Hall Ticket No | | | | | | | | | | | Question Paper Code: AAE007

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech V Semester End Examinations (Regular) - November, 2018

Regulation: IARE – R16

AIRCRAFT PROPULSION

Time: 3 Hours **(AE)** **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Describe the working principle of gas turbine engine with the help of neat diagram **[7M]**

   (b) A closed cycle regenerative gas turbine is operating with air as the working medium. Assume the following data: P_1=1.4 bar, T_1=310 K, P_2/P_1=5, T_{max} =1050 K, Effectiveness of regenerator is 100%, net output = 3000 kW. Assuming the compression and expansion to be isentropic, Calculate Thermal Efficiency and Mass flow rate of air. **[7M]**

2. (a) Derive thrust equation for ideal turbojet engine. **[7M]**

   (b) Illustrate RAMJET engine and explain the operation principle along with its operating cycle. **[7M]**

UNIT – II

3. (a) What are the important factors that affect the combustion chamber design? **[7M]**

   (b) Briefly classify the combustion chambers of gas turbine engines with neat sketches. **[7M]**

4. (a) a) What are different types of air intakes for subsonic airplanes powered by turbo jets? Illustrate each of these categories with sketches and aerodynamic characteristics. **[7M]**

   (b) Write short notes on need for flame stabilization and various techniques adopted in combustion chamber. **[7M]**

UNIT – III

5. (a) Write short notes on thrust vectoring and different techniques used to achieve thrust vectoring. **[7M]**

   (b) Explain in detail about variable aera nozzle and different techniques adopted to achieve it. **[7M]**

6. (a) Explain theory of flow through convergent divergent nozzle and factors effecting their performance. **[7M]**

   (b) Write short notes on operating conditions of convergent divergent nozzle with a neat sketch. **[7M]**

UNIT – IV

7. (a) Construct a centrifugal compressor and explain principle of operation with neat diagrams? **[7M]**

   (b) What are the advantages of the axial flow compressor over the centrifugal flow compressor? **[7M]**

8. (a) What are different types of flow losses in the compressor? Explain in detail? **[7M]**

   (b) Define degree of reaction. Explain the conditions of dor = 0.5, dor = 1 and dor = 0 and Justify for dor= 0.5, blades are symmetrical. **[7M]**

UNIT – V

9. (a) Illustrate and explain the concept of integral ram rocket and its advantages. **[7M]**

   (b) Write a brief note on operating principle of axial flow turbine with a neat sketch. **[7M]**

10. (a) What do u understand by blade and stage efficiency. Derive the expression for blade efficiency? **[7M]**

    (b) Write short notes on work done and pressure rise by axial flow turbine and derive the equations? **[7M]**