Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VII (NEW) EXAMINATION – WINTER 2024

Subject Code:3170113 Date:19-11-2024

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)**	State the technical differences between a helicopter and an airplane.	**03**
	(b)	Explain in short power vs speed variation for a helicopter rotor.	**04**
	(c)	What is lateral Flapping? State the effect of Flapping.	**07**
Q.2	**(a)**	State the effect of centre of pressure.	**03**
	(b)	Explain Transverse Flow effect	**04**
	(c)	Explain the velocity distribution over a helicopter rotor in forward flight and hover. A neat sketch of both is compulsory.	**07**
		OR	
	(c)	State the features of semi rigid and rigid rotor system.	**07**
Q.3	**(a)**	Define Solidity.	**03**
	(b)	Discuss various Airfoil section used for main rotors.	**04**
	(c)	Define mass flow rate and derive an equation of induced velocity for high climb conditions.	**07**
		OR	
Q.3	**(a)**	Define Parasite power and Total power.	**03**
	(b)	What is speed stability and angle of attack stability?	**04**
	(c)	Explain flight performance during a retreating blade stall. Also state the causes of retreating blade stall.	**07**
Q.4	**(a)**	List all the characteristics of an Airfoil for a rotor.	**03**
	(b)	What is Coriolis force, Drag force and Lift force?	**04**
	(c)	Write short notes on figure of merit and blade loading coefficients.	**07**
		OR	
Q.4	**(a)**	Difference between cyclic and collective pitch.	**03**
	(b)	What is tail rotor system and where is it mounted?	**04**
	(c)	How does the compressibility effect the helicopter?	**07**
Q.5	**(a)**	State the effects of wind and weight on performance of helicopter.	**03**
	(b)	State the effects of too far forward C.G in helicopter.	**04**
	(c)	Explain Anti torque system failure.	**07**
		OR	
Q.5	**(a)**	When the helicopter is said to be trimmed?	**03**
	(b)	Discuss climb power, induce power and parasitic power.	**04**
	(c)	Write the Weight and balance data needed to determine proper loading of a helicopter.	**07**

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