

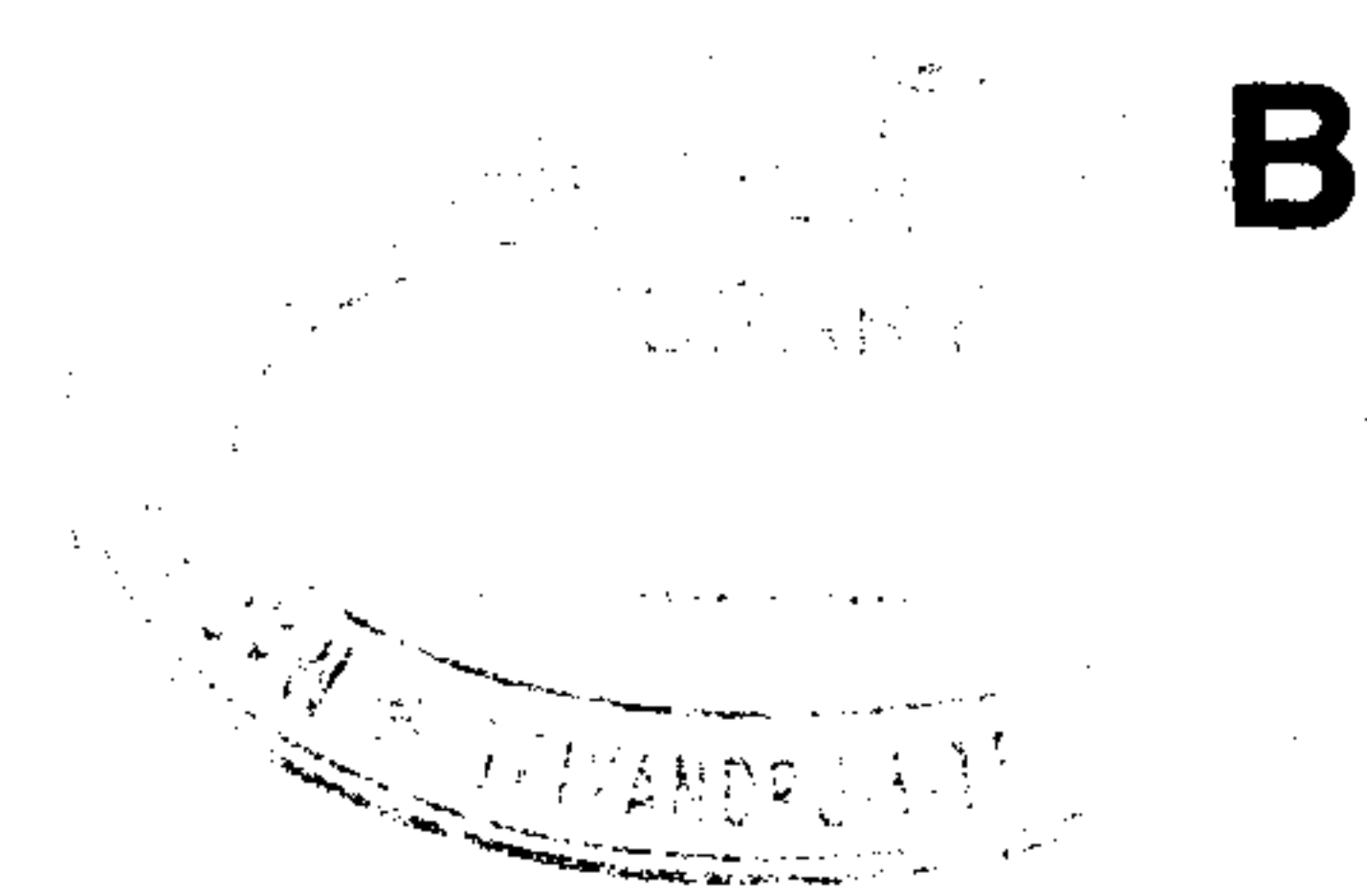


(Pages : 3)

B – 2584

Reg. No. :

Name :



**Eighth Semester B.Tech. Degree Examination, December 2016
(2008 Scheme)
08.806.1 : PROPULSION ENGINEERING (MPU)**

Time : 3 Hours

Max. Marks : 100

- Instructions :** 1) Answer **all** questions from Part – **A** and **one full** question from **each** module in Part – **B**.
2) Include figures **wherever** necessary.
3) **Gas tables** and **atmospheric tables** allowed in examination hall.

PART – A

1. Distinguish between air breathing and non air breathing engines.
2. Explain the working of a turboprop engine.
3. List few advantages and disadvantages of pulse-jet engine.
4. How do you obtain overall efficiency of a Turbojet engine ?
5. Explain turbine – compressor matching.
6. Explain working of a nuclear rocket.
7. Explain combustion instability in solid motors.
8. Write short notes on different types of injectors used in liquid engines.
9. Explain Pyrogen igniter.
10. Derive an expression for velocity of rocket vehicle at the end of powered flight. **(10×4=40 Marks)**

P.T.O.



PART – B

Module – I

11. Make a thermodynamic analysis of Jet propulsion cycle and get expressions for the different component efficiencies represent the cycle in T-s diagram. **20**

OR

12. The following data apply to a turbojet aircraft flying at an altitude of 6.1 km where the ambient conditions are 0.458 bar and 248 K,

Speed of aircraft ; 805 km/hr

Pressure ratio of compressor : 4 : 1

Combustion chamber pressure loss : 0.21 bar

Turbine inlet temperature : 1100 K

Intake duct efficiency : 95%

Isentropic efficiency of compressor : 0.85

Isentropic efficiency of turbine : 0.90

Mechanical efficiency of transmission : 99%

Nozzle efficiency : 95%

Nozzle outlet area : 0.0935 m²

LCV of fuel : 43MJ/kg

Find the thrust and specific fuel consumption. Assume convergent nozzle,

Take $\gamma_a = 1.4$; $\gamma_g = 1.33$ $C_{p_a} = 1.005$ KJ/kg K ; $C_{p_g} = 1.147$ KJ/kg K. **20**

Module – II

13. a) Explain any two methods employed for augmenting thrust in turbojet engines. **12**
b) Explain working of ion rocket. **8**

OR

14. a) Explain surging and stalling phenomena in axial compressors. **12**
b) Explain the general operating principle of chemical rockets making reference to all of its kind. **8**



Module – III

15. a) Explain the properties of few fuels and oxidizers used in liquid propulsion systems. **10**
- b) With the help of neat sketch, explain a pump fed liquid propulsion system. **10**

OR

16. a) Explain rocket test facilities and safe guards. What are the measurement systems used in Rocket test facility ? **10**
- b) Determine the maximum velocity of a rocket and the altitude attained from the following data :
- Mass ratio : 0.15
- Burn out time : 75s
- Effective jet velocity : 2500 m/s
- What are the values of velocity and altitude losses due to gravity ? Ignore drag and assume vertical trajectory. **10**

