

# **Introduction to Aircraft Design**

**July-2023**

## **Assignment 2**

Q 1	Read the following statements and choose the correct option: I. Short Range Airliners usually fly at an altitude of 3000 m AMSL. II. Medium and Long Range Airliners usually fly at almost the same Mach Number and Altitude. III. Long Range Airliners usually fly at supersonic speeds.	
MCQ (1 mark)	(A)	All statements are correct.
	(B)	Only I is correct.
	(C)	Only II is correct.
	(D)	Only III is correct.
	(E)	Both I and II are correct.
	(F)	Both I and III are correct.
	(G)	Both II and III are correct.
	(H)	All statements are incorrect.
Solution: (C)		

Q 2	Which of the following statement(s) is/are TRUE about Supercritical airfoils?	
MSQ (1 mark)	(A)	They result in lower wing weight.
	(B)	They require a lower wing sweep.
	(C)	They increase the Critical Mach Number.
	(D)	They result in higher Flaps effectiveness.
Solution: (A), (B), (C), (D)		

Q 3	Which of the following statement(s) is/are TRUE about Airliners?	
MSQ (1 mark)	(A)	They are usually powered with high BPR Turbofans.
	(B)	Their engines have high SFC and low noise levels
	(C)	Their engines are usually mounted below the wings.
	(D)	They are usually powered with Turbojet engines.
Solution: (A), (C)		

Q 4	Which of the following statement(s) is/are TRUE about A-330 and A-340 Aircraft?	
MSQ (1 mark)	(A)	They are equipped with same number of engines.
	(B)	They have a similar Wing Planform.
	(C)	They have same number of passengers.
	(D)	They require only Two cockpit crew.
Solution: (B), (D)		

Q 5	Read the following and choose the correct option:  <b>Statement:</b> High Aspect Ratio wing is a desired feature of future airliners. <b>Reason:</b> High Aspect Ratio wing results in lower Induced Drag.	
MCQ (1 mark)	(A)	Only Statement is correct but the Reason is incorrect.
	(B)	Only Reason is correct but the Statement is incorrect.
	(C)	Both the Statement and Reason are correct.
	(D)	Both the Statement and Reason are incorrect.
Solution: (C)		

Q 6	Which of the following statement(s) is/are TRUE about a transport aircraft with Strut-based wing?	
MSQ (1 mark)	(A)	It has a lower All Up Weight.
	(B)	It has higher fuel consumption.
	(C)	It has lower noise and emissions.
	(D)	It can have very slender wings.
Solution: (A), (C), (D)		

Q 7	Which of the following aircraft can fly at Supersonic speeds?	
MSQ (1 mark)	(A)	HAL <i>Tejas Mk2</i>
	(B)	Mikoyan <i>MiG-27</i>
	(C)	Lockheed Martin <i>F22 Raptor</i>
	(D)	General Dynamics <i>F-16 Fighting Falcon</i>
Solution: (A), (B), (C), (D)		

Q 8	<p>Read the following statements about <i>Concorde</i> aircraft, and choose the correct option:</p> <p>I. CG control was achieved by transporting its fuel among various fuel tanks.</p> <p>II. When transitioned from subsonic to supersonic flight, its CP shifted rearwards.</p> <p>III. It had four separate Ailerons and two separate Elevators.</p>	
MCQ (1 mark)	(A) All the statements are correct.	
	(B) Only I is correct.	
	(C) Only II is correct.	
	(D) Only III is correct.	
	(E) Both I and II are correct.	
	(F) Both I and III are correct.	
	(G) Both II and III are correct.	
	(H) All the statements are incorrect.	
Solution: (E)		

Q 9	Which of the following statement(s) is/are TRUE about a Delta Wing Planform?	
MSQ (1 mark)	(A)	It has a larger Root chord.
	(B)	It has a high wing Aspect Ratio.
	(C)	It is suitable for high Mach Number flight.
	(D)	It has a high Lift curve slope.
	(E)	It has poor longitudinal stability.
	(F)	It has a lower Critical Mach Number.
	(G)	It results in higher Flap span.
	(H)	It has Roll Yaw coupling at high Angles of Attack.
Solution: (A), (C), (E), (H)		

Q 10	Which of the following statement(s) is/are TRUE about a Spiroid Winglet?	
MSQ (1 mark)	(A)	It increases operating Range.
	(B)	It results in shorter time-to-climb rates.
	(C)	It results in higher Parasite Drag.
	(D)	It increases the aircraft's empty weight.
Solution: (A), (B), (C), (D)		

Q 11	Which of the following is/are TRUE about General Dynamics <i>F-16 XL</i> aircraft?	
MSQ (1 mark)	(A)	It has an Ogive Delta wing planform.
	(B)	It has a high sweep to the inboard section of the wing.
	(C)	It has a lower Supersonic Drag.
	(D)	It has a low sweep to the outboard section of the wing.
	(E)	It has higher maneuverability at low speeds.
	(F)	It won the Enhanced Tactical Fighter competition of USAF in 1981.
	(G)	It had the same Payload carrying capacity as of the baseline F-16A.
	(H)	It had the same Range with Payload as of the baseline F-16A.
Solution: (B), (C), (D), (E)		

Q 12	<p>Read the following statements about dedicated Cargo aircraft, and choose the correct option:</p> <p>I. It has higher trip cost compared to a conventional aircraft.</p> <p>II. It has lower acquisition cost compared to a conventional aircraft.</p>	
MCQ (1 mark)	(A)	Both the statements are correct.
	(B)	Only I is correct.
	(C)	Only II is correct.
	(D)	Both the statements are incorrect.
Solution: (C)		

Q 13	<p>Which of the following statement(s) is/are TRUE about the Hughes H-4 Hercules (<i>Spruce Goose</i>) and AN-225 (<i>Mriya</i>) aircraft?</p>	
MSQ (1 mark)	(A)	<i>Spruce Goose</i> had a higher wingspan compared to <i>Mriya</i> .
	(B)	Both had the same number of engines.
	(C)	Currently, there is only one <i>Mriya</i> in service.
	(D)	Both had the same total length.
	(E)	Both were constructed principally using <i>Duralumin</i> .
	(F)	Both were designed to carry vast amount of Cargo.
	Solution: (A), (F)	

Q 14	Which of the following statement(s) is/are CORRECT?	
MSQ (1 mark)	(A)	<i>MiG-21 FL</i> is a Strategic Bomber.
	(B)	<i>MiG-27 Bahadur</i> is a Tactical Bomber.
	(C)	<i>A-10 Thunderbolt</i> is a Ground Attack Aircraft.
	(D)	<i>Ilyushin IL-78 MKI</i> is a Tanker Aircraft.
Solution: (B), (C), (D)		

Q 15	Which of the following statement(s) is/are TRUE about Interceptor Aircraft?	
MSQ (1 mark)	(A)	They have a high Rate of Climb.
	(B)	They are fitted with high BPR Turbofans.
	(C)	They are equipped with an Afterburner.
	(D)	They have a high Thrust-to-Weight Ratio.
Solution: (A), (C), (D)		