

CBCS Scheme

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15AE62

Sixth Semester B.E. Degree Examination, June/July 2018

Gas Turbine Technology

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. With the help of the energy distribution diagram, explain the performance characteristics of a Turbo prop engine. List its advantages and disadvantages. (10 Marks)
- b. Illustrate and describe the comparison of operating parameters of Turbojet, Turboprop and Turbofan engines. (06 Marks)

OR

- 2 a. List the three basic types of burner systems and explain with its advantages and disadvantages. (08 Marks)
- b. Write short notes with relevant sketches on :
i) Thrust Reversers ii) Methods of Thrust augmentation. (08 Marks)

Module-2

- 3 a. Illustrate the different manufacturing techniques used for engine parts. (08 Marks)
- b. Write in detail about the heat ranges of metals for aero – engine application. (08 Marks)

OR

- 4 a. Describe FADEC interface with aero – engine, with suitable sketches. (08 Marks)
- b. Write short notes on :
i) Typical oil system of a Gas turbine engine.
ii) Starting systems of a aero – engine. (08 Marks)

Module-3

- 5 a. Explain Transient performance of a Aero gas turbine engine with relevant sketches. (08 Marks)
- b. Define Windmilling and describe the process of windmilling in a turbojet engine. (08 Marks)

OR

- 6 a. Write short notes on : (10 Marks)
i) Thrust engine start envelope.
ii) Engine performance parameters with related equations.
- b. Calculate surge for the following data :
New production engine to engine working line variation = $0 \pm 1.5\%$.
Engine to engine surge line variation for production engines = $0 \pm 4.0\%$.
In service working line deterioration = 2.0% .
In service surge – line deterioration = 4.0% .
Control system fuel metering VIG v position etc = $0 \pm 1.0\%$.
Reynold number effect = 1.0% .
Intake distortion = 1.0% .
Transient allowance = 12.0% . (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-4

- 7 a. Discuss the three off – design performance characteristics of compression used in gas turbine engine. (08 Marks)
- b. Explain the various tests to which a jet engine combustor will be subjected to during its performance evolution. (08 Marks)

OR

- 8 a. Explain the Turbine testing and its performance evolution. (08 Marks)
- b. Write short notes on :
- i) Ram pressure recovery of inlets and propelling nozzles.
- ii) Testing and performance evolution of ducts. (08 Marks)

Module-5

- 9 a. List the proof of concepts used in the process of engine testing. Explain preliminary flight rating test in detail. (08 Marks)
- b. Explain : i) Estimating engine operating limits. (08 Marks)
- ii) Methods of displacing equilibrium tests. (08 Marks)

OR

- 10 a. Briefly explain the instruments used in Test cell for measurement of various parameters. (08 Marks)
- b. Explain with relevant sketches :
- i) Mass and CUSUM plots.
- ii) Uncertainty in measurements and its analysis. (08 Marks)
