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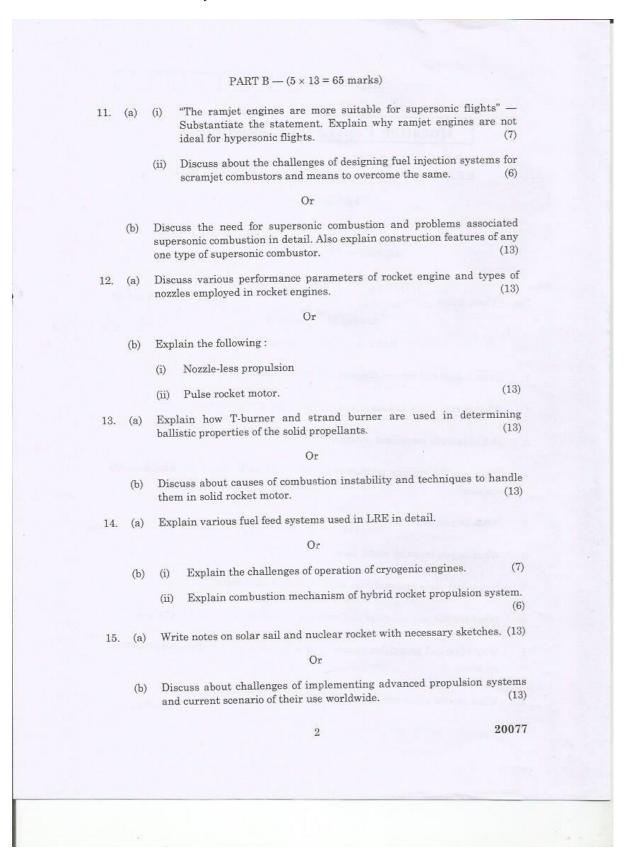
B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.  Fifth Semester  Aeronautical Engineering  AE 8504 — PROPULSION — II  (Regulations 2017)  Time: Three hours  Maximum: 100 marks  Answer ALL questions.  PART A — (10 × 2 = 20 marks)  1. Draw a neat and labeled diagram of ramjet engine.  2. What is ram effect and state how it is achieved in supersonic vehicles?  3. Define specific propellant consumption.  4. What are the various ignition methods employed in liquid propellant rocket engines?  5. What do you understand from term erosive burning?  6. What do you mean by motor case?  7. Name four fuels and oxidizers used in liquid rocket engines.  8. What are the technological challenges in operating hybrid rocket engines?  9. Why advanced propulsion systems are being tried beyond chemical propulsion systems?  10. What are-the challenges in electric rocket propulsion systems?		Reg. No.:
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## PART C — $(1 \times 15 = 15 \text{ marks})$

16. (a) A ramjet engine is to fly at a Mach number of 4 in an atmosphere where temperature is 223 K. At entrance to the burner, the Mach number of the flow is 0.3. Combustion in the burner (whose cross-sectional area is constant) may be represented approximately as heating of a perfect gas with constant specific heat ratio. At the exit from the burner, the temperature of the gas is 2462 K. Neglecting frictional effects in the burner and considering the flow to be one-dimensional throughout, estimate the Mach number of the gas leaving the burner. Determine also the stagnation pressure loss due to heating.

On

(b) Using a propellant of molecular weight 15 and flame temperature 3300K, determine the rocket throat and exhaust areas required for a thrust of 500 kN and an ideal specific impulse of 300 s. Take the ambient pressure as 0.1 MPa and the specific heat ratio of the propellant as 1.4. How much thrust would this rocket develop if the ambient pressure were changed to 0.03 MPa? How much thrust would be developed by a rocket designed to expand to 0.03 MPa, if it had the same stagnation conditions, throat area and propellant? (15)

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