INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)

B.Tech VI Semester End Examinations (Regular), November– 2020
Regulation: IARE–R16
AEROSPACE PROPULSION AND COMBUSTION

Time: 2 Hours   **(ME)**   **Max Marks: 70**

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

PART – A

1. Indentify all the factors which are affecting thrust of jet engine? **[5M]**

2. Predict and explain the propeller performance parameters in detail **[5M]**

3. Differentiate between subcritical and supercritical modes of inlet operation. **[5M]**

4. Explain in detail about factors affecting combustion chamber performance. **[5M]**

5. Determie the Rankine-Hugoniot relations. **[5M]**

6. Write short notes on i) Flame tube cooling ii) Fuel injection **[5M]**

7. Find the expression for multicomponent diffusion and momentum. **[5M]**

8. Explain the turbulent premixed flame propagation with equation. **[5M]**

PART – B

9. Examine the criteria for improving thrust of an aircraft? And also write thrust equations with respect to mass flow and pressures? **[10M]**

10. Estimate the efficiency of a gas turbine operates on a pressure ratio of 6. The inlet air temperature to the compressor is 300K and the air entering the turbine is at a temperature of 577^oC. If the volume rate of air entering the compressor is $240m^3$/s. Assume that the cycle operates under ideal conditions. **[10M]**

11. Compute the diameter of the flow field in the far wake of a propeller of diameter 3.05 m, which produces a propulsive thrust of 8.9 kN of thrust while flying at a speed of 322 km/hr. **[10M]**

12. Explain ducted propellers along its advantages and applications **[10M]**

13. Describe briefly the factors affecting the combustion chamber design. **[10M]**

14. Illustrate the factors which are considered while designing i) subsonic inlets ii)supersonic inlets **[10M]**

15. Explain briefly about Steady state approximation method in global kinetic reaction. **[10M]**

16. With the help of neat diagram, explain the concept of combustion stability. **[10M]**

17. Briefly explain about Large Eddy simulation technique. **[10M]**

18. Explain the laminar premixed flame propagation with equations. **[10M]**

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