Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2022

Subject Code:3160102 Date:01/06/2022

Subject Name:Fundamentals of Jet Propulsion

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)**	Explain the Jet cycle in brief.	**03**
	(b)	Draw and explain schematic of turbofan engine.	**04**
	(c)	Draw and explain h-s diagram of a ramjet engine.	**07**
Q.2	**(a)**	Enlist the Factors affecting the performance of turbofan engine.	**03**
	(b)	What is mixed and unmixed turbofan engine design?	**04**
	(c)	Write a note on turboshaft engine.	**07**
		OR	
	(c)	Explain Performance characteristics of turbojet engine with the change in cycle temperature ratio and compressor pressure ratio.	**07**
Q.3	**(a)**	Explain the working of pulse jet engine.	**03**
	(b)	Discuss critical, subcritical and supercritical operation of ramjet diffuser.	**04**
	(c)	Discuss effect of back pressure in convergent divergent nozzle.	**07**
		OR	
Q.3	**(a)**	Draw P-V and T-S diagram of Brayton cycle with intercooling.	**03**
	(b)	Explain the need of inlets in brief.	**04**
	(c)	Derive Mach area relation for flow through variable area ducts and explain it's importance in view of jet engine nozzle section.	**07**
Q.4	**(a)**	Explain the types of combustion chamber in brief.	**03**
	(b)	Explain lean mixture, rich mixture and their effect on performance of complete combustion.	**04**
	(c)	Explain the needs and requirements of an efficient jet engine combustor.	**07**
		OR	
Q.4	**(a)**	Why Low-Emission Combustors are preferred?	**03**
	(b)	Derive the expression for nozzle exit velocity and nozzle coefficient for convergent ducts.	**04**
	(c)	What is choking? Prove that critical pressure ratio for convergent duct is 0.528.	**07**
Q.5	**(a)**	Give the brief classification of Rocket engines.	**03**
	(b)	Write a note on liquid propellant rockets.	**04**
	(c)	Discuss solid propellant rockets and compare it with liquid propellant rockets.	**07**
		OR	
Q.5	**(a)**	Derive expressions for thermal efficiency, propulsive efficiency, TSFC and Specific impulse for turbojet engine.	**03**
	(b)	Discuss Energy Sources in Sustainable Aviation.	**04**
	(c)	Write a note on Promising Technologies in Propulsion and Power.	**07**

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