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Reg. No. : .....

Name : .....

Eighth Semester B.Tech. Degree Examination, April 2015
(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. Give the general classification of propulsive devices.
2. Explain the working of turbofan engine.
3. List few advantages and disadvantages of Ramjet engine.
4. What are the different types of efficiencies related with turboengines ?
5. Explain surging phenomena in compressors.
6. Explain working of a solar rocket.
7. What do you mean by grain configuration ? List and sketch the commonly used solid grains.
8. List few of commonly used liquid propellants and explain their properties.
9. Explain pyrotechnic igniter.
10. Write short notes on :
    a) Escape velocity
    b) Characteristic velocity. **(10×4 = 40 Marks)**

P.T.O.

PART – B

Module – I

11. a) Give the reason why propeller engines are not in common use in present day aircraft engines. 5

b) A turbojet engine develops a thrust of 7 kN when flying at a speed of 900 km/hr at an attitude where pressure and temperature are 19.4 kPa and 216.7 K respectively. The fuel used has a heating value of 48000 kJ/kg of fuel. The overall efficiency and propulsive efficiency of the engine are 0.16 and 0.5 respectively. Calculate the air fuel ratio, propulsive power and thermal efficiency. Given diameter of inlet section 0.65 m and neglect pressure thrust. 15

OR

12. a) List advantages and disadvantages of Turbo fan engines. 12

b) What is a Scramjet engine ? In what way it is different from Ramjet engine ? 8

Module – II

13. a) Explain the different types of combustion chambers used in Turbojet engines. Compare them. 12

b) What are the different inlet and exhaust ducts used in turboengines. 8

OR

14. a) What are the advantages of axial compressors over centrifugal compressors in turbojet applications ? Explain a turnspool axial compressor. 12

b) Explain plasma propulsion. 8

Module – III

15. a) Derive an expression for propulsive efficiency of a rocket engine. 6

b) Prove that $J_{sp} = \frac{C_F}{C_m}$ and $V^* = \frac{J_{sp}}{C_F}$. 6

c) A rocket flies at 10,080 km/hr with an effective exhaust jet velocity of 1400 m/s and propellant flow rate of 5 kg/s. If the heat of reaction of propellants is 6500 kJ/kg, determine $\eta_p, \eta_{th}, \eta_{overall}$ and propulsive power. 8

OR

16. Write short notes on the following :

i) Hybrid Rocket

ii) Turbo pump fed rocket engine cycles

iii) Cooling of thrust chambers

iv) Combustion instabilities in LPR engines and their control. **(5×4 = 20 Marks)**