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Reg. No. : .....

Name : .....

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

Time : 3 Hours Max. Marks : 100

***Instruction** : Answer **all** questions from Part **A** and **one full** question from **each** Module in Part **B**.*

PART – A

1. Explain the classification of propulsion devices.
2. What is turboshaft engine ? Where is it used ?
3. Define propulsive efficiency and obtain an expression for it in the case of a turbojet engine.
4. With the help of sketches differentiate between air intakes of a subsonic air plane and a supersonic air plane.
5. What are the performance requirements of turbojet engine combustors ?
6. Define specific impulse, thrust coefficient, characteristic velocity and mass ratio as applied to chemical rockets.
7. Give the working principle of the three types of electrical rockets.
8. Sketch three grain configurations which will produce neutral, progressive and regressive burning.
9. Explain any one method of cooling LPR thrust chamber.
10. List the types of tests performed in rocket testing. **(10×4=40 Marks)**

PART – B

Module – I

11. a) With neat sketch explain the working of a turbofan engine. **10**

    b) A turbojet engine flying at a speed of 1050 kmph has an exit jet velocity of 490 m/s and consumes air at the rate of 31.3 kg/s. Calculate thrust, thrust power, propulsive power and propulsive efficiency. **10**

OR

12. A turbojet engine is travelling at 850 kmph at standard sea level conditions. The ram efficiency is 85%, the compression ratio is 4 : 1, the compressor efficiency is 80%, the burner pressure coefficient is 2%, the F/A ratio is 0.0122, the turbine inlet temperature is 700° C. The turbine efficiency is 84% and jet efficiency is 95%. Calculate specific net thrust and the thrust specific fuel consumption. Assume

    C_{Pa} = 1kJ/Kg K γ_a = 1.4, C_{Pg} = 1.155 kJ/Kg K, γ_g = 1.33. **20**

P.T.O.

Module – II

13. a) Discuss about the compressors used in turbojet engines. **10**
    b) Explain turbine-compressor matching in turbojet engines. **10**

OR

14. a) What is meant by thrust augmentation ? Describe the different methods of thrust augmentation in turbojet engines. **10**
    b) Explain the constructional features of exhaust nozzle of a turbojet engine. **10**

Module – III

15. a) With neat sketch explain the working of a pressure fed LPR. **10**
    b) What are the desirable properties of liquid propellants ? What are the precautions in liquid propellant handling ? **10**

OR

16. a) What is meant by combustion instability in rocket motors ? How can the instabilities be controlled ? **10**
    b) Derive the expressions for the burnout velocity and burnout altitude for a dragless projectile following a simplified vertical trajectory. **10**
