

Code No:R164121D

R16

Set No. 1

IV B.Tech I Semester Regular Examinations, October/November - 2019

ELEMENTS OF COMBUSTION

(Aeronautical Engineering)

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any FOUR questions from Part-B

PART-A(14 Marks)

1. a) What do you understand by first order reaction? [2]
- b) What is a heat engine? Classify a heat engine? [2]
- c) Name the various types of combustion chamber. [2]
- d) What do you understand by propellant burning rate? Write the simplest equation. [3]
- e) Define detonation? How is it different from deflagration? [3]
- f) What do you understand by the term "Air Pollution"? [2]

PART-B(4x14 = 56 Marks)

2. a) The reactant concentration in a first-order reaction was 7.30×10^{-2} M after 45.0 s and 8.70×10^{-3} M after 65.0 s. What is the rate constant for this reaction? [7]
- b) Illustrate with a neat diagram the Rankine-Hugoniot curve and explain its salient features. [7]
3. a) What are the methods to avoid detonation? Explain any one. [7]
- b) Classify the fuels used for combustion in aircraft piston engines. [7]
4. a) Define combustion efficiency. Derive an equation for the combustion efficiency of a turbofan engine. [7]
- b) Elaborate on the differentiate types of combustion chamber and explain its salient features. [7]
5. a) What do you understand by double base propellants? What is the difference between extruded and cast double-base propellant? [7]
- b) Explain any one combustion model in detail. [7]
6. a) Write short notes on:
(i) Pressure loss (ii) Combustion efficiency (iii) Combustion instability [7]
- b) Write short note on starting problem in supersonic inlets. Are the problems predominant in any other forms of inlet? [7]
7. a) What are the causes of exhaust emissions? Elaborate. [7]
- b) Is soot a necessary evil or unwanted product? Justify. [7]

