



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad-500043

AERONAUTICAL ENGINEERING

TUTORIAL QUESTION BANK

Course Title	FLIGHT VEHICLES DESIGN				
Course Code	AAE017				
Programme	B.Tech				
Semester	VII	AE			
Course Type	Core				
Regulation	IARE - R16				
Course Structure	Theory			Practical	
	Lectures	Tutorials	Credits	Laboratory	Credits
	3	1	4	--	2
Chief Coordinator	Ms. M.Mary Thraza, Assistant Professor				
Course Faculty	Ms. K.Sai Priyanka, Assistant Professor				

COURSE OBJECTIVES:

The course should enable the students to:	
I	Discuss the importance of conceptual design process and studying different phases of design process involved in the design.
II	Understand the levels of integrated product development and principles of the baseline design-stability & control, performance and constraint analysis
III	Analyze cost estimation, parametric analysis, optimization, and refined sizing and trade studies.
IV	Observe different designing processes and how an aircraft production company works on it.

COURSE OUTCOMES (COs):

CO 1	Describe different phases of aircraft design, weight estimation and few basics of aerodynamics
CO 2	Differentiating size estimation fuel system and understanding the installation of engine systems
CO 3	Estimation of lift curve slopes maximum lift coefficient and different material selection can be found
CO 4	Understanding the concepts of stability for different control surfaces and also understanding the methods of structural analysis
CO 5	Acquiring knowledge on cost estimation research, Development, Test and Evaluation and product cost for designing an aircraft

COURSE LEARNING OUTCOMES (CLOs):

AAE017.01	Understanding the different designing concepts like preliminary design conceptual design and detail design
AAE017.02	Interpret the weight estimation of propulsion system structural weight empty weight
AAE017.03	Calculating the dimensioning of engine inlet location and capture area
AAE017.04	Estimation of wing geometry and wing vertical location, wing tip shapes, tail geometry and arrangements, thrust to weight ratio-statistical estimation
AAE017.05	Understand a theories and to predict the maximum lift coefficient, and complete drag build up, installed performance of an engine
AAE017.06	Development of configuration lay out from conceptual sketch.
AAE017.07	Calculating the velocity, angle of Attack, angle of attack rate, pitch rate, elevator angle.
AAE017.08	Constructing v-n diagram, air load distribution on lifting surfaces
AAE017.09	Developing the concept of Propulsion selection fuel selection and
AAE017.10	Plotting the mission segment with different weight fractions
AAE017.11	Understanding the concepts of different landing gear system
AAE017.12	Estimation of design-stability and control
AAE017.13	Analysis of performance under constrained conditions constraint
AAE017.14	Acquire Basic knowledge to solve real time problems in Aircraft propulsion and structure with different loading conditions
AAE017.15	Understand the fundamental concepts in competitive examinations

TUTORIAL QUESTION BANK

UNIT -I

OVERVIEW OF THE DESIGN PROCESS, SIZING FROM A CONCEPTUAL SKETCH AIRFOIL AND GEOMETRY SELECTION, THRUST TO WEIGHT RATIO, WING LOADING

Part - A (Short Answer Questions)

S.NO	QUESTIONS	Blooms Taxonomy Level	Course Outcomes	Course Learning Outcomes
1	What is design?	Remember	CO1	AAE017.01
2	Explain about preliminary design with one example.	Remember	CO1	AAE017.01
3	Explain typical mission profile in simple cruise condition.	Understand	CO1	AAE017.01
4	Write about the over view of the design process with design wheel sketch?	Knowledge	CO1	AAE017.02
5	What are the three different phases of aircraft design requirements	Remember	CO1	AAE017.02
6	Explain typical mission profile for commercial transport.	Understand	CO1	AAE017.02
7	Write about detail design process with example?	Remember	CO1	AAE017.01
8	What is lofting?	Understand	CO1	AAE017.02
9	What is difference between design and drafting?	Understand	CO1	AAE017.03
10	Explain specific fuel consumption trends at typical cruise altitudes.	Knowledge	CO1	AAE017.03
11	What is first order sizing?	Understand	CO1	AAE017.03

12	What is sizing?	Remember	CO1	AAE017.02
13	What is integrated product development?	Remember	CO1	AAE017.02
14	Explain aircraft conceptual design process with initial sketch.	Understand	CO1	AAE017.02
15	Name the affects of airfoil during all phases of flight?	Remember	CO1	AAE017.03
16	Write about takeoff-weight buildup with the help of relevant equations?	Understand	CO1	AAE017.03
17	What is empty weight fraction explain how it is calculated with some examples?	Remember	CO1	AAE017.03
18	Write about Fuel-fraction estimation and how it is calculated approximately.	Remember	CO1	AAE017.03
19	Explain how lift to drag is estimated and explain about each factor that influences L/D ratio	Understand	CO1	AAE017.03
20	Explain typical mission profiles for sizing with neat sketch.	Remember	CO1	AAE017.03
Part - B (Long Answer Questions)				
1	Explain clearly, the sets of data required to be available before the beginning of preliminary design phase and the data that is expected to be ready at the end of this phase.	Understand	CO1	AAE017.01
2	What are the factors involved in deciding the location of the wing with respect to the fuselage? Explain in detail.	Understand	CO1	AAE017.01
3	Discuss airfoil aerodynamic characteristics of 6 digit NACA airfoils. Use good sketches. Discuss in particular (Cl) _{max} versus t/c (thickness to chord ratio).	Understand	CO1	AAE017.01
4	Explain how specific fuel consumption and propeller specific fuel consumption calculated in cruise and loiter condition.	Understand	CO1	AAE017.02
5	What is meant by design lift coefficient? Explain its importance in the conceptual design phase?	Understand	CO1	AAE017.02
6	Explain types of stall and what are the stall characteristics for thinner airfoils?	Understand	CO1	AAE017.02
7	Illustrate some of possible variations in aft-tail arrangement and positioning with neat sketch.	Understand	CO1	AAE017.01
8	Explain about power loading and horse power-to-weight with the equation.	Understand	CO1	AAE017.02
9	Explain thrust lapse at cruise with neat sketch and derive the equation.	Understand	CO1	AAE017.03
10	Explain about take-off distance requirement parameters with the following expression.	Understand	CO1	AAE017.03
11	Justify the statement that 'a key aspect of conceptual design is a very fluid process'.	Remember	CO1	AAE017.03
12	In which phase of design does a production designer get involved? Explain about the involvement of production designer.	Understand	CO1	AAE017.01
13	Explain the significance of integrated product development in aircraft design.	Understand	CO1	AAE017.01
14	Explain how the total weight of the aircraft as it begins the mission for which it was designed. Explain how it is determined?	Understand	CO1	AAE017.01
15	Explain about empty weight estimation and how it is estimated statistically from historical trends.	Understand	CO1	AAE017.02
16	Explain about mission segment weight fractions with the historical mission segment weight fractions.	Understand	CO1	AAE017.02
17	What is specific fuel consumption and write down the equation for equivalent-trust SFC for a propeller-driven aircraft.	Understand	CO1	AAE017.02
18	What is lift to drag ratio and explain different factors that influence L/D ratio in design perspective	Understand	CO1	AAE017.01
19	Explain about first order design method.	Understand	CO1	AAE017.02

20	Explain briefly about trade studies.	Understand	CO1	AAE017.03
Part - C (Analytical Questions)				
1	Explain the take-off weight buildup and the empty weight estimation for a new aircraft design.	Understand	CO1	AAE017.01
2	What are the implications of a using loading (w/s) value on aircraft design?	Understand	CO1	AAE017.01
3	What are the considerations for deciding the length of the fuselage?	Understand	CO1	AAE017.01
4	Explain airfoil thickness ratio with the effects of t/c on drag on critical mach number, on maximum lift, thickness ratio historical trend with graphs.	Understand	CO1	AAE017.02
5	Describe wing vertical location for the fuselage with one example. What are the different shapes of wing tips with the neat sketches?	Understand	CO1	AAE017.02
6	Explain tail geometry for some general-aviation aircraft with tail aspect ratio and taper ratio.	Understand	CO1	AAE017.02
7	Explain thrust –to-weight ratio and wing loading.	Understand	CO1	AAE017.01
8	Explain statistical estimation of T/W and hp/W for different classes of aircraft.	Understand	CO1	AAE017.02
9	Explain Thrust-Matching Requirements? Explain the comparison of selected engines thrust available during cruise to estimated aircraft.	Understand	CO1	AAE017.03
10	Explain stall speed of an aircraft determined by wing loading maximum lift coefficient and derive the equation.	Remember	CO1	AAE017.03

UNIT-II

INITIAL SIZING & CONFIGURATION LAYOUT

Part – A (Short Answer Questions)

1	What is aircraft sizing?	Understand	CO2	AAE017.05
2	What is productability, maintainability?	Knowledge	CO2	AAE017.05
3	Explain leading edge suction of an airfoil.	Remember	CO2	AAE017.04
4	What is rubber engine sizing and in which type of aircraft it is used?	Remember	CO2	AAE017.04
5	Explain tail volume coefficient for military cargo/bomber aircraft.	Knowledge	CO2	AAE017.05
6	Derive refined sizing equation.	Understand	CO2	AAE017.04
7	Describe tail arrangement configurations for tandem wing.	Remember	CO2	AAE017.04
8	Write the weight fraction for an aircraft climbing and accelerating to cruise altitude and Mach number.	Knowledge	CO2	AAE017.5
9	Derive the weight fraction for loiter mission segment.	Understand	CO2	AAE017.5
10	Explain Special considerations in configuration layout from conceptual sketch.	Remember	CO2	AAE017.6
11	Write the breguet range equation for cruise.	Understand	CO2	AAE017.7
12	Explain fixed engine sizing for an military cargo / bomber aircraft.	Remember	CO2	AAE017.7
13	Explain Rubber engine sizing for an general aviation-single engine.	Knowledge	CO2	AAE017.6
14	Discuss tail geometry for tail and taper aspect ratio for vertical tail for fighter aircraft.	Understand	CO2	AAE017.6
15	What is refined sizing method?	Remember	CO2	AAE017.7
16	Explain tail geometry for tail and taper aspect ratio for vertical tail for sailplane aircraft.	Knowledge	CO2	AAE017.6
17	What is geometry sizing?	Understand	CO2	AAE017.7
18	What are the design objectives of refined sizing method?	Remember	CO2	AAE017.5
19	Describe control surfaces sizing and types of control surfaces explain in detail with neat sketches.	Knowledge	CO2	AAE017.6
20	What is integrated product development?	Knowledge	CO2	AAE017.7

Part - B (Long Answer Questions)

1	Explain wing loading for different aircrafts –jet fighter, sailplane, twin	Understand	CO2	AAE017.05
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	turboprop.			
2	How to develop the configuration layout from conceptual sketch?	Knowledge	CO2	AAE017.05
3	Explain about isobar tailoring, sears-hack volume distribution.	Understand	CO2	AAE017.04
4	What is lofting definition? Explain briefly about flat wrap lofting?	Knowledge	CO2	AAE017.04
5	Explain briefly about visual detectability and aural signature.	Understand	CO2	AAE017.05
6	Explain briefly about vulnerability considerations with vulnerable area calculations.	Knowledge	CO2	AAE017.04
7	Explain how crew station will affect the conceptual design primarily in the vision Requirements with the example.	Understand	CO2	AAE017.04
8	Explain about passenger compartment for commercial aircraft and give some typical passenger compartment data.	Understand	CO2	AAE017.5
9	Explain how Carriage of weapons is the purpose of most military aircraft.	Understand	CO2	AAE017.5
10	Derive combat/known-time fuel burn equation.	Understand	CO2	AAE017.6
11	Describe the summary of refined sizing method.	Knowledge	CO2	AAE017.7
12	Explain tail volume coefficient?	Understand	CO2	AAE017.7
13	Write about conic lofting; flat wrap lofting with neat sketch?	Knowledge	CO2	AAE017.6
14	Explain wetted area with neat diagram?	Understand	CO2	AAE017.6
15	Explain about aerodynamic considerations?	Knowledge	CO2	AAE017.7
16	Explain about aural signature and consideration of vulnerability?	Knowledge	CO2	AAE017.6
17	Explain in detail about typical fuselage lofting with example.	Understand	CO2	AAE017.7
18	Explain briefly about tail volume coefficient and write the equation for horizontal tail volume coefficient	Knowledge	CO2	AAE017.5
19	Explain longitudinal control lines with conic layout example.	Understand	CO2	AAE017.6
20	Explain about end products of configuration layout with design sketch.	Knowledge	CO2	AAE017.7
Part - C (Analytical Questions)				
1	Derive the equation for rubber Engine sizing of an aircraft with neat sketches.	Understand	CO2	AAE017.07
2	What are the advantages and disadvantages of pusher and tractor Engine?	Remember	CO2	AAE017.05
3	Discuss in detail the most commonly employed methods to assess the fuel tank volume.	Knowledge	CO2	AAE017.07
4	Explain in detail refined sizing an aircraft? With neat sketches.	Remember	CO2	AAE017.04
5	Explain the major differences in the designs of the fuselage of a fighter and bomber plane. Justify your answer? With neat sketches.	Understand	CO2	AAE017.05
6	Explain tail volume coefficient and write the expressions of vertical tail volume coefficient, horizontal tail volume coefficient with the help of neat sketch.	Understand	CO2	AAE017.04
7	Explain weapons carriage for military aircraft and gun installation? Explain with neat sketches.	Knowledge	CO2	AAE017.04
8	Explain briefly about conic lofting and conic fuselage development.	Understand	CO2	AAE017.5
9	Explain about common problem in lofting with the example.	Remember	CO2	AAE017.5
10	Explain briefly about Airfoil Linear Interpolation with wing airfoil layout.	Knowledge	CO2	AAE017.6
UNIT -III				
PROPULSION & FUEL SYSTEM INTEGRATION, LANDING GEAR & SUBSYSTEMS				
Part - A (Short Answer Questions)				
1	Illustrate the major options for aircraft propulsion system with neat sketch.	Knowledge	CO3	AAE017.09
2	Explain about propulsion system speed limits with graph.	Knowledge	CO3	AAE017.08
3	Explain about jet engine integration and types of jet engine.	Understand	CO3	AAE017.10

4	Explain about propeller sizing and propeller location .	Knowledge	CO3	AAE017.10
5	Explain Engine-Size Estimation in propeller aircraft design.	Knowledge	CO3	AAE017.08
6	What are the factors include aircraft fuel system with fuel tank volume plotting?	Understand	CO3	AAE017.09
7	What are the types of landing gears and location of landing gears on the aircraft?	Knowledge	CO3	AAE017.10
8	Explain common options for landing-gear arrangement with the help of neat sketch.	Knowledge	CO3	AAE017.08
9	What are the different types of subsystems?	Understand	CO3	AAE017.09
10	What are the factors involving design layout of aircraft?	Knowledge	CO3	AAE017.08
11	What are the factors involving design layout of aircraft?	Understand	CO3	AAE017.10
12	Draw the Oleo shock absorber and name the parts?	Knowledge	CO3	AAE017.10
13	Explain electrical system?	Understand	CO3	AAE017.08
14	Explain avionics?	Knowledge	CO3	AAE017.09
15	Draw simplified hydraulic system?	Understand	CO3	AAE017.10
16	Explain gear retraction geometry?	Knowledge	CO3	AAE017.08
17	Draw solid-spring gear sizing?	Understand	CO3	AAE017.09
18	Explain about stoke determination and give the equation?	Knowledge	CO3	AAE017.08
19	Explain landing gear arrangements?	Understand	CO3	AAE017.10
20	Derive the equation shows that the thrust is zero.	Knowledge	CO3	AAE017.10
Part – B (Long Answer Questions)				
1	Explain typical wing lift curves along with the graphs of effect of camber and effect of aspect ratio.	Understand	CO3	AAE017.08
2	Explain the maximum lift coefficient of wing with the graph of Subsonic maximum lift of high-aspect-ratio wings.	Remember	CO3	AAE017.09
3	Explain about typical engine performance curves of max power thrust and military power thrust.	Understand	CO3	AAE017.08
4	Explain about thrust methodology with the help of block diagram.	Knowledge	CO3	AAE017.08
5	Explain net propulsive force corrections with different nozzle incremental drag.	Understand	CO3	AAE017.08
6	Explain the load categories with typical fighter limit load factor.	Understand	CO3	AAE017.09
7	What are the two different types of air loads explain in detail with v-n diagrams?	Knowledge	CO3	AAE017.08
8	Describe air loads on lifting surfaces? write the expression for Trapezoidal Chord and elliptical chord.	Understand	CO3	AAE017.09
9	Describe the structural analysis fundamentals of aircraft components.	Understand	CO3	AAE017.08
10	Describe the important properties to the selection of material for an aircraft.	Understand	CO3	AAE017.08
11	Explain turbojet thrust contributors with the help of neat sketches.	Knowledge	CO3	AAE017.08
12	Describe turbojet installed thrust with one example.	Knowledge	CO3	AAE017.08
13	Explain installed thrust methodology with block diagram.	Understand	CO3	AAE017.08
14	Explain installed engine thrust corrections for a subsonic engines and super sonic engines.	Understand	CO3	AAE017.08
15	Explain briefly about installed net propulsive force corrections.	Understand	CO3	AAE017.09
16	Explain piston-engine performance with typical engine performance for non-super charged, super charged, and turbocharged engines	Knowledge	CO3	AAE017.08
17	Describe briefly propeller performance and write the properties of propeller which is expressed in coefficient form.	Understand	CO3	AAE017.09
18	Explain briefly about turboprop engine performance.	Knowledge	CO3	AAE017.08
19	Explain piston-prop thrust corrections with the fixed-pitch propeller adjustment.	Understand	CO3	AAE017.09

20	Explain briefly about the turboprop performance.	Understand	CO3	AAE017.08
Part - C (Analytical Questions)				
1	Explain about jet engine integration and also explain how length, diameter, and weight vary with the scale factor for the typical jet engine.	Understand	CO3	AAE017.10
2	Explain about power –plant loads and what is the safety factor for jet engine with two cylinders, three cylinders, and four cylinders.	Understand	CO3	AAE017.09
3	Describe Scaling laws for piston and turboprop engines Width and height vary insignificantly within $\pm 50\%$ horsepower.	Knowledge	CO3	AAE017.08
4	What are the various fields for propulsion system integration with block diagram?	Understand	CO3	AAE017.09
5	With the help of neat graph explain how CL max varies with the different types of flaps.	Understand	CO3	AAE017.10
6	Explain the landing gear arrangements for multi-wheel main landing gear with neat sketch? and also Explain landing gear arrangements for tail dragger, quadric-cycle, and multi-bogey.	Knowledge	CO3	AAE017.09
7	Describe inlet geometry with pitot inlet layout and inlet location for buried engines.	Understand	CO3	AAE017.08
8	Explain about nozzle integration with different types of nozzles.	Understand	CO3	AAE017.10
9	Explain about tire sizing and what the calculations of static loads on tires are.	Understand	CO3	AAE017.09
10	Describe the more common forms of shock absorber types? Explain about oleo shock absorber.	Understand	CO3	AAE017.08
UNIT –IV				
BASELINE DESIGN ANALYSIS - II				
Part – A (Short Answer Questions)				
1	What is static pitch stability?	Understand	CO4	AAE017.11
2	What is velocity stability and trim?	Knowledge	CO4	AAE017.11
3	What is directional stability and trim?	Knowledge	CO4	AAE017.12
4	What is estimation of stability and control derivatives?	Understand	CO4	AAE017.12
5	Name the characteristic estimation of dynamic aircraft?	Knowledge	CO4	AAE017.12
6	What are the handling qualities of dynamic aircraft?	Knowledge	CO4	AAE017.13
7	What is Cooper - Harper scale?	Knowledge	CO4	AAE017.13
8	Derive the equation for minimum thrust required for level flight	Knowledge	CO4	AAE017.11
9	What is minimum thrust required for level flight?	Knowledge	CO4	AAE017.10
10	What are the effects of wind on aircraft performance?	Knowledge	CO4	AAE017.13
11	Derive the equation for steady level flight?	Understand	CO4	AAE017.12
12	What is steady level flight??	Knowledge	CO4	
13	Derive range equation.	Knowledge	CO4	AAE017.12
14	Derive the equation for minimum thrust required for level flight?	Understand	CO4	AAE017.12
15	What is range?	Knowledge	CO4	AAE017.12
16	What is range optimization-jet?	Understand	CO4	AAE017.12
17	Explain graphical analysis for thrust and power required with neat graph.	Understand	CO4	AAE017.12
18	What is loiter endurance and derive the equation in terms of L/D and weight.	Knowledge	CO4	AAE017.15
19	What is range optimization-prop?	Knowledge	CO4	AAE017.12
20	Derive the equation for minimum power required for level flight?	Understand	CO4	AAE017.12
Part – B (Long Answer Questions)				
1	Derive the equation for static pitch stability.	Understand	CO4	AAE017.11
2	Derive the equation for static lateral, directional stability and trim.	Knowledge	CO4	AAE017.12

3	Explain briefly about estimation of dynamic characteristics and handling qualities.	Remember	CO4	AAE017.12
4	Explain briefly about cooper-harper scale.	Understand	CO4	AAE017.13
5	Derive minimum thrust required for level flight.	Knowledge	CO4	AAE017.13
6	Derive the equation for range and loiter endurance.	Understand	CO4	AAE017.11
7	Derive equation for steady climbing and descending flight.	Understand	CO4	AAE017.11
8	Explain energy maneuverability methods of optimal climb trajectories and turns.	Understand	CO4	AAE017.11
9	What is aircraft operating envelope, take off analysis, balanced field length, landing analysis, fighter performance measures of merit and its effects on aircraft performance?	Understand	CO4	AAE017.13
10	Explain about base line design and report of specifications.	Understand	CO4	AAE017.13
11	Derive the equation for loiter optimization-prop.	Understand	CO4	AAE017.13
12	Explain briefly effects of wind on cruise and loiter with the help of neat sketch.	Knowledge	CO4	AAE017.11
13	Describe briefly about steady climbing and descending flight with the following equations.	Knowledge	CO4	AAE017.13
14	What is the best angle and rate of climb-jet and rate of climb-prop? Write necessary equations.	Understand	CO4	AAE017.13
15	Explain briefly about time to climb and fuel climb and derive the equations for the following	Knowledge	CO4	AAE017.11
16	Write about i. Instantaneous turn rate ii. Sustained turn rate	Understand	CO4	AAE017.13
17	What is gliding flight? Explain about different types of gliding flights.	Knowledge	CO4	AAE017.13
18	What are energy maneuverability methods? Explain with the help of energy equations.		CO4	AAE017.11
19	What is operating envelope? Explain with the help of neat graph.	Knowledge	CO4	AAE017.13
20	Explain briefly about take-off analysis and landing analysis.	Understand	CO4	AAE017.12
Part - C (Analytical Questions)				
1	Explain the lift-curve slopes of the wing and tail are obtained with the different methods.	Understand	CO4	AAE017.13
2	Derive aerodynamic damping forces resist motion and how Roll damping is estimated with the figure which is based upon data in NACA1098 covering the lower aspect ratios and NACA 868 covering the higher aspect ratios with the help of neat sketch.	Remember	CO4	AAE017.13
3	Illustrates the Cooper-Harper Handling Qualities Rating Scale, which is used by test pilots to categorize design deficiencies.	Understand	CO4	AAE017.11
4	Describe quasi-steady state with the help rolling damping parameters graph.	Understand	CO4	AAE017.11
5	Explain about departure criteria with the expressions of the aileron-alone divergence parameter another departure parameter $C_n\beta_{dynamic}$ which includes the effects of the mass moments of inertia.	Understand	CO4	AAE017.13
6	Explain graphical analysis for thrust and power required.	Understand	CO4	AAE017.13
7	Explain minimum fuel-to-climb trajectory and write energy equations can be modified to determine the climb trajectory that minimizes fuel consumption.	Understand	CO4	AAE017.11
8	Derive sustained turn-rate of the aircraft and also explain the turn rate and corner speed with the graphical representation.	Understand	CO4	AAE017.13
9	Explain "level-flight operating envelope" has the further restriction that the aircraft be capable of steady level flight with neat graphical representation.	Understand	CO4	AAE017.13
10	Explain about ground roll and ground rolling resistance with different surfaces.	Understand	CO4	AAE017.11

UNIT - V

BASELINE DESIGN– STABILITY & CONTROL, PERFORMANCE AND CONSTRAINT ANALYSIS

Part - A (Short Answer Questions)

1	What are the elements of life cycle cost?	Remember	CO5	AAE017.14
2	What is cost estimating method, RDT&E and production costs?	Knowledge	CO5	AAE017.15
3	What is production cost?	Knowledge	CO5	AAE017.14
4	What is DOC and IOC?	Knowledge	CO5	AAE017.14
5	What is break even analysis?	Understand	CO5	AAE017.15
6	What are the methods of improved conceptual sizing?	Knowledge	CO5	AAE017.14
7	What is trade studies?	Knowledge	CO5	AAE017.14
8	What are multi variable design optimization methods?	Understand	CO5	AAE017.15
9	Determine the final base line design configuration.	Knowledge	CO5	AAE017.14
10	What is the preparation type of specific report?	Knowledge	CO5	AAE017.14
11	What is pitching moment equation?	Remember	CO5	AAE017.15
12	Explain about aerodynamic center.	Knowledge	CO5	AAE017.14
13	Explain about down wash.	Knowledge	CO5	AAE017.14
14	Write the equation for fuselage and nacelle pitching moment.	Understand	CO5	AAE017.15
15	Explain about up wash	Knowledge	CO5	AAE017.14
16	Explain about ground affect on trim calculation.	Understand	CO5	AAE017.14
17	What is take-off rotation?	Knowledge	CO5	AAE017.15
18	What is stick free stability?	Understand	CO5	AAE017.14
19	Explain about castoring-wheel geometry.	Knowledge	CO5	AAE017.14
20	Explain landing gear retraction with neat sketch.	Understand	CO5	AAE017.15

Part - B (Long Answer Questions)

1	Explain briefly about elements life cycle cost.	Understand	CO5	AAE017.14
2	Explain briefly about operations and maintenance cost and cost measures of airline economics.	Understand	CO5	AAE017.15
3	Explain about improved conceptual sizing methods.	Understand	CO5	AAE017.14
4	Explain sizing matrix plot and carpet plot , trade studies.	Understand	CO5	AAE017.14
5	Briefly explain about design trades requirement trades.	Understand	CO5	AAE017.15
6	Describe briefly about design optimization method.	Understand	CO5	AAE017.14
7	Explain briefly about determination of final baseline design configuration.	Understand	CO5	AAE017.14
8	Write and explain the equation for Refined sizing.	Knowledge	CO5	AAE017.15
9	Write about the case study on design of DC-3 and Boeing B-707&747.	Understand	CO5	AAE017.14
10	Write about the case study on general dynamics F-16, SR-71 Blackbird, Northrop-Grumman B-2 Stealth Bomber.	Understand	CO5	AAE017.14
11	Explain briefly about pitching-moment equation and trim.	Understand	CO5	AAE017.15
12	Explain about different coordinate systems commonly used in aircraft analysis with help of neat sketches.	Knowledge	CO5	AAE017.14
13	With the help of required equations explain about static pitch stability.	Understand	CO5	AAE017.14
14	Explain briefly about gear-retraction geometry.	Knowledge	CO5	AAE017.15
15	Explain briefly about seaplanes with the help of neat sketches.	Understand	CO5	AAE017.13
16	Describe briefly about auxiliary/emergency power.	Understand	CO5	AAE017.15
17	Explain transport aircraft electrical system design of Boeing 767.	Understand	CO5	AAE017.13
18	Explain pneumatic/ECS systems and uses.	Knowledge	CO5	AAE017.15
19	Describe simplified hydraulic system with neat sketches	Understand	CO5	AAE017.13
20	Explain briefly about AMAD with the help of APU installation.	Knowledge	CO5	AAE017.14

Part - C (Analytical Questions)				
1	Explain how many engineering hours during the RDT &E phase were actually spent in support of production.	Knowledge	CO5	AAE017.15
2	Describe latest version of the Development and Procurement Costs of Aircraft (DAPCA) model.	Understand	CO5	AAE017.13
3	Derive the equation of Modified DAPCA IV Cost Model.(costs in constant 1986 dollars)	Understand	CO5	AAE017.14
4	Explain sizing matrix with the example of a sizing matrix for a small fighter.	Understand	CO5	AAE017.15
5	Explain about trade studies with the requirements trades and growth sensitivities.	Understand	CO5	AAE017.13
6	Explain carpet plot matrix and how carpet plot," is based upon superimposing the takeoff weight plots from Sizing matrix cross plots.	Understand	CO5	AAE017.14
7	Describe improved conceptual sizing methods and write the expression for the duration of time to perform the mission segment.	Understand	CO5	AAE017.15
8	Explain take-off, climb and acceleration, cruise and loiter with the following expressions.	Understand	CO5	AAE017.13
9	Explain combat maneuver, Descent, landing with the following calculations.	Understand	CO5	AAE017.14
10	Describe detail sizing methods with the equations which are the basis of the highly-detailed sizing programs used by the major aircraft companies.	Knowledge	CO5	AAE017.15

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