Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER- VII EXAMINATION-SUMMER 2023

Subject Code: 3170113 Date: 21/06/2023

Subject Name: Helicopter Engineering

Time: 10:30 AM TO 01:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	How does auto gyro is different than conventional helicopter?	**03**
	(b)	What do you understand about fully articulated rotor?	**04**
	(c)	Briefly explain collective and cyclic pitch controls of monorotor conventional helicopters.	**07**
Q.2	**(a)**	Shortly explain Coriolis force.	**03**
	(b)	Define Centre of pressure. Define dissymmetry of lift.	**04**
	(c)	Briefly discuss forces acting upon main rotor blades.	**07**
		OR	
	(c)	Explain flapping and feathering with neat sketch.	**07**
Q.3	**(a)**	What is the effect of density altitude on helicopter performance?	**03**
	(b)	Differentiate between Induced power and Parasite Power.	**04**
	(c)	Discuss reasons of failure of tail rotor failure.	**07**
		OR	
Q.3	**(a)**	Shortly explain retreating blade stall.	**03**
	(b)	Explain the need to trim the helicopter while hover.	**04**
	(c)	Discuss effect of dihedral angle on main rotor blade on hover and	**07**
Q.4	**(a)**	What is the role of horizontal stabilizer while cruising of a conventional helicopter?	**03**
	(b)	Define forward speed dynamic stability.	**04**
	(c)	What is directional stability? How will you improve directional stability as a helicopter designer?	**07**
		OR	
Q.4	**(a)**	Define maneuvering loads. Shortly explain effects of high maneuvering loads on airframes of helicopters.	**03**
	(b)	Differentiate between static and dynamic stability.	**04**
	(c)	Briefly explain factors affecting structural design and material selection of main rotor blades.	**07**
Q.5	**(a)**	Define- Service Life, Creep Fatigue and Corrosion.	**03**
	(b)	Why centrifugal clutch is used to connect engine gear box and main/tail rotor?	**04**

	(c)	With neat sketch explain main rotor and tail rotor power transmission system.	**07**

OR

Q.5	**(a)**	What is role of CG limits in flight stability?	**03**
	(b)	What are effects of too aft and too forward CG on helicopter cruise and maneuvering.	**04**
	(c)	Explain the principle of Gyrodyne.	**07**

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