Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII • EXAMINATION – WINTER • 2014

Subject Code: 180102 Date: 29-11-2014

Subject Name: Helicopter Engineering

Time: 02:30 pm - 05:00 pm Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	State the technical differences between a helicopter and an airplane. Sketch necessary drawings.	**07**
	(b)	Explain Tandem and Co-axial rotor arrangements and the working principles behind the same.	**07**
Q.2	**(a)**	State the technical differences between a helicopter and an airplane. Sketch necessary drawings.	**07**
	(b)	Explain power loading and disk loading. Explain three significant differences in the design criteria for transport and fighter aircrafts.	**07**
		OR	
	(b)	Write a short note on: 1. Downwash and Induced angle of attack 2. Advance ratio and induced velocity	**07**
Q.3	**(a)**	Derive the equations using momentum theory for helicopter in hover.	**07**
	(b)	Derive the equations using blade element theory for helicopter in forward flight.	**07**
		OR	
Q.3	**(a)**	Derive the equations using blade element theory for helicopter in hover.	**07**
	(b)	Derive the equations using momentum theory for helicopter in forward flight.	**07**
Q.4	**(a)**	State the assumptions made for the momentum theory. Explain rate of change of momentum.	**07**
	(b)	Write a note on the flow conditions around the rotor in axial flight	**07**
		OR	
Q.4	**(a)**	Explain autorotation and ground effect.	**07**
	(b)	Draw the velocity profile for hover and forward flight.	**07**
Q.5	**(a)**	Describe conceptual design of a helicopter rotor.	**07**
	(b)	Explain the highlighting points of airfoils used for rotor blades.	**07**
		OR	
Q.5	**(a)**	Explain the reason of providing twist and taper in a blade.	**07**
	(b)	Write a short note on Coriolis force and types of rotor	**07**

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