

40526



12. a) i) Compute the ideal rocket thrust coefficient for a rocket operating at 50 km altitude. It has a nozzle area ratio of 50, specific heat ratio of 1.28 and operates at a chamber pressure of 40 atm. (7)
- ii) Derive an expression for thrust of a rocket motor with a convergent-divergent nozzle, having a finite angle of divergence. (6)
- (OR)
- b) i) Briefly discuss the uniqueness of rocket propulsion. How would you classify chemical rockets? Also compare their performance and application areas. (6)
- ii) How is the chemical energy of the propellants utilized for propulsive power of a rocket vehicle? How would you define propulsive efficiency, thermal efficiency and overall efficiency? Briefly discuss. (7)
13. a) i) What are the important factors that influence the burning rate of a solid propellant? Explain them with appropriate sketches. (7)
- ii) How do you classify solid propellant rockets? Name any four solid propellant ingredients function with two examples for each function. (6)
- (OR)
- b) Explain in detail about the operating principles of strand burner and T burner.
14. a) What are the peculiar problems associated with operation of cryogenic engines? Explain. (6)
- (OR)
- b) Explain about main combustion instabilities in liquid propellant rocket engines.
15. a) Explain with neat diagram the working principle of nuclear propulsion. And also write the advantages and disadvantages. (6)
- (OR)
- b) Explain with neat diagram electro thermal thrusters. (6)

PART - C

(1×15=15 Marks)

16. a) i) Liquid propellants are burned in a rocket motor at 20.26 bar chamber pressure. The molecular weight of the combustion gases is 26, and combustion chamber temperature of 2222 K. If $\gamma = 1.25$ and $C_d = 0.95$, what throat diameter is required to give a flow of 2.27 kg/sec? (8)
- ii) Explain why burning index of a solid propellant should be less than unity. (7)
- (OR)
- b) i) Distinguish between hypergolic and non-hypergolic bipropellant systems of a liquid rocket engines. Give three examples. (8)
- ii) What are the testing procedures for rocket engines? (7)