Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI • EXAMINATION – SUMMER • 2014

Subject Code: 160102 **Date: 21-05-2014**

Subject Name: Fundamentals of Jet Propulsion

Time: 10:30 am - 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.**

Q.1	**(a)**	Draw and explain the h-S diagram for turbojet engine.	**07**
	(b)	Explain in brief turboprop engine and turbofan engine.	**07**
Q.2	**(a)**	Compare the reciprocating engines with the jet engines and give the basic working principle of the jet engines	**07**
	(b)	Derive the thrust equation for the propeller engines and the jet engines.	**07**
		OR	
	(b)	Explain the performance of turbojet engine with the variation in compressor pressure ratio and cycle temperature ratio.	**07**
Q.3	**(a)**	Write a short note on ramjet engine.	**07**
	(b)	Draw schematics of reheat cycle, regenerative cycle and the intercooled cycle.	**07**
		OR	
Q.3	**(a)**	A gas turbine operating at a pressure ratio of 11.3137 produces zero not work output when 476.354KJ of heat is added per kg of air mass. If the inlet air total temperature is 300K and the turbine efficiency is 71%. Find the compressor efficiency and the temperature ratio.	**07**
	(b)	A closed cycle regenerative gas turbine operating with air as the working medium. Assume pressure and temperature at entry is 1.4bar and 310K. Pressure ratio of compression is 5, maximum cycle temperature is 1050K, effectiveness of the regenerator is 100%, and net output is 3000KW. Calculate thermal efficiency and the mass flow rate of air per minute.	**07**
Q.4	**(a)**	Write a short note on thrust augmentation methods.	**07**
	(b)	The effective jet exit velocity from a jet engine is 2700m/s. the forward flight velocity is 1350m/s and the air flow rate is 78Kg/s. calculate thrust, thrust power, thermal efficiency, propulsive efficiency and the overall efficiency.	**07**
		OR	
Q.4	**(a)**	List the basic requirements of the combustion chamber.	**07**
Q.4	**(b)**	Explain with neat sketch, the different zones of combustion chamber.	**07**
Q.5	**(a)**	Write a short note on the thrust reversing and thrust vectoring.	**07**
	(b)	Explain the effect of back pressure in convergent-divergent nozzle.	**07**
		OR	
Q.5	**(a)**	Write a short note on liquid propellant engines.	**07**
	(b)	Write a short note on turbo pump feed system for the rocket engine.	**07**

****