BAE302

Third Semester B.E/B.Tech. Degree Examination, June/July 2025
Elements of Aeronautics

Time: 3 hrs.   Max. Marks:100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
1	a.	Write a short note on Fuselage construction with neat sketch and explain the following : i) Truss type ii) Monocoque Type iii) Semi-Monocoque type	12	L1	CO1
	b.	Explain various metallic and metallic materials in aircraft construction.	8	L1	CO1
		OR			
2	a.	Lists the classification of aircrafts with explanation.	7	L1	CO1
	b.	With a neat sketch explain the parts of Helicopter and its functions.	8	L1	CO1
	c.	Illustrate the axis system of the aircraft and explain its corresponding motion.	5	L1	CO1
		Module – 2			
3	a.	With a neat sketch explain airfoil geometry.	8	L1	CO1
	b.	Explain the following i) Aerodynamic Center ii) Aspect ratio iii) Centre of Pressure iv) Mach Number	8	L1	CO1
	c.	Explain forces acting on an airfoil.	4	L1	CO1
		OR			
4	a.	Define Drag. Explain different types of drag in detail.	6	L2	CO2
	b.	Explain the Bernoullils Theorem and its application for the generation of lift.	8	L2	CO2
	c.	Consider an aircraft flying, if $C_L = 1.0$ and $C_D = 0.05$ for an airfoil. Then i) Find the span required for a rectangular wing of chord 10m, the lift 3560 KN at take off speed 282 km /hr. ii) Calculate the drag force on the wing at take off.	6	L3	CO3
		Module – 3			
5	a.	Define thrust Augmentation. Discuss the various types of thrust augmentation with neat sketch.	10	L2	CO2
	b.	With a neat sketch explain the working principle of Turbojet engine and also merits and demerits over Turbofan Engine.	10	L2	CO2
		OR			
6	a.	Write the general classification of the aircraft power plants.	8	L2	CO2
	b.	Explain different processes which take place in Brayton cycle with PV and TS diagram and derive efficiency equation of Brayton cycle. Discuss its application to gas turbine engines.	12	L2	CO2

Module – 4

7	a.	Describe the different types of static and dynamic stability with neat diagram.	8	L2	CO3
	b.	Define degrees of freedom for an Aircraft.	8	L2	CO2
	c.	Find the correct angle of bank for an aeroplane travelling on a circle of radius 120 m at velocity of 53 ms^{-1}.	4	L3	CO3

OR

8	a.	Explain the effect of flaps and slats on lift with proper graph.	10	L2	CO3
	b.	Write a short notes on aerobatics and inverted maneuver of an aircraft.	10	L2	CO3

Module – 5

9	a.	Discuss the environment control system, fuel system and oxygen system of an aircraft.	10	L2	CO2
	b.	Explain hydraulic and pneumatic system. Mention their applications in an aircraft.	10	L2	CO2

OR

10	a.	Describe the Flight Control System and navigation system in an aircraft.	10	L2	CO3
	b.	Briefly explain about i) Communication System ii) Cockpit instrumentation and displays in aircraft.	10	L2	CO3

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