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Question Paper Code : 40058

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Fifth Semester

Aeronautical Engineering

AE 8504 – PROPULSION – II

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Differentiate subcritical and supercritical operation of a supersonic inlet.
2. State the problems associated with Supersonic combustion.
3. Define Internal Ballistics.
4. Define the concept of nozzle-less propulsion.
5. What are the selection criteria of solid propellants?
6. Define combustion instability in solid rockets.
7. What are the advantages of liquid propellant system over solid propellant system?
8. Write down three fuel-oxidizer combination for hybrid propellant rockets.
9. Define solar sail.
10. What are the advantages of ion jet propulsion system?

PART B — (5 × 13 = 65 marks)

11. (a) With neat sketch briefly explain the operating principle, and combustion process involved in Ramjet engine. (13)

Or

- (b) Write short notes on :
- (i) The different types of combustors in scram jet engine (7)
 - (ii) Salient features and applications of Scramjet engine. (6)

12. (a) Write short notes on :
- (i) Air Augmented Rockets (7)
 - (ii) Pulse Rocket Motors (6)

Or

- (b) Explain the following in detail :
- (i) Static testing of Rocket engines (7)
 - (ii) Safety considerations that should be followed during rocket testing. (6)

13. (a) With neat sketch describe the working principle of solid propellant rocket engine and explain the erosive burning in solid propellant rockets. (13)

Or

- (b) Write short notes on :
- (i) Propellant grain design Considerations (7)
 - (ii) Applications and advantages of solid propellant rockets. (6)

14. (a) Explain the salient features and working of liquid propellant rockets with a neat sketch and describe the selection criteria of liquid propellants. (13)

Or

- (b) Write short notes on :
- (i) Combustion instability in liquid propellant rockets (5)
 - (ii) Combustion mechanism in Hybrid propellant rockets (8)

15. (a) Explain the following :
- (i) Types of Electric propulsion techniques. (7)
 - (ii) Nuclear rocket propulsion. (6)

Or

- (b) Write short notes on :
- (i) Performance of Ionic propulsion over chemical rocket propulsion. (7)
 - (ii) Future applications of electric propulsion systems. (6)

PART C — (1 × 15 = 15 marks)

16. (a) Describe the current advanced developments in propulsion systems of rocket engines worldwide. (15)

Or

- (b) Explain the working principle of Cryogenic rocket engines and list out the peculiar problems associated with it. (15)