

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 6 – EXAMINATION – SUMMER 2026

Subject Code: 3160102

Date: 08/06/2026

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.**

- Q.1** (a) Define air-breathing and non-air-breathing propulsion systems with examples. **03**
(b) Define thermal efficiency and propulsive efficiency. what is their importance? **04**
(c) Draw and explain h-s diagram for turbojet engine. **07**
- Q.2** (a) List the different types of combustion chambers used in gas turbine engines. **03**
(b) Derive the thrust equation for a turbojet engine. **04**
(c) Derive an expression for nozzle mass flow rate and explain choking condition. **07**
- OR
- Q.2** (c) Compare the performance of turbojet, turbofan, and turboprop engines. **07**
- Q.3** (a) State the advantages and disadvantages of ramjet engines. **03**
(b) Enlist the Factors affecting the performance of jet engine. **04**
(c) Explain the design and working of a liquid propellant rocket engine with neat sketch. **07**
- OR
- Q.3** (a) Define TSFC and specific impulse. **03**
(b) Discuss various types of nozzles used in aircraft propulsion systems. **04**
(c) Discuss effect of back pressure in convergent divergent nozzle. **07**
- Q.4** (a) Explain lean mixture, rich mixture and their effect on performance of complete combustion. **03**
(b) Draw the schematic diagram of an ideal ramjet and explain its working. **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**
- OR
- Q.4** (a) Discuss critical, subcritical, and supercritical operation of ramjet diffuser. **03**
(b) Explain the zones of combustion chamber and the function of each zone. **04**
(c) Explain the needs and requirements of an efficient jet engine combustor. **07**
- Q.5** (a) Classify the rocket engines. **03**
(b) Explain the operation of an afterburner and its effect on thrust and TSFC. **04**
(c) Write a note on liquid propellant rocket engine. **07**

OR

Q.5	(a) Write a brief on water injection method of thrust augmentation.	03
	(b) Draw and explain schematic of turbofan engine.	04
	(c) Write a note on propellant feed systems.	07
