Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – WINTER 2023

Subject Code:3160102 Date:02-12-2023

Subject Name:Fundamentals of Jet Propulsion

Time:02:30 PM TO 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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Explain Working principle of gas turbine engine.	**03**
	(b)	Air Entre a turbojet engine at the rate of 40 kg/s with a velocity of 250 m/s relative to an aircraft which moving at 300 km/hr. Exhaust of the engine has a velocity of 700 m/s relative to the moving aircraft. Calculate the Thrust develop by engine.	**04**
	(c)	Differentiate between turbojet, turboprop & turbofan engine with diagram.	**07**
Q.2	**(a)**	Why turbine is required in a jet engine.	**03**
	(b)	Write a short note on performance of turbojet engine with the change in compressor pressure ratio.	**04**
	(c)	Derive Mach Area relation for variable duct and state its importance.	**07**
		OR	
	(c)	Derive Mach Area relation for nozzles.	**07**
Q.3	**(a)**	Listed the types of combustion chamber with sketch.	**03**
	(b)	Explain zones of combustion chamber with neat sketch.	**04**
	(c)	Write a note on factors affecting the performance of combustion chamber.	**07**
		OR	
Q.3	**(a)**	Write a short note on needs of combustion chamber.	**03**
	(b)	Explain combustion chamber pressure lose. How it can be minimized?	**04**
	(c)	Derive thrust equation with sketch.	**07**
Q.4	**(a)**	Discuss Supersonic Inlets.	**03**
	(b)	Differentiate between critical, subcritical and supercritical operations of ramjet diffuser	**04**
	(c)	Explain Solid propellant and liquid propellant rockets with figure.	**07**
		OR	
Q.4	**(a)**	Explain need for subsonic inlet.	**03**
	(b)	Explain need for subsonic and supersonic inlets.	**04**
	(c)	Explain inlets for ramjet engine.	**07**
Q.5	**(a)**	Draw h-s diagram representing nozzle operation and diffuser operation separately.	**03**
	(b)	Derive expression for specific thrust, specific impulse and specific fuel consumption.	**04**
	(c)	Write a short note on effect of back pressure for flow through C-D nozzle.	**07**
		OR	
Q.5	**(a)**	What do you mean by choking? When it occurs?	**03**
	(b)	Explain effect of back pressure on convergent nozzle.	**04**
	(c)	Explain the parameters affecting the performance of rocket.	**07**

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