine datasheets

c) Convergence of the problem is ensured if T/W is estimated first

d) There is less variability in T/W from past data

**Options :**

1. A

2. B

3. C

4. D

**Question Number : 37  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

What is the type of load that leads to *Hammer shock* in an aircraft?

    a)  Air loads

    b)  Inertia

    c)  Power plant

    d)  Control surface deflection

Options :
1. A
2. B
3. C
4. D

Question Number : 38  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

Correct Marks : 1  Wrong Marks : 0

The shadowgraph optical flow visualization technique depends on the

(A) First derivative of density with respect to spatial coordinate.

(B) Second derivative of density with respect to spatial coordinate.

(C) Third derivative of density with respect to spatial coordinate.

(D) Fourth derivative of density with respect to spatial coordinate.

Options :
1. A
2. B
3. C
4. D

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

Correct Marks : 1  Wrong Marks : 0

The Prandtl-Meyer supersonic expansion function (K) can be written as ($\gamma$ = ratio of specific heats)

(A) $K = \dfrac{\gamma}{\gamma - 1}$

(B) $K = \dfrac{\gamma - 1}{\gamma + 1}$

(C) $K = \dfrac{\gamma - 1}{\gamma}$

(D) $K = \dfrac{\gamma + 1}{\gamma - 1}$

Options :
1. A
2. B
3. C
4. D

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

**Correct Marks : 1  Wrong Marks : 0**

Consider the following statements.

(I)   The volumetric change of the fluid caused by a resistance is known as compressibility.

(II)  The density of water is maximum at 4°C.

(III) The bulk modulus of elasticity decreases with increase in pressure.

(IV) Viscosity of liquids is appreciably affected by change in pressure.

Which of the above statements is/are TRUE?

(A) I only

(B) I and II

(C) III and IV

(D) All

Options :

1. A

2. B

3. C

4. D

**Question Number : 41  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

An oblique shock wave with a wave angle of $\beta = 60°$ is generated from a wedge angle of $\theta = 30°$. The ratio of

Mach number downstream of the shock to its normal component will be

(A) $2/\sqrt{3}$

(B) 0.87

(C) 0.5

(D) 2

Options :

1. A

2. B

3. C

4. D

**Question Number : 42  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

If an aircraft is in cruise motion at Mach 3, where the outside air temperature is found to be 350K. The stagnation temperature at the nose of the aircraft will be? (For air, the specific heat ratio, $\gamma = 1.4$)

(A) 980 K

(B) 1610 K

(C) 350 K

(D) Insufficient data

Options :

1. A

2. B

3. C

4. D

Question Number : 43  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

Correct Marks : 1  Wrong Marks : 0

Consider the jet exhaust through an underexpanded nozzle.

(I)  Normal shock wave

(II)  Expansion fans

(III)  Subsonic diffusion

(IV)  Supersonic diffusion

Options :

1. A

2. B

3. C

4. D

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

Correct Marks : 1  Wrong Marks : 0

In supersonic flows, which of the following waves can never be made isentropic?

(A) Mach line

(B) Expansion wave

(C) Shock wave

(D) None

Options :

1. A

2. B

3. C

4. D

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

**Correct Marks : 1 Wrong Marks : 0**

If $M_1$ and $M_2$ are the upstream and downstream Mach numbers across a normal shock wave, then which of the following is CORRECT?

(A) $(M_2)_{minimum} = \sqrt{\frac{\gamma+1}{\gamma-1}}$

(B) $(M_2)_{minimum} = \sqrt{\frac{\gamma+1}{2\gamma}}$

(C) $(M_2)_{maximum} = \sqrt{\frac{\gamma+1}{2\gamma}}$

(D) $(M_2)_{minimum} = \sqrt{\frac{\gamma-1}{2\gamma}}$

**Options :**

1. A

2. B

3. C

4. D

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

**Correct Marks : 1 Wrong Marks : 0**

Which of the following statements is CORRECT?

(A) In transonic flow, the density change is faster than the velocity change.

(B) The density change in supersonic flow is slower than the velocity change.

(C) Mach number downstream of an oblique shock wave is always subsonic.

(D) In Hot-Wire Anemometry, the hot wire sensor is generally made of Tungsten.

**Options :**

1. A

2. B

3. C

4. D

**Question Number : 47 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Air flows from a reservoir through a convergent-divergent nozzle at low subsonic speed and is exhausted into the atmosphere. A pitot tube is mounted at the mid-section of the nozzle and traversed along the length of the nozzle from exit to the reservoir end. The pressure recorded by the pitot tube will

(A) Increase during traverse

(B) Decrease during traverse

(C) Decrease up to the throat and then increase during traverse

(D) Remain constant during traverse

Options :
1. A
2. B
3. C
4. D

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

The schlieren technique works on the basis of

(A) Density variation in the flow field

(B) Pressure variation in the flow field

(C) Velocity variation in the flow field

(D) Density gradient variation in the flow field

Options :
1. A
2. B
3. C
4. D

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

When a moving fluid is brought to rest adiabatically, then which of the following statement is CORRECT?

(A) Both stagnation pressure and stagnation temperature are conserved.

(B) Stagnation pressure is not conserved but stagnation temperature is conserved.

(C) Stagnation pressure is conserved but stagnation temperature is not conserved.

(D) Both stagnation pressure and stagnation temperature are not conserved.

Options :
1. A

2. B

3. C

4. D

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

**Correct Marks : 1 Wrong Marks : 0**

Which of the following is an INCORRECT statement?

(A) Both heat and work may cross the sytem boundary.

(B) Both heat and work are path functions.

(C) Both heat and work are property of the system.

(D) Heat flows when the system and surrounding are not in equilibrium which is not necessary for work.

**Options :**

1. A

2. B

3. C

4. D

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

**Correct Marks : 1 Wrong Marks : 0**

Consider the following statements.

I. Static pressure

II. Total pressure

III. Dynamic pressure

Which of the above affects air speed measurement using a Pitot probe?

(A) I, only

(B) II, only

(C) II & III

(D) All

**Options :**

1. A

2. B

3. C

4. D

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

**Correct Marks : 1 Wrong Marks : 0**

Which of the following statement is NOT correct?

(A) A calorically perfect gas must be thermally perfect.

(B) A thermal perfect gas must be calorically perfect.

(C) A perfect gas must be both thermally and calorically perfect.

(D) A real gas behaves like an ideal gas at higher temperature and lower pressure.

**Options :**

1. A
2. B
3. C
4. D

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

**Correct Marks : 1  Wrong Marks : 0**

For an aircraft flying at supersonic speeds, consider the following statements.

   I.    The wave drag of wing with sharp leading edge will be lower.

   II.   The wave drag of wing with rounded leading edge will be lower.

   III.  The wing with sharp leading edge will have well-defined point of boundary layer separation.

   IV.   The resultant wing loading with rounded leading edge will be steady.

Choose the correct option among the following.

(A) I & III

(B) I & IV

(C) III & IV

(D) II, III & IV

**Options :**

1. A
2. B
3. C
4. D

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

**Correct Marks : 1  Wrong Marks : 0**

Which of the following visualization technique cannot be used in supersonic flow?

(A) Schlieren

(B) Shadowgraph

(C) Tuft

(D) Interferometer

**Options :**

1. A
2. B
3. C
4. D

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

**Correct Marks : 1 Wrong Marks : 0**

Consider the following statements

I.   Viscosity of liquids increases with increase of temperature.

II.  Viscosity of gases decreases with increase of temperature.

III. Viscosity of liquids increases with increase of pressure.

Which of the above statements is/are correct?

(A) I, only

(B) II, only

(C) III, only

(D) All are correct.

**Options :**

1. A
2. B
3. C
4. D

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

**Correct Marks : 1 Wrong Marks : 0**

If the ratio of back pressure $(p_b)$ to reservoir stagnation pressure $(p_0)$ is less than 0.528, then the flow exiting a convergent nozzle will be:

(A) Underexpanded

(B) Overexpanded

(C) Supersonic

(D) Subsonic

Options :

1. A

2. B

3. C

4. D

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

**Correct Marks : 1  Wrong Marks : 0**

Consider the high pressure air discharge coming out of a small opening from a large reservoir with given stagnation conditions as shown in Figure Q20.



$p_0, T_0, \rho_0, V_0$

$\Rightarrow V$
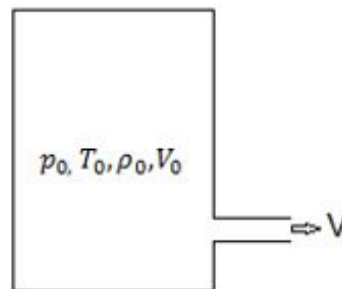
**Figure Q20**

The error involved in treating the air as an incompressible medium is:

(A) 20

(B) 60

(C) 90

(D) Data insufficient

Options :

1. A

2. B

3. C

4. D

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

**Correct Marks : 1  Wrong Marks : 0**

A supersonic flow encounters a normal shock wave and brings down to a subsonic flow. Keeping the flow conditions same as of previous case the flow is reversed across the shock (i.e. from subsonic to supersonic). Which of the following remains valid?

I.  State Equation

II.  Continuity Equation

III.  First Law of Thermodynamics

IV.  Increase of Entropy Principle

Choose the correct option among the following.

(A) I, III & IV

(B) I, II & III

(C) I, II & IV

(D) All the above

Options :

1. A

2. B

3. C

4. D

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

Correct Marks : 1  Wrong Marks : 0

An aircraft is flying at an altitude where the ambient temperature is found to be 200K. If the stagnation

temperature on the surface of the aircraft is 360 K. The aircraft is flying at Mach:

(A) 1.5

(B) 2

(C) 2.5

(D) 3

Options :

1. A

2. B

3. C

4. D

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

Correct Marks : 1  Wrong Marks : 0

At supersonic Mach numbers the drag coefficient varies approximately as:

(A) $C_d \propto \dfrac{1}{(M_\infty^2 - 1)}$

(B) $C_d \propto \dfrac{1}{\sqrt{M_\infty^2 - 1}}$

(C) $C_d \propto \sqrt{M_\infty^2 - 1}$

(D) $C_d \propto \dfrac{1}{(M_\infty^2 - 1)^{\frac{3}{2}}}$

Options :

1. A
2. B
3. C
4. D

Question Number : 61  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
Correct Marks : 1  Wrong Marks : 0

If M is the Mach number and $M'$ is the characteristic Mach number then which of the following is TRUE?

(A) $M = \sqrt{\dfrac{M'^2(\gamma-1)}{2 + M'^2(\gamma-1)}}$

(B) $M = \sqrt{\dfrac{M'^2(\gamma-1)}{2 + M'^2(\gamma+1)}}$

(C) $M' = \sqrt{\dfrac{M^2(\gamma+1)}{2 + M^2(\gamma-1)}}$

(D) $M' = \sqrt{\dfrac{M^2(\gamma-1)}{2 + M^2(\gamma-1)}}$

Options :

1. A
2. B
3. C
4. D

Question Number : 62  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
Correct Marks : 1  Wrong Marks : 0

The oblique shock diffuser is more frequently used than the normal shock one in a supersonic wind-tunnel, because it:

(A) Rapidly accelerates the flow.

(B) Increases total pressure loss.

(C) Reduces the flow speed more rapidly

(D) Reduces total pressure loss.

Options :

1. A
2. B
3. C
4. D

**Question Number : 63 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

In a convergent-divergent nozzle, a normal shock can generally occur:

(A) In the convergent portion

(B) In the divergent portion and throat

(C) Near the inlet

(D) Anywhere in the nozzle

Options :

1. A
2. B
3. C
4. D

**Question Number : 64 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

In the flow across a normal shock, if $M_1$ and $M_2$ represent the Mach number upstream and downstream of the

shock, what is the asymptotic value of the downstream Mach number for an ideal gas having $\gamma = 1.4$.

(A) $\sqrt{0.5}$

(B) $\sqrt{(0.14)}$

(C) $\frac{1}{7}$

(D) $\sqrt{7}$

Options :

1. A
2. B
3. C
4. D

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

**Correct Marks : 1  Wrong Marks : 0**

In the limit of a high Mach number flow across a shock wave, which of the following is TRUE?

(A) $\frac{p_2}{p_1} = \left(\frac{2\gamma}{\gamma-1}\right) M_1 sin\beta$

(B) $\frac{p_2}{p_1} = \left(\frac{2\gamma}{\gamma-1}\right) M_1^2 (sin\beta)^2$

(C) $\frac{\rho_2}{\rho_1} = \left(\frac{\gamma+1}{\gamma-1}\right)$

(D) $\frac{\rho_2}{\rho_1} = \left(\frac{\gamma}{\gamma-1}\right)$

**Options :**
1. A
2. B
3. C
4. D

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

**Correct Marks : 1  Wrong Marks : 0**

A model aircraft in a wind tunnel that is operating at 50 m/s develops a minimum pressure coefficient of −8.0

at some point on its upper surface. The local airspeed at that point is

(A)  16.67 m/s

(B)  50 m/s

(C)  150 m/s

(D)  200 m/s

**Options :**
1. A
2. B
3. C
4. D

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

**Correct Marks : 1  Wrong Marks : 0**

An isentropic nozzle is discharging air through critical pressure ratio. If the back pressure is further decreased the discharge will

(A) Decrease

(B) Increase

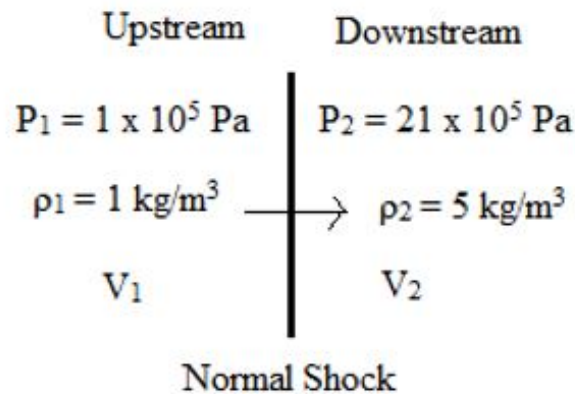(C) Remain unaffected

(D) Come to a dead stop due to shock waves

Options :
1. A
2. B
3. C
4. D

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

For the given values of pressures and densities, upstream and downstream of a normal shock as shown in figure

below, the velocity $V_1$ upstream of the normal shock will be?

<div align="center">

Upstream      Downstream

$P_1 = 1 \times 10^5$ Pa  |  $P_2 = 21 \times 10^5$ Pa

$\rho_1 = 1$ kg/m$^3$ $\longrightarrow$ $\rho_2 = 5$ kg/m$^3$

$V_1$        $V_2$

Normal Shock

</div>

(A) 4 m/s

(B) 5 m/s

(C) 10 m/s

(D) 15 m/s

Options :
1. A
2. B
3. C
4. D

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

The spacecraft re-entry into the atmosphere takes place in the Mach number range ($M \approx 28 - 32$). At such a high Mach numbers, the gases present near the spacecraft nose are subjected to high temperature. To visualize this phenomenon in the wind tunnel, which of the following technique is best suited?

(A) Oil flow visualization with color dyes

(B) Shadowgraph technique

(C) Schlieren technique

(D) Interferometry technique

Options :

1. A
2. B
3. C
4. D

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

Which one of the following statements is FALSE for a supersonic flow?

(A) Over a gradual expansion, entropy remains constant

(B) Over a sharp expansion corner, entropy can increase

(C) Over a gradual compression, entropy may remain constant

(D) Over a sharp compression corner, entropy increases

Options :

1. A
2. B
3. C
4. D

Question Number : 71  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option :
No  Option Orientation : Vertical
Correct Marks : 1  Wrong Marks : 0

If "$n$" is the degree of freedom of the gas molecules, then the ratio of specific heats will be

(A) $\gamma = \frac{n+4}{n}$

(B) $\gamma = \frac{n-2}{n}$

(C) $\gamma = \frac{n+2}{n}$

(D) $\gamma = \frac{n}{n+2}$

Options :

1. A
2. B
3. C
4. D

**Question Number : 72 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

Consider the following statements:

    I.   A perfect gas must be both thermally and calorically perfect

    II.   A calorically perfect gas must be thermally perfect.

    III.   A thermal perfect gas must be calorically perfect.

Which of the following is true?

(A) I only

(B) Both, I and II

(C) Both, I and III

(D) All are true.

Options :

1. A
2. B
3. C
4. D

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

Choose the CORRECT relation between flow Mach number ($M$) and characteristics Mach number ($M'$),

defined as ratio of local flow speed and critical speed of sound:

(A) If $M \to \infty$ then $M' \to \infty$

(B) If $M \to \infty$ then $M' \to 0$

(C) If $M \to \infty$ then $M' \to \sqrt{\left(\frac{\gamma+1}{\gamma-1}\right)}$

(D) If $M \to \infty$ then $M' \to \sqrt{\left(\frac{\gamma-1}{\gamma+1}\right)}$

Options :

1. A
2. B
3. C
4. D

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

For a perfect gas, the supersonic flow becomes a subsonic flow across a normal shock wave. This is in

accordance with which of the following law of thermodynamics?

(A) Zeroth law

(B) First law

(C) Second law

(D) Third law

Options :

1. A

2. B

3. C

4. D

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

For a given gas, the maximum mass flow rate per unit area $\left(\frac{\dot{m}_{max}}{A}\right)$ is directly proportional to:

(A) $T_0/\sqrt{P_0}$

(B) $P_0/\sqrt{T_0}$

(C) $\sqrt{T_0}$

(D) $P_0^2/\sqrt{T_0}$

Options :

1. A

2. B

3. C

4. D

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

The flow across a non-isentropic compression front can be made isentropic flow by optimizing the entropy generation ($\Delta s$) and flow deflection angle ($\Delta\theta$) across the compression front. The approximate linear relation holds for this is:

(A) $\Delta s(\Delta\theta)$

(B) $\Delta s(\Delta\theta)^3$

(C) $\Delta s \, 1/(\Delta\theta)^3$

(D) $\Delta s \, 1/(\Delta\theta)^4$

Options :
1. A
2. B
3. C
4. D

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

An oblique shock wave with a wave angle $\beta$ is generated from a wedge angle of $\theta$. The ratio of the Mach number downstream of the shock to its normal component is:

(A) $\sin(\beta - \theta)$

(B) $\cos(\beta - \theta)$

(C) $\sin(\theta - \beta)$

(D) $\cos(\theta - \beta)$

Options :
1. A
2. B
3. C
4. D

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

Flow across a curved shock wave is

(A) Irrotational

(B) Incompressible

(C) One-dimensional

(D) None of the above

Options :

1. A
2. B
3. C
4. D

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

**Correct Marks : 1  Wrong Marks : 0**

Consider the following statements for a chocked nozzle flow,

    I. The nozzle must be a supersonic one

    II. Critical condition exists at the nozzle throat

    III. Flow inside the nozzle must be isentropic

    IV. There is no heat transfer from the hot flowing gases to the wall

Which of the above is/are TRUE?

    **(A)** Only I is correct

    **(B)** Only II is correct

    **(C)** I, II and III are correct

    **(D)** I, II and IV are correct

Options :

1. A
2. B
3. C
4. D

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

**Correct Marks : 1  Wrong Marks : 0**

Strike the odd man out of the following with respect to stability & control of the aircraft

    (a) trim

    (b) equilibrium

    (c) balanced

    (d) stability

Options :

1. A
2. B
3. C
4. D

A body that tends to move away from trim condition after initial disturbance from equilibrium is said to be

(a) statically stable

(b) statically unstable

(c) neutrally stable

(d) dynamically stable

**Options :**

1. A
2. B
3. C
4. D

Trim angle of attack of an aircraft can be increased by

(a) increasing up elevator deflection

(b) increasing down elevator deflection

(c) increasing angle of incidence of horizontal stabilizer

(d) All of the above

**Options :**

1. A
2. B
3. C
4. D

Necessary criteria for longitudinal balance at positive angle of attack and static stability are

(a) $C_{m_0}$ and $C_{m_\alpha}$ are positive

(b) $C_{m_0}$ and $C_{m_\alpha}$ are negative

(c) $C_{m_0}$ is positive and $C_{m_\alpha}$ is negative

(d) $C_{m_0}$ is negative and $C_{m_\alpha}$ is positive

**Options :**

1. A
2. B

3. C

4. D

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

**Correct Marks : 1 Wrong Marks : 0**

Inherent characteristics of a positively cambered wing is to have

(a) Positive $C_{m_{ac}}$

(b) negative $C_{m_{ac}}$

(c) zero $C_{m_{ac}}$

(d) zero $C_{m_{c/4}}$

**Options :**

1. A

2. B

3. C

4. D

**Question Number : 85 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Which of the following factor is least/not desirable for large civil aircrafts?

(a) long range

(b) high speed

(c) maneuverability

(d) stability

**Options :**

1. A

2. B

3. C

4. D

**Question Number : 86 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Which of the following parameter variation does not lead to increase in elevator power?

(a) tail arm

(b) tail area

(c) elevator effectiveness

(d) aerodynamic center

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 87  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

Which of the following contributes maximum to the longitudinal stability of the aircraft?

(a) vertical movement of center of gravity

(b) lateral movement of center of gravity

(c) longitudinal movement of center of gravity

(d) movement of center of gravity about longitudinal axis

**Options :**
1. A
2. B
3. C
4. D

**Question Number : 88  Question Type : MCQ  Option Shuffling : No  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 indirect effect of running propellers on the static longitudinal stability of the aircraft?

(a) slipstream effect on wing-fuselage moments

(b) slipstream effect on wing drag coefficient

(c) slipstream effect on downwash at the horizontal tail

(d) effect of increased slipstream dynamic pressure on the tail

**Options :**
1. A
2. B
3. C
4. D

**Question Number : 89  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

For which of the following condition the stick fixed neutral has most aft location?

   (a) power-off conditions with propellers wind-milling

   (b) propellers running at low power

   (c) propellers running at high power

   (d) none of the above

Options :

1. A

2. B

3. C

4. D

**Question Number : 90  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

Which of the following elevator deflection will lead to maximum trim lift coefficient for stick

fixed case?

   (a) $\delta_e = -10^0$

   (b) $\delta_e = -5^0$

   (c) $\delta_e = -0^0$

   (d) $\delta_e = 5^0$

Options :

1. A

2. B

3. C

4. D

**Question Number : 91  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

The neutral point is defined as the location of center of gravity on the mean aerodynamic

chord at which an aircraft is

   (a) statically stable

   (b) statically unstable

   (c) Neutrally stable

   (d) Dynamically stable

Options :

1. A

2. B

3. C

4. D

**Question Number : 92 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

Which of the following expression correctly represents the static margin?

(a) $SM = (x_{ac} - N_0)$

(b) $SM = -(x_{ac} - N_0)$

(c) $SM = (x_{cg} - N_0)$

(d) $SM = -(x_{cg} - N_0)$

Options :
1. A
2. B
3. C
4. D

**Question Number : 93 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

$(d(F_s/q)/dC_L)$ is a

(a) direct measure of stick fixed stability

(b) indirect measure of stick fixed stability

(c) direct measure of stick free stability

(d) indirect measure of stick free stability

Options :
1. A
2. B
3. C
4. D

**Question Number : 94 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

When the hinge line of the control surface is moved aft far enough so that the resultant

moment is reversed, then the control is said to be

(a) balanced

(b) unbalanced

(c) under-balanced

(d) over-balanced

Options :

1. A
2. B
3. C
4. D

**Question Number : 95  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

Which of the following is responsible for damping in longitudinal short period mode?

(a) Fuselage of the airplane

(b) Altitude of the airplane

(c) Horizontal Tail of the airplane

(d) All of the above

**Options :**
1. A
2. B
3. C
4. D

**Question Number : 96  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

Addition of dorsal fin to the airplane improves

(a) Longitudinal dynamics

(b) Lateral Dynamics

(c) Directional Dynamics

(d) Easy recovery from spin

**Options :**
1. A
2. B
3. C
4. D

**Question Number : 97  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

Which of the following is most critical center of gravity limit?

    (a) minimum stick force per 'g'

    (b) stick free neutral point with power on

    (c) stick fixed neutral point with power on

    (d) elevator angle required out of ground effect

**Options :**
1. A
2. B
3. C
4. D

**Question Number : 98  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option :
No  Option Orientation : Vertical**
**Correct Marks : 1  Wrong Marks : 0**

The lateral flight dynamic mode of an airplane consisting of heavily damped rolling motion

is termed as

    (a) Phugoid mode

    (b) Dutch roll mode

    (c) Roll subsidence mode

    (d) Spiral mode

**Options :**
1. A
2. B
3. C
4. D

**Question Number : 99  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option :
No  Option Orientation : Vertical**
**Correct Marks : 1  Wrong Marks : 0**

The location of center of gravity where the stick force required to accelerate the airplane

per g vanishes is called

    (a) stick fixed neutral point

    (b) stick free neutral point

    (c) stick fixed maneuver  point

    (d) stick free maneuver point

**Options :**
1. A
2. B
3. C

4. D

**Question Number : 100  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

The change in yawing moment coefficient due to change in sideslip angle is called

(a) Weathercock stability

(b) Damping in roll

(c) Dihedral effect

(d) Cross derivative

**Options :**

1. A

2. B

3. C

4. D

**Question Number : 101  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

The change in rolling moment coefficient due to change in yaw rate or change in yawing

moment coefficient due to change in roll rate is called

(a) Weathercock stability

(b) Damping in roll

(c) Dihedral effect

(d) Cross derivative

**Options :**

1. A

2. B

3. C

4. D

**Question Number : 102  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

Which of the following phenomenon results if a roll is induced in the stalled airplane by aileron displacement or by the premature stall of the wing tip and a yawing moment is also imposed through the use of the rudder?

(a) Dutch Roll

(b) Pure Convergence

(c) Spin

(d) Spiral Divergence

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 103  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

An aircraft rolled into a turn along with rudder deflection so as to produce no sideslip defines

(a) adverse yaw

(b) dihedral effect

(c) Coordinated turn

(d) rudder power

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 104  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

If the ratio of weather-cock stability to dihedral effect falls between the limiting condition of spiral divergence & directional divergence, then the a/c experiences

(a) Spin

(b) Pure roll

(c) Longitudinal third mode

(d) Dutch roll

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 105 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

Which of the following option is not having stabilizing effect on aircraft lateral stability?

(a) Anhedral

(b) Sweep-back

(c) High-wing configuration

(d) Vertical Tail

**Options :**

1. A
2. B
3. C
4. D

**Question Number : 106 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

The yaw moment produced due to roll is called

(a) Dihedral effect

(b) Adverse yaw

(c) Adverse roll

(d) Weather-cocking effect

**Options :**

1. A
2. B

3. C

4. D

**Question Number : 107  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

Which of the following dynamic mode involves the lateral-directional oscillations of an aircraft?

(a) Phugoid mode

(b) Spin

(c) Spiral divergence

(d) Dutch roll

**Options :**

1. A

2. B

3. C

4. D

**Question Number : 108  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

Which of the following option represents the damping stability derivatives?

(a) $C_{l_\beta}$ and $C_{n_\beta}$

(b) $C_{l_p}$ and $C_{n_r}$

(c) $C_{l_{\delta a}}$ and $C_{n_{\delta r}}$

(d) $C_{l_r}$ and $C_{n_p}$

**Options :**

1. A

2. B

3. C

4. D

**Question Number : 109  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

What is the criterion usually followed for dihedral effect by Air force?

(a) Dihedral effect should be negligible

(b) Dihedral effect should be half of the weather-cocking effect

(c) Dihedral effect should be equal to the weather-cocking effect

(d) Dihedral effect should be twice of the weather-cocking effect

Options :

1. A
2. B
3. C
4. D

**Question Number : 110 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

If the weather-cock stability is very strong in comparison to the dihedral effect, then the

dynamic motion due to disturbance will result in

(a) Dutch roll

(b) Phugoid mode

(c) Spiral divergence

(d) Pure roll

Options :

1. A
2. B
3. C
4. D

**Question Number : 111 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**
**Correct Marks : 1 Wrong Marks : 0**

What will be the value of angle of attack of horizontal stabilizer with retracted control

surface for the stick fixed case for the following given data?

$\alpha_w = 10^0$      $\varepsilon = 1^0$      $i_t = -1^0$      $i_w = 2^0$

(a) $2^0$

(b) $4^0$

(c) $6^0$

(d) $8^0$

Options :

1. A

2. B

3. C

4. D

**Question Number : 112 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

An aircraft is flying at a speed of 100 m/s. The relative speed at horizontal tail is 90 m/s.

What will be the horizontal tail efficiency?

(a) 1.2

(b) 1.1

(c) 0.9

(d) 0.81

**Options :**

1. A

2. B

3. C

4. D

**Question Number : 113 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

An aircraft is having wing and vertical tail area of 30 $m^2$ and 6 $m^2$ respectively. The span and

mean aerodynamic chord of the wing are 15 m and 2 m respectively. Vertical tail moment

arm is 6 m long. What will be the value of vertical tail volume coefficient?

(a) 2

(b) 0.5

(c) 0.6

(d) 0.08

**Options :**

1. A

2. B

3. C

4. D

**Question Number : 114 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 1 Wrong Marks : 0**

What will be the angular velocity of airplane about lateral axis during a pull-up maneuver at

load factor and speed of 1.5 and 100 m/s respectively?

    (a) 0.0049

    (b) 0.0495

    (c) 0.0245

    (d) 0.2450

Options :

1. A

2. B

3. C

4. D

**Question Number : 115  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

What will be the load factor produced perpendicular to the airplane during a pull-up

maneuver at a speed of 100 m/s and an angular velocity of 0.1476 rad/sec?

    (a) 1.5

    (b) 2

    (c) 2.5

    (d) 3

Options :

1. A

2. B

3. C

4. D

**Question Number : 116  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

**Correct Marks : 1  Wrong Marks : 0**

Increment in tail angle of attack due to angular velocity during symmetric maneuver for the

following data comes out to be

$l_t$ = 5m    q = 0.2 rad/sec    V= 100 m/s

    (a) -0.1 rad

    (b) -0.01 rad

    (c) +0.01 rad

    (d) +0.1 rad

Options :

1. A
2. B
3. C
4. D

Which of the following option with respect to sign convention for an aircraft having static

lateral and directional stability is wrong?

(a) $C_{n_\beta} = 0.13$, $C_{l_\beta} = -0.19$

(b) $C_{n_p} = -0.049$, $C_{l_p} = -0.38$

(c) $C_{n_r} = 0.18$, $C_{l_r} = -0.19$

(d) $C_{n_{\delta r}} = -0.09$, $C_{l_{\delta a}} = -0.03$

Options :
1. A
2. B
3. C
4. D

The typical values of roots for longitudinal dynamic mode are $\lambda_{1,2} = -2.0 \pm i\,2.5$. What will be the

period and time to damp to half amplitude respectively?

(a)    3.14 sec and 0.277 sec respectively

(b)    0.277 sec and 3.14 sec respectively

(c)    2.51 sec and 0.346 sec respectively

(d)    0.346 sec and 2.51 sec respectively

Options :
1. A
2. B
3. C
4. D

The typical values of roots for longitudinal stick fixed case for an airplane with time characteristics of 1.5 are given by ($\lambda_{1,2} = -0.02 \pm i\ 0.03$) – Eq.(1) and ($\lambda_{3,4} = -2.0 \pm i\ 2.5$) – Eq.(2). Which mode is represented by these equations?

(a) Eq.(1) represents short period mode while Eq.(2) represents Phugoid mode

(b) Eq.(1) represents Phugoid mode while Eq.(2) represents short period mode

(c) Eq.(1) and Eq.(2) both represent short period mode

(d) Eq.(1) and Eq.(2) both represent Phugoid mode

Options :
1. A
2. B
3. C
4. D

Question Number : 120  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
Correct Marks : 1  Wrong Marks : 0

Match the symbol with respective stability derivative and choose correct option

(I)      $C_{l_\beta}$                (i) damping derivative

(II)     $C_{l_p}$                (ii) stability criteria derivative

(III)    $C_{l_r}$                (iii) cross derivative

(IV)    $C_{l_{\delta a}}$                (iv) control power derivative

(a) (I)-(ii), (II)-(iii), (III)-(iv), (IV)-(i)

(b) (I)-(ii), (II)-(iv), (III)-(iii), (IV)-(i)

(c) (I)-(ii), (II)-(iii), (III)-(i), (IV)-(iv)

(d) (I)-(ii), (II)-(i), (III)-(iii), (IV)-(iv)

Options :
1. A
2. B
3. C
4. D

Question Number : 121  Question Type : MCQ  Option Shuffling : No  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
Correct Marks : 1  Wrong Marks : 0

Match the symbol with respective stability derivative and choose correct option

(I)　　$C_{n_\beta}$　　　　　　　　(i) damping derivative

(II)　　$C_{n_p}$　　　　　　　　(ii) stability criteria derivative

(III)　　$C_{n_r}$　　　　　　　　(iii) cross derivative

(IV)　　$C_{n_{\delta r}}$　　　　　　　(iv) control power derivative

(a) (I)-(ii), (II)-(iii), (III)-(iv), (IV)-(i)

(b) (I)-(ii), (II)-(iv), (III)-(iii), (IV)-(i)

(c) (I)-(ii), (II)-(iii), (III)-(i), (IV)-(iv)

(d) (I)-(ii), (II)-(i), (III)-(iii), (IV)-(iv)

**Options :**
1. A
2. B
3. C
4. D