Model Question Paper-I

CBCS SCHEME

First/ Second Semester B.E Degree Examination,

Elements of Aeronautics (1BEAE105/205)

TIME: 03Hours **Max.Marks:100**

Notes:

1. *Answer any FIVE full questions, choosing at least ONE question from each MODULE*
2. *M: Marks, L: Bloom's level, C: Course outcomes.*
3. Use clear diagrams/flowcharts wherever necessary.
4. Data missing, if any, may be assumed suitably

		Module-1	M	L	C
Q.1	a	Explain the classification of aircraft using a clear flowchart	8	2	1
	b	With a neat sketch, describe the types of fuselage construction used in aircraft.	6	2	1
	c	Explain the general structural construction methods used in aircraft design.	6	2	1
OR					
Q.2	a	With a neat sketch, explain the main components of a helicopter and their functions.	8	2	1
	b	Describe the primary and secondary control surfaces of an aircraft with examples.	6	2	1
	c	Compare metallic and non-metallic materials used in aircraft construction based on strength, weight, corrosion, and cost.	6	3	1
Module–2					
Q.3	a	With a neat sketch, explain airfoil nomenclature and its importance in aerodynamic design.	6	2	2
	b	Explain Bernoulli's theorem and illustrate how it contributes to lift generation on an airfoil.	6	2	2
	c	Using the standard atmosphere-temperature variation graph, derive the relationship between pressure, temperature, and density with altitude.	8	3	2
OR					
Q.4	a	Define drag and describe its major types with real-world examples from aircraft operation.	6	2	2
	b	Consider an aircraft with wing area 206 m^2, an aspect ratio of 10, a span effectiveness factor of 0.95 and NACA 4412 airfoil. The weight of the airplane is 7.5×10^5 N. If the density altitude is 3 km and the velocity is 100 m/s. Calculate the total drag.	6	3	2
	c	Define (i) Centre of Pressure (ii) Aerodynamic Center (iii) Mach Number (iv) Aspect Ratio	8	2	2
Module–3					
Q5	a	Define thrust augmentation and explain the various methods used with neat sketches.	8	2	3
	b	With a neat sketch, explain the working principle of a turbofan engine. Compare turbojet, turbofan, and turboprop engines based on efficiency, fuel consumption, and applications.	12	3	3
OR					
Q.6	a	With a neat sketch, explain the working principle of a ramjet engine.	8	2	3
	b	Explain the thermodynamic processes of the Brayton cycle using a pressure–volume or temperature–entropy diagram	8	2	3
	c	Write the general classification of aircraft powerplants.	4	2	3
Module–4					
Q.7	a	Write short notes on stalling, gliding, landing, and turning of an aircraft.	10	2	4
	b	Illustrate the power required and power available curves for an aircraft and explain the effect of changes in engine power on performance.	10	3	4
OR					
Q.8	a	Discuss longitudinal, lateral, and directional stability of an aircraft. State the	10	3	4

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		conditions for longitudinal stability.			
	b	An aircraft flies in a circular path of radius 120 m at 53 m/s. Calculate the correct angle of bank required for this turn.	10	3	4
Module–5					
Q.9	a	Write short notes on hydraulic and pneumatic systems and mention their aircraft applications.	10	2	5
	b	Briefly explain about (i) Communication system (ii) Cockpit instrumentation and displays	10	2	5
OR					
Q.10	a	Discuss the types of flight control systems with neat diagrams illustrating mechanical, hydraulic, and fly-by-wire systems.	10	3	5
	b	Explain the methods of cabin air-cooling using suitable diagrams.	10	2	5