Introduction to Aircraft Design
July-2023

Assignment 10

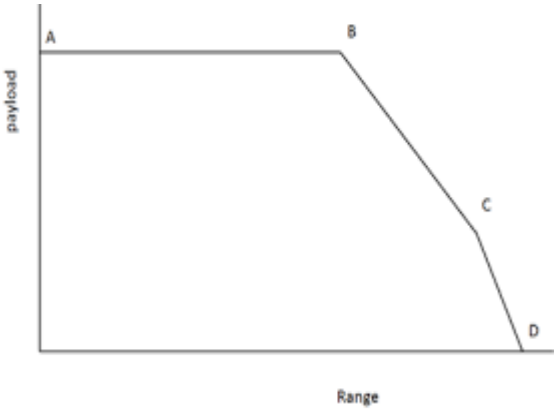
Q 1	What is the maximum weight that a landing gear of an aircraft is expected to withstand?	
MCQ (1 mark)	(A)	Maximum Zero Fuel Weight
	(B)	Maximum Landing Weight
	(C)	Maximum Take-off Weight
	(D)	Maximum Ramp Weight
Solution: (D)		

Q 2	Which of the following is/are the component(s) of Operating Empty Weight?	
MSQ (1 mark)	(A)	Manufacturer's Empty Weight
	(B)	Standard Items
	(C)	Operating Items
	(D)	Cargo
	(E)	Passengers
Solution: (A), (B), (C)		

Q 3	Which of the following is/are the reason(s) to carry the Reserve fuel?	
MSQ (1 mark)	(A)	Missed Approach
	(B)	Diversion and Hold
	(C)	Navigational Errors
	(D)	Range Increment
	(E)	Better Performance
Solution: (A), (B), (C)		

Q 4	Read the following statements and choose the correct option: I. It is always possible to carry Maximum Payload with Maximum Fuel. II. Specific Range remains constant through out the mission. III. Maximum Payload weight is limited only by the structural strength of the Payload bay.	
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)	Only I and II are correct.
	(F)	Only I and III are correct.
	(G)	Only II and III are correct.
	(H)	All the statements are incorrect.
Solution: (H)		

Q 5	Range with no Payload and including Reserve fuel is called_____.	
MCQ (1 mark)	(A)	Harmonic Range
	(B)	Ferry Range
	(C)	Gross Still Air Range
	(D)	Maximum Range
Solution: (B)		

Q 6	Point C in the RPD shown in the figure corresponds to _____. 	
MCQ (1 mark)	(A)	Maximum Payload and Maximum Take-off Weight
	(B)	Maximum Payload and Maximum Fuel Weight
	(C)	Maximum Fuel and Maximum Take-off Weight
	(D)	Minimum Payload and Maximum Fuel Weight
Solution: (C)		

Q 7	Which of the following factor(s) affect(s) the Range Payload Diagram?	
MSQ (1 mark)	(A)	Cruising Altitude
	(B)	Cruising Speed
	(C)	Powerplant characteristics
	(D)	En-route weather conditions
Solution: (A), (B), (C), (D)		

Q 8	What is the effect of a constraint on the Maximum Landing Weight of an aircraft on its Range Payload Diagram?	
MCQ (1 mark)	(A)	It decreases the Harmonic Range.
	(B)	It increases the Harmonic Range.
	(C)	It decreases the Ferry Range.
	(D)	It increases the Ferry Range.
Solution: (A)		

Q 9 - 10	The following data is related to transport aircraft: Maximum Ramp Weight = 100,000 kg Maximum Payload Weight = 25,000 kg Operating Empty Weight = 40,000 kg Fuel required for Warm Up, Taxi-out and Takeoff = 800 kg Reserve Fuel = 800 kg Specific Range = 0.18 km/kg
Q 9	Estimate the Mission Fuel Weight (in kg). (Write your answer nearest to an integer)
NAT (1 mark)	Answer : 33400
Solution: $W_{Ramp} = W_{Warm-up,Taxi\ and\ Take-off} + W_{Pay} + W_{Fuel} + W_{OEW}$ $100000 = 800 + 25000 + W_{Fuel} + 40000$ $W_{Fuel} = 34200\ kg$ $W_{Mission\ Fuel} = W_{Fuel} - W_{Reserve\ Fuel} = 34200 - 800 = 33400\ kg$	
Q 10	Estimate the Harmonic Range (in km), assuming a constant value for Specific Range. (Write your answer correct upto two decimal places)
NAT (1 mark)	Answer :6012
Solution: $Harmonic\ Range\ =\ Mission\ Fuel * Specific\ Range = 33400 * 0.18 = 6012\ km$	

Q 11	Which of the following statement(s) is/are TRUE about Contrails behind an aircraft?	
MSQ (1 mark)	(A)	They are caused due to the condensation of water vapor.
	(B)	They trap IR rays.
	(C)	They lead to Global Warming.
	(D)	They result in lower Induced Drag.
Solution: (A), (B), (C)		

Q 12	Which of the following component(s) create(s) loudest noise in a jet engined aircraft?	
MSQ (1 mark)	(A)	Engine Exhaust
	(B)	Main Landing Gear
	(C)	Spoilers
	(D)	Compressor Fan
Solution: (A), (D)		

Q 13	Flow Noise is caused due to_____.	
MSQ (1 mark)	(A)	Pressure fluctuation in Boundary Layer
	(B)	Rotating Fans
	(C)	Turbulent wake
	(D)	Piston Engine Exhaust
Solution: (C)		

Q 14	The Far Field Noise levels are measured at _____ different locations under FAR 36 regulations?	
MCQ (1 mark)	(A)	Five
	(B)	Four
	(C)	Three
	(D)	Two
Solution: (C)		

Q 15	Which of the following is/are the technique(s) used to reduce the Noise levels?	
MSQ (1 mark)	(A)	Shape optimization of engine duct
	(B)	High ByPass Ratio
	(C)	Engine acoustic liners
	(D)	Chevron Nozzle
Solution: (A), (B), (C), (D)		