INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)

B.Tech IV Semester End Examinations (Regular), November – 2020

Regulation: IARE–R18

AERPSPACE PROPUSLION

Time: 2 Hours | **(AE)** | **Max Marks: 70**

Answer any Four Questions from Part A
Answer any Five Questions from Part B

PART – A

1. Explain the evolution of engines with some examples   [5M]

2. What is the importance of combustor and explain the various types of combustors.   [5M]

3. List out the major design variables for the inlet and nacelle and what is the importance of them.   [5M]

4. Enumerate the main differences between centrifugal compressor and axial flow compressor.   [5M]

5. Write short notes on i) Compressor stall ii) Surge   [5M]

6. Compare between turboprop, turbofan, and turbojet engines.   [5M]

7. Write short notes on inlet stalling and their effect on engine performance.   [5M]

8. Will there be any wave formation in correctly expanded nozzle. Justify your answer. [5M]

PART – B

9. What is the importance of thrust force which is driving the aircraft forward. Obtain the thrust equation for ideal turbojet engine.   [10M]

10. Explain the Ramjet engine with help of neat diagram and enumerate advantage, disadvantages and applications.

[10M]

11. Explain the design considerations of subsonic inlet at different flight Mach numbers (top) with auxiliary blow-in door (bottom) with help of neat sketches.   [10M]

12. An inlet of about 48 ft^2 (a little larger tha the inlet on one of the C5A's engines) is designed to have an inlet Mach number of 0.8 at sea level. Determine the variation of the additive drag with flight Mach number from Mo = 0 to 0.9. Assume that M_1 remains constant at 0.8.   [10M]

13. Writ short notes with diagrams: i) Cone ii) Bell iii) Annular convergent divergent nozzle   [10M]

14. Explain about various methods used for thrust augmentation techniques with a labeled diagram for each method.

[10M]

15. With help of neat diagrams explain the principle of operation of centrifugal compressor and axial flow compressor.

[10M]

16. Explain about thrust reversing and thrust vectoring process with help of neat representation and write some advantages.   [10M]

17. Describe and bring out the differences between axial flow turbine and reaction turbine.   [10M]

18. Consider the calculation based on one-dimensional flow. Given: Mass flow rate = 200 lbm/s, $Pt^8 = 30$ psia Tt^8 = 2000°R , A^9/A^8=2.0, gaama= 1.33 R=53.34ft.lbf/(lbm.°R), Pt^9/ Pt^8=0.98, C_D=0.98, P^0=5psia. Find the dimensions of an axisymmetric nozzle and the vaues of Cfg, Fg, and Cv.   [10M]

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