



MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS INSTITUTION-UGC, GOVT. OF INDIA)



Department of AERONAUTICAL ENGINEERING



AIR BREATHING PROPULSION QUESTION BANK

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Code No: R20A2111

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**(Autonomous Institution – UGC, Govt. of India)****III B.Tech I Semester Regular/Supplementary Examinations, January 2024****Air Breathing Propulsion****(AE)**

Roll No									
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Time: 3 hours**Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing **ONE** Question from each SECTION and each Question carries 14 marks.

*********SECTION-I**

- 1 significance of different engine stations in the performance analysis of an aircraft engine.

OR

- 2 T-s plots for a turbo-jet and turbo-prop engines. Explain the functioning and thermodynamics of a turbojet engine and plot the variation of pressure, temperature and velocity in as best manner as you can.

SECTION-II

- 3 s types of exhaust nozzles for a turbojet engine. What are their advantages and disadvantages?

OR

- 4 hree most commonly used types of thrust reversers which are used in jet-powered passenger aircrafts. with illustrations.

SECTION-III

- 5 onsiderations that affect the selection of blade profiles in various categories of turbines.

OR

- 6 Analyse a performance map of an axial compressor and interpret the information provided, including surge lines, choke points, and efficiency contours.

SECTION-IV

- 7 With a neat sketch, explain the combustion chamber geometry and bring out the various zones that play a part in the process of combustion.

OR

- 8 Enumerate and discuss briefly the effect of four operating variables on burner performance.

SECTION-V

- 9 ynamic and transient responses involved in matching an engine to an aircraft. How do these responses impact the overall performance and safety of the system?

OR

- 10 teps involved in sizing an aircraft engine for a specific application. What factors are critical in determining the appropriate size for an engine?

Code No: R20A2115

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY**(Autonomous Institution – UGC, Govt. of India)****IV B.Tech I Semester Regular Examinations, October/November 2023****Space Propulsion****(ANE)**

Roll No										
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Time: 3 hours**Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing **ONE** Question from each SECTION and each Question carries 14 marks.

SECTION-I

- 1 Explain the working principle of ramjet with a neat schematic diagram. [7M]
Explain in detail the need for supersonic combustion technology. [7M]

OR

- 2 Describe the flow process involved in Supersonic Inlets [7M]
Explain principle, construction, operation of turbo-ramjet [7M]

SECTION-II

- 3 Describe the working of a typical liquid propellant rocket engine with Schematic diagram [7M]
Compare the solid propulsion systems with liquid propulsion systems and mention their comparative advantages. [7M]

OR

- 4 A What are the characteristics of liquid propellants and list all the types of liquid propellants. [7M]
B Explain the various thrust vector control methods involved in Solid Rocket Motor. [7M]

SECTION-III

- 5 Describe various consideration in determining Dimensions of Nuclear Reactor and Leakage of Neutrons [14M]

OR

- 6 A Describe the propellant flow and cooling systems used in Nuclear reactor [7M]
B Describe the start-up and shutdown sequences used in Nuclear engine [7M]

SECTION-IV

- 7 A Describe the working of Electro static thrusters and Electro thermal propulsion devices. [7M]
B Explain the working of a Arc-jet Thruster with a neat diagram [7M]

OR

- 8 A Write the working principle of MEMS micro propulsion [7M]
B Describe the working of Solar and Magnetic Sails [7M]

SECTION-V

- 9 A Mention the Role of space launch vehicles and various functions of military space launch vehicle [7M]
B Describe the various space mission profiles [7M]

OR

- 10 A Describe the various concepts involved in SSTD [7M]
B Describe the effect of Propellant slosh and Propellant hammer on Rocket performance [7M]

Code No: **R18A2109****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY****(Autonomous Institution – UGC, Govt. of India)****II B.Tech II Semester Supplementary Examinations, January 2024****Air Breathing propulsion****(AE)**

Roll No									
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Time: 3 hours**Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing **ONE** Question from each SECTION and each Question carries 14 marks.

SECTION-I

- 1 a) Justify the need for thrust augmentation and list out its advantages of it. [7M]
- b) Compare reciprocating and jet engines. [7M]

OR

- 2 a) Identify all the factors which are affecting the thrust of a jet engine. [7M]
- b) The effective jet velocity from a jet engine is 3500 m/s. The forward flight velocity is 1250 m/s and the airflow rate is 78.6 kg/s. Calculate the thrust and propulsive efficiency of a jet engine. [7M]

SECTION-II

- 3 a) Identify and discuss the problems in inlets at high-speed flows. [7M]
- b) Derive the non-ideal equations for various nozzles. [7M]

OR

- 4 a) Describe thrust reversers and vectoring mechanisms. [7M]
- b) A diffuser on a Mach 2 aircraft operates with a standing normal shock outside of the inlet at STP. If the internal diffuser recovery factor is 0.90, what are the diffuser exit total pressure and the total pressure recovery from the freestream to the diffuser exit? [7M]

SECTION-III

- 5 a) Summarize the concepts of the pre-whirl, stall and surge of a centrifugal compressor. [7M]
- b) Compare centrifugal and axial flow compressors. [7M]

OR

- 6 a) Describe the process of estimating turbine stage performance. [7M]
- b) Discuss various turbine blade cooling methods. [7M]

SECTION-IV

- 7 a) Discuss the overall total pressure loss of the burner. [7M]
- b) Explain the combustion mechanism in a combustion chamber with a neat sketch. [7M]

OR

- 8 a) Enumerate performance parameters and combustion efficiency of burners. [7M]
- b) Determine the characteristic ignition time t_c , the blow-off velocity V_{1c} , and the flame holder stability for the following data: $T = 800$ K, $M_1 = 0.5$, $\gamma = 1.33$, $\phi = 1.4$, $H = 254$ mm., $B = 0.3$, a 15-deg half-angle flame holder, and pressures P of 0.4 and 0.1 atm. [7M]

SECTION-V

- 9 a) Illustrate the use of matching and cycle analysis in the second stage of design. [7M]
- b) Summarize the matching procedure for a free power turbine. [7M]

OR

- 10 a) Elaborate on factors involved in engine selection. [7M]
- b) Give the importance of the aircraft mission analysis. [7M]
